Digital Library Environment: Implications on E-learning

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Abstract

The paper discusses about the digital library initiatives in context of digital learning environment as both the environments are coming closer as the demand of time. It also highlights the significance of learning objects in e-learning environment along with the brief introduction of some major learning objects repositories of various disciplines. The paper outlines some functional requirements of learning objects.
1. Introduction

Digital information forms an increasingly large part of our cultural and intellectual heritage and offers significant benefits to users. Massive investment is being made in the creation and purchase of digital content and information. Printed collection is converted into digital form rather than in microform. Digital technology enhances access and functionality. Institutions typically select treasures for digitization not because they are in high demand, rather, by digitizing they seek to make their valuables better known and more widely accessible. The relevant considerations when selecting materials for digitization thus are not primarily about preserving the original, but for its easy access. In the digital world, preservation is the action and access is the thing – the act of preserving access to high quality, high value, well-protected, and fully integrated version of an original document.

2. Relevance of Digital Information

Due to significant advances in computer and communication technologies digital information has become the buzzword today.

- The purpose of digitization is to ensure protection of information enduring value for access by present and future generations (5)
- Through digitization there is unhindered access to contents over computer and communication networks.
- Digitization may be considered as a means to enhance the life of material by preservation apart from the virtue of increased and easy access.
- As a number of users may make any number of copies, there are fair chances of at least one electronic copy to be available on the network for use in future.
- Digitized material can be easily searched and retrieved.
- Requires less space for storage.
- Less likely to be damaged than print counterparts, as they have no physical form to yellow and decay with age, and loaning out a copy does not relinquish the original (8)
Helps to avoid duplication in generation and collection of data by different agencies.

- Enables the library professionals to choose the information from various agencies by quality control and standardization
- Supports distance education

Digitization of information is a boon for library and information professionals. Digital imaging projects offer unique advantages. Information and content may be delivered directly to end-users, and can be retrieved remotely. Image quality can be quite good, and is often enhanced, with capabilities continuously improving (4). There is added advantage with the possibility of full-text searching, cross-collection indexing and newly designed user interfaces that allow for new uses of the material and content (4). Flexibility of the digital material is another advantage. Since the data is not “fixed”, as with paper or printed text, it is easy to reformat, edit and print.

3. Digital Library

Digital library offers users the prospects of access to electronic resources at their convenience temporarily and spatially. The term digital library calls for carrying out of the functions of libraries in a new way, encompassing new types of information resources; new approaches to acquisition (especially with more sharing and subscription services); new methods of storage and preservation; new approaches to classification and cataloguing, new modes of interaction with and for patrons; more reliance on electronic systems and networks; and dramatic shifts in intellectual, organizational and economic practices (6).

In general, digital libraries used to be considered as systems providing a community of users with coherent access to a large, organized repository of information and knowledge (14).

Technically speaking, digital libraries can be viewed as infrastructures for supporting the creation of information sources, facilitating the movement of information across global networks, and allowing the effective and efficient
interaction among knowledge producers, librarians and information and knowledge seekers (1).

The US Digital Library Federation project worked out a practical definition as digital libraries are organizations that provide the resources, including the specialized staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence overtime of collections of digital works so that they are readily and economically available for use by a defined community or set of communities (20). Digital library mediates between diverse and distributed information resources on one hand and a changing range of user community on the other. In this capacity, it establishes a digital library environment that is networked online information in which users can discover, locate, acquire and access information anywhere, anytime and of any form.

4. The Network Environment and E-learning

The networked digital environment has rapidly transformed traditional means of communicating information. Digital media have provided faculty and students in all disciplines with the remarkable opportunity to create interactive learning environments by integrating images, sound, and text online. In a world of increasing information resources, students and educators need to learn to collect, analyze, and evaluate information using both visual and text-based critical skills. Digitization is a mechanism, not only integrate images, sound, and text online, but also to offer faculty in all disciplines a wonderful opportunity to create interactive learning environments.

