

## **Higher Education and Digital Libraries: Issues and Challenges**

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### **Abstract**

Digital libraries are quite new – about 20 years of age. At the same time, they have been growing at a fast pace. Digital libraries have the following characteristics – they store, preserve, distribute and protect contents in different formats and, at the same time, they allow interaction between the user and the contents; they are always present, both geographically and over time; they can make works internationally known, enhancing referencing and citations; they can make public the products of the educational process and let them be used as inputs for further learning. This work addresses some aspects of digital libraries that make them suitable tools to support higher education.

**Keywords:** *digital libraries, electronic theses and dissertations, higher education, open access.*

### **1. Introduction**

Over the centuries, libraries have been the keepers and distributors of books, journals, maps and other materials that are used by students in the learning process. They have also been the legal deposit of part of the products of scholarly publications – theses & dissertations, articles, technical reports, etc. In general, students have been patrons of the libraries of their institutions. In order to make more contents available and thus benefit students and faculty, pools of

institutions have engaged in commuting items and/or their copies. There is no reason for digital libraries not to have the same functions of traditional libraries, except that they can add functions and value due to their digital and networked nature. Let the different functions of a digital library in the higher education context be examined.

## **2. Courseware management**

Digital libraries are suitable tools to manage courseware and additional reference items used in class. Some reasons for this use are:

- Management of documents in all formats in a unified way – texts, animations, interactive exercises, audio files, video streams, e-books, e-journals and online tests can be stored, described and distributed through computers and networks. The management is independent of the type of information, as long as it can be stored in digital files. It also can be shared without human intervention making the whole process faster and cheaper.
- Access control – contents can be assigned different types of access according to the classes of users that are entitled to them. Authors can decide if their works are to be used by their students only, by any student of a given institution or the public in general.
- Content sharing – authors can make their contents available for other faculty to aggregate into their courseware. This can be done without duplication, simply by ‘pointing’ to the contents with the suitable set of metadata elements.
- Interactivity – contents that are managed by digital libraries can be interactive and based on multimedia. Students can listen to soundtracks, view animated images, solve exercises and have them checked online, write and send comments to authors and/or tutors.

- Customization – some users may require special characteristics of the contents and the system. This is true when people with special needs are involved, for example, persons who are blind or visually impaired. System interfaces and contents in digital formats can be customized to fulfill these necessities.
- Reuse – courseware can be developed with a granularity that makes it flexible to combine and support multiple syllabus. Reuse is important because developing courseware is expensive and takes time, so increasing reuse improves efficiency.

### **3. Products of higher education**

Digital libraries in their role of courseware and reference holders and distributors are of paramount importance in distance learning and training. A very special situation occurs in continued education when focusing on training professional staff who works in remote locations, as for example engineers in road and dam constructions, and offshore oil drilling. Current trends in continued education make digital libraries very useful, especially due to the possibility of customization of contents to meet individual needs [1].

In 2000, Hagen and McMillan [2] presented some interesting points related to ETDs; two are worth being mentioned. The first is that much of the research developed during graduate work ends up by not being published in journals and for this reason is not known. Digital libraries make this knowledge easily and widely accessible; the whole process is much faster than traditional publication. Virginia Tech started requiring ETDs in 1997; the total requests for theses and dissertations rose from 31,171 in 1996 to 1,090,113 in 1999. The second important point is the decrease in administrative costs: paper, binding, handling and shelf space.

#### **4. Challenges for Digital Libraries**

Digital libraries face many challenges –

Interoperability;

Multi-language,

Multi-culture and multi-legislation situations;

Multiple types of information and ever changing digital formats;

Digital preservation;

IPR – Intellectual Property Rights.

The last two seem to be the most crucial. Worldwide many efforts have been devoted to the study of these two topics and to finding solutions for the problems they represent in the use of digital contents. Digital preservation can be seen from three different points:

- (1) the physical preservation of the supporting media (HDs, CDs, DVDs, tapes);
- (2) the technological preservation to avoid technological obsolescence; and
- (3) preservation of access.