Digital cameras and scanners, documents, photographs, paintings, slides, film and other images can be captured and incorporated into an online collection. Cataloguing the images, maintaining the collection, and creating online databases which can be easily searched demands not only the expertise of computer technicians, museum and library professionals and faculty in a broad range of disciplines but also capital expenditures on computer hardware, classroom renovations, and state-of-the-art projection equipment. E learning also requires strong technology infrastructure. In this
regard the developers – programmers, academics, graphic designers, and multimedia experts – should come forward to develop a model to create knowledge that is appropriate for the network environment.

5. Digital Learning Objects

Learning objects (LO) are the most meaningful and effective way of creating content for e-learning. ‘Any digital resource that can be reused to support learning. The term "learning objects" generally applies to educational materials designed and created in small chunks for the purpose of maximizing the number of learning situations in which the resource can be utilized’ (21). A learning object can be a single file such as animation, a video clip, a discrete piece of text or URL, or it could be a collection of contextualised files that make up a learning sequence. It is a digital resource that can be identified, tracked, referenced, used and reused for a variety of learning purposes.

A Learning Object is defined as any entity, digital or non-digital, that may be used for learning, education or training” (10).

“...A Learning Object... [is] any digital resource that can be reused to support learning.” This definition includes anything that can be delivered across the network on demand, be it large or small Learning Objects include multimedia content, instructional content, instructional software and software tools that are referenced during technology supported learning. Examples of smaller reusable digital resources include digital images or photos, live data feeds (like stock tickers), live or prerecorded video or audio snippets, small bits of text, animations, and smaller web-delivered.

“Learning Objects are a new way of thinking about learning content. Traditionally, content comes in a several hour chunk. Learning Objects are much smaller units of learning, typically ranging from 2 minutes to 15 minutes” (23).

Because learning objects are in digital formats, they are deliverable over the Internet and therefore accessible by any number of people.
6. Functional Requirements of Learning Objects

- **Accessibility:** the LO should be tagged with metadata so that it can be stored and referenced in a database
- **Reusability:** once created, a LO should function in different instructional contexts
- **Interoperability:** the LO should be independent of both the delivery media and knowledge management systems

The functional requirements of LOs are similar to the benefits derived from the object. A number of excellent models are available for teachers to use. These projects/models encourage students to select, analyse, organise and use information to provide creative answers or solutions to set questions or situations. They also aim to provide an easy access to Internet research for students and teachers.

Existing content repositories arbitrarily classify and categorize digital content as *Reusable Learning Objects* (RLOs). For example, the Center for International Education at the University of Wisconsin at Milwaukee ([http://www.uw-igs.org/search/index.asp](http://www.uw-igs.org/search/index.asp)) classifies interactive maps, lectures, a population clock, course modules, and other objects, all under the category of *Global Studies Learning Objects*. The Campus Alberta Repository of Educational Objects ([http://www.careo.org/](http://www.careo.org/)) lists a video clip of a person lifting weights with voice-over narration, an oriental porcelain statue, and the Final Declaration of Participants in a seminar on land mines, as *Educational Objects*. Comparable inconsistency is reflected in the Educational Object Economy's ([http://www.eoe.org/](http://www.eoe.org/)) Learning Objects: Java Applets Library, in which the only criterion for classifying a digital resource as a LO is that the object be a Java applet.

7. Learning Object Repositories

Learning Object Repositories are appearing on the Internet due to a number of initiatives that are happening around the world. Some of the major initiatives taking place include:
Digital Library Environment...

- **EduSourceCanada**
  Canadian Network of Learning Object Repositories. Provides links to seven different repositories.

- **Curriculum Online**
  The definitive catalogue of digital learning resources linked to the National Curriculum for England. English schools receive e-earning credits to enable them to ‘purchase’ the resources.

- **iLumina**
  Digital library of shareable teaching materials for chemistry (from the US). Undergraduate level.