Some important actions can be mentioned dating as far as the 1990s. In 1994, the Commission on Preservation and Access and the Research Libraries Group [3] created the Task Force on Digital Archiving. In 1997, the Commission on Preservation and Access merged with CLIR – Council on Library and Information Resources [3]. The objective of the Task Force was to

investigate the means of ensuring “continued access indefinitely into the future of records stored in digital electronic form”. The group had members from different organizations interested in the preservation of digital collections – archives, libraries, museums, universities, scholarly societies, publishers and industry. In 1996, the Task Force presented the final report of its activities [4], where problems were identified related to both media deterioration and to technological obsolescence. Analysis was performed on solutions for obsolescence; different types of migration of technology were analyzed along with the issues of integrity of documents and of the information. This document also addresses costs associated with preservation efforts. In 2003, UNESCO published the UNESCO Charter on the Preservation of the Digital Heritage [5] whose objective is to make governments and all institutions that create digital contents aware of the necessity of the preservation of both contents and access. A special case of preservation challenge is related to born-digital contents, i.e., contents that have no existed on other media except some type of digital media. This is the case of computer based simulators, on-line interactive exercises and animations which are important learning objects. Another set of born-digital contents is present in all on-line interaction in companies or between companies and business partners or clients (e-business and e-commerce) and in government actions (e-government). This is an area where archives and archivists are very active due to the mission of preserving institutional and government archival documents. As higher education migrates from traditional media to the digital formats, these problems will have to be faced. For example, when theses and dissertations written on paper are no longer used and ETDs become the only format, archival problems will be present concerning the long term preservation of these works. The preservation of born-digital LOs is a current concern especially due to products that are

discontinued. Preservation of access is another big challenge. A news release published by Ascribe [6], on an article written by Dellavalle et al [7], shows the results the authors obtained after searching Internet based reference on medical publications. The numbers are quite surprising: (1) Internet references accounted for 2.6% of all references on more than 1,000 articles published on three medical journals between 2000 and 2003 – New Journal of Medicine, The Journal of the American Medical Association and Science; (2) 13% of the Internet references were lost for articles that were 27 or less months old. One of the possible solutions to overcome this problem is the DOI – Digital Object Identifier [8]; it is a controlled name assigned to a digital object that does not change, even if its location changes. The second challenge is intellectual property in the digital world – another point of great attention. The digital world has changed the way information is recorded and distributed, as well as the roles of the actors in the process. Anyone can publish a book on a website, or make a film and distribute it through YouTube, or take pictures and distributed them via e-mail. At the same time, intellectual property laws, in general, were created before the information revolution took place. In 2006, the British Library [9] launched its Intellectual Property Manifesto [10]. The manifesto deals with the balance between access and authors' rights. It suggests six areas to be addressed. Another important document is the report written by the Committee on Intellectual Property Rights and the Emerging Information Infrastructure [11]. The motivation of the committee was 'to assess issues and derive research topics and policy recommendations related to the nature, evolution, and use of the Internet and other networks, and to the generation, distribution, and protection of content accessed through networks'. As in the case of the Task Force on digital preservation, this committee had representatives from all interested parties. Intellectual property is of paramount

importance in higher education. One of the reasons is the students must be taught about IPR and how authors' rights must be respected, while research and use of previous works is necessary and must be encouraged. A second reason is that's results of the higher education process – technical reports, articles, theses & dissertations, books and patents are to be protected. Intellectual property rights come to discussion when OA is considered and/or when an author must choose a Creative Commons Attribution (license level). So, students as well as faculty will be involved in the world of IPR. Universities will have to adjust their rules and the way they deal with IPR in this new environment. IPR in the digital age will impact higher education.

## **5. Conclusion**

Libraries have been the companions of higher education for many centuries. They have preserved and given access to all sorts of materials – books, manuscripts, rare documents, journals, maps, etc. – that have supported the process of learning. They have also been the keepers of materials produced by students, faculty and researchers – graduate projects, theses & dissertations, technical reports, etc. – in this sense they have functioned as the institutional archive. It is important to remark that, for institutionally created materials, the library has to grant access while preserving the documents as an archive. Theses and dissertations are scientific works but, at the same time, are parts of the history of the institution. When a digital library is created, all the functions that have been performed by the traditional library will have parallel in the digital and networked environment. In terms of preservation, the problem is more complex since two types are to be considered – the physical preservation (as traditional libraries) and the technological preservation, in a world of fast-changing technology. At the same time, a digital

library can perform functions that are impossible with traditional situation and that aggregate value to higher education. These were presented in the second section of this work. Accessibility, availability, interaction, customization and reuse are strong reasons to use digital libraries for higher education even when there are challenges in the digital and networked environment.

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