- **Teacher Domain**
  A multimedia digital library for K-12 teachers and students.

**Health and Physical Education**

- **HEAL**
  Health Education Assets Library (US). Free access – includes K-12 resources. Requires registration to establish a profile. Content is mainly tertiary but use of the browse feature reveals some resources suitable for education use.

**Mathematics**

- **ExploreLearning.com**
  Includes a number of activities that illustrate complex mathematical concepts. Free 30-day trial available.

**Science**

- **EarthScience Center** to help students to gain understanding of the major physical events that impact on the Earth, including hurricanes, earthquakes, volcanoes and global warming.

- **Diffusion**

- **Osmosis**
  Paul O. Lewis has created these java applets to illustrate simple diffusion and osmosis. They may be downloaded free of charge and integrated into a unit of work for students.
• **ExploreLearning.com**
  Includes various online activities for Mechanics, Wave Motion, Electricity Magnetism, Optics, Astronomy and Life Sciences. Free 30-day trial available.

• **On FIRE**
  Allows students to explore the basics of combustion, including how a fire ignites, how a molecule's atoms rearrange themselves during combustion, and what a flame is made of.

• **Froguts**
  An online frog dissection

• **SCIQ** - Science revealed. Activities from different science disciplines.

• **Virtual Courseware for Earth and Environmental Sciences**
  A comprehensive project to develop Web-based lab activities that enhance the learning and teaching of Geology and other Earth and Environmental Science topics for introductory College and High School courses.
  - Virtual River
  - Virtual Earthquake

• **Physlets**
  Physics Applets, are small flexible Java applets designed for science education.

### Technology and Enterprise

• **Engineering For Earthquakes**
  Students can build bridges from a selection of designs and test them against earthquakes of various magnitudes.

• **Engines101**
  Animated explanations of the principles of the jet engine.

• **NSDL National Science Digital Library**
  A digital library of exemplary resource collections for science technology, engineering and mathematics education at all levels

• **ADC Tutorials - Free Images Resources**
  An ADC-maintained list of websites offering free or inexpensive photos and images with information on each for terms of use, image quality, credits, redistribution, etc.
http://www.mtroyal.ab.ca/ADC/workshops/_misc/free_images/free_images.htm

• FreeFoto.com
FreeFoto.com is the largest collection of free photographs for private non-commercial use on the Internet. FreeFoto.com is made up of 62951 images with 112 sections organized into 2218 categories.
http://www.freefoto.com

• ResearchChannel
Consortium of more than 30 higher education institutions offering broadcast-quality streaming media over the internet in both live and on-demand formats,
Over 2,000 hours of original university-level programs available with 300 new programs added in 2003.
http://www.researchchannel.org/

• MIT OpenCourseWare - Massachusetts Institute of Technology
Free open publication of MIT course materials, MIT’s course materials for educators, students, and individual learners around the world.
http://ocw.mit.edu/

• EOE - Educational Object Economy - Global community for Web based learning tools in Java
A "Global Community" of educators contribute, 3,312 Java Applets (as of 28/05/2003),

The preparation of LO requires the roles/skills of Project Manager, Editor, Librarian, Programmer and Designer.

8. Conclusion

E learning in the digital network environment enables students, teachers and researchers to access any learning resource at anytime and from any place. The networked digital environment has rapidly transformed traditional means of learning and teaching. The Networked Learning Environment is a very big idea. But we have to face many big challenges to make it a reality like finance, infrastructure, skill, etc. Latest technology needs thoughtful introduction into classrooms. Learning Objects are the most meaningful and
effective way of creating content for e-learning. There is a need to reengineer the design and development process of LOs. In this regard, the developers - programmers, academics, graphic designers, and multimedia experts - should embrace a multidisciplinary and cooperative model of development to create knowledge that is appropriate for the networked learning environment.

9. References


5. Ibid. pp. 206


Wisconsin Online Resource Centre.  

http://www.nedcc.org/plam3/tleaf35.htm