Modeling a National Collaborative Digital Library for Malaysian Secondary Schools

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Abstract

This paper describes the conceptualisation of a model for a collaborative digital library specially tailored for Malaysian secondary schools, which will support classroom teaching and learning. The move towards collaboratively building the contents of a digital library is a fairly recent trend and it simulates an environment where partners are empowered to participate in building and up keeping the knowledge contents of the system. The conceptualisation of a Malaysian digital library is in line with the government's efforts in establishing SMART schools. However, various issues such as identifying local resources, ascertaining the needs of it users, and establishing a framework to meet these needs, must be addressed before the digital library can be fully implemented. It may be approached through the establishment of test beds in a particular learning institution, before nationwide implementation.

Keywords : *Digital libraries; Smart education; Educational technology; Collaborative resource development; Malaysia*

Digital Library in Education (DLE)

The meaning of the term digital library ranges from a digitised collection of material to a collection of all digital information along with the services that make the information useful to all possible users. At times it is used interchangeably with terms such as virtual library, electronic library and a library without walls. The simplest definition was aptly put forth by Hunter and Mardis (2001), "a digital library is a collection of information that is both in digital (electronic form) and is organized. Information may take many forms, such as images, video, audio, text, formatted documents and interactive software." A digital library for teaching and learning in an Internet worked society has become an "institution" that integrates previ-

ously separated lines of research, development, teaching learning, and collaboration in education. Various materials that can be used for education are now widely available in digital form — lesson plans, notes, maps, images, data sets, visualizations, assessment activities, curriculum, project-based learning, courseware materials and online courses. Access to and usage of these materials can be achieved via the creation and usage of digital libraries. Masullo (1996) brought forth the concept of a Universal and Global Education Infrastructure stating that digital libraries act "as the foundation, or underlying set of components that can be used to support various forms of networked teaching and learning activities; and to the organized collections of literary and artistic materials, in digital and other forms, needed to carry out those activities on a global scale."

Thus, within this context and framework, the digital library is an education infrastructure. It cannot teach but it provides support for teaching and learning. Subsequently, a digital library should not be designed to teach and improve learning, and educators should not expect it to teach. But, it should be used as a tool that will support quality and equitable learning which hopefully will result in improved learning and improved outcomes from the same processes. Six important features of a DLE which will support the teaching-learning process have been identified by Wallace and Soloway (1996) and Mendel (1999) :

* content is current
* content is comprehensive
* content is readily accessible
* content can be from primary resources
* resources are presented in various formats
* student can publish them online
* reuse of teaching resources

There has been a tremendous growth in educational digital library research and development since 1990. Numerous examples of educational digital library initiatives developed at local, national and international levels are currently available on the World Wide Web. Some fine examples are the Library of Congress' American Memory (AMLC) (http://memory.loc.gov), Spain's Archivo General de Indias (http://www.mcu.es/homemcu.html), United States National Science Foundation's Digital Library (NSDL) (http://nsdl.org/render.userLayoutRootNode.uP), the Multimedia Education Resource for Learning and Online Teaching (MERLOT) (www.merlot.org) and Canada's SchoolNet Digital Collections (www.schoolnet.ca). Most of these digital libraries grew from grassroot efforts of teachers, students and scientists working collaboratively to create a library of educational resources

and services to support teaching and learning. In lieu of their potential use by the educational community and their assumed potential to improvements in education, DLE has been developed with the goal of distributing learning materials in order to promote dissemination of educational innovations.

Any functional digital library should contain the following five main components (IBM DB2, 1998) :

* It should provide for creating and capturing materials and support an array of industry standard and specifications, able to define and import data in varied format, incorporate templates and authoring tools to help in the creation process.
* It should include an access and distribution module so that information can be distributed over public or private networks.
* It should provide the search and retrieval components so that the contents of the stored learning objects can be searched effectively, utilising keyword searches, Boolean searches and ranking relevant searches.
* It should provide an authentication and rights management module that control user access and protects the library contents.
* It should incorporate the storage and management of contents that provides high-performance, scalable storage and efficient digital learning objects management.

DLE is perceived as a federation of library services and collections that functions together to create a digital learning community (Kalinichenko, 2001). Besides being a repository for teaching and learning materials, it also should provide services for authors and teachers such as annotation, evaluation and peer review of the materials deposited. It should also offer students the capability to search for desired information, interact with peers and publish online, as well as enable independent learners to participate in forums. Interdisciplinary activities, lifelong learning and the process of education will reap its benefits.

National Collaborative Digital Library for Malaysian Secondary Schools

The conceptual blueprint of the Smart School, one of the seven flagship applications of the Malaysian Multimedia Super Corridor, was unveiled in July 1997. It reveals technology as the driving force behind the Smart School concept whereby it will be the enabling infrastructure for new teaching-learning processes which are related to curriculum, pedagogy, assessment, and teaching-learning materials. By 2010, 10000 primary and secondary schools will become Smart Schools (Telekom, 2002). At present, the

Malaysian educational community is acutely aware that usage of electronic resources, particularly the Internet is growing; and students have begun to value access to accurate and up-to-date information.

Digital libraries will play a central role in this Smart School environment as the central concern is in providing access to information sources. Digital libraries are built around the concept of providing fast and easy access to digital information resources without the constraints of time and geographic boundaries. Information plays a crucial role in realising the objectives of smart education which require "qualified knowledgeable educators" and "well-informed and well-supported individuals". However, the digital libraries in the smart education concept must address the issues of creation and organization of rich, local resources, besides providing access to other foreign resources. There is now a need to collect and collate all existing available sources and bring into the mainstream those resources that can contribute to the smart education objectives. Educators need to have at their disposal various types of learning resources to become knowledgeable and they also require teaching resources to produce well-informed and well-supported individuals out of the smart education system.

The Faculty of Computer Science and Information Technology, University of Malaya has began a research project aimed at understanding the needs of a viable collaborative digital library for education and has initiated an electronic platform for collaboratively building educational resources. The proposed digital library aims to provide an electronic system to help educators and students obtain accurate information; collect, store and organize information in digital format; publish and share electronic resources; and learn how to use IT tools to obtain information on local contents.

Unlike research digital library collections, educational digital libraries depend heavily on the direct contributions of materials from their communities of users. In order to facilitate this, the main difference in the proposed system when compared to other digital libraries in Malaysia is in the system architecture that allows collaborators such as partner schools, organizations, associations and individuals to cooperatively develop electronic resources and upload the resources to a hosting system. This is consistent with the systems architecture and model for collaboration proposed by EduPort (Masullo, 1996). This is a shift from the traditional concept, where individual educational organization procures its own resources, process and disseminates mainly bibliographic information to its users.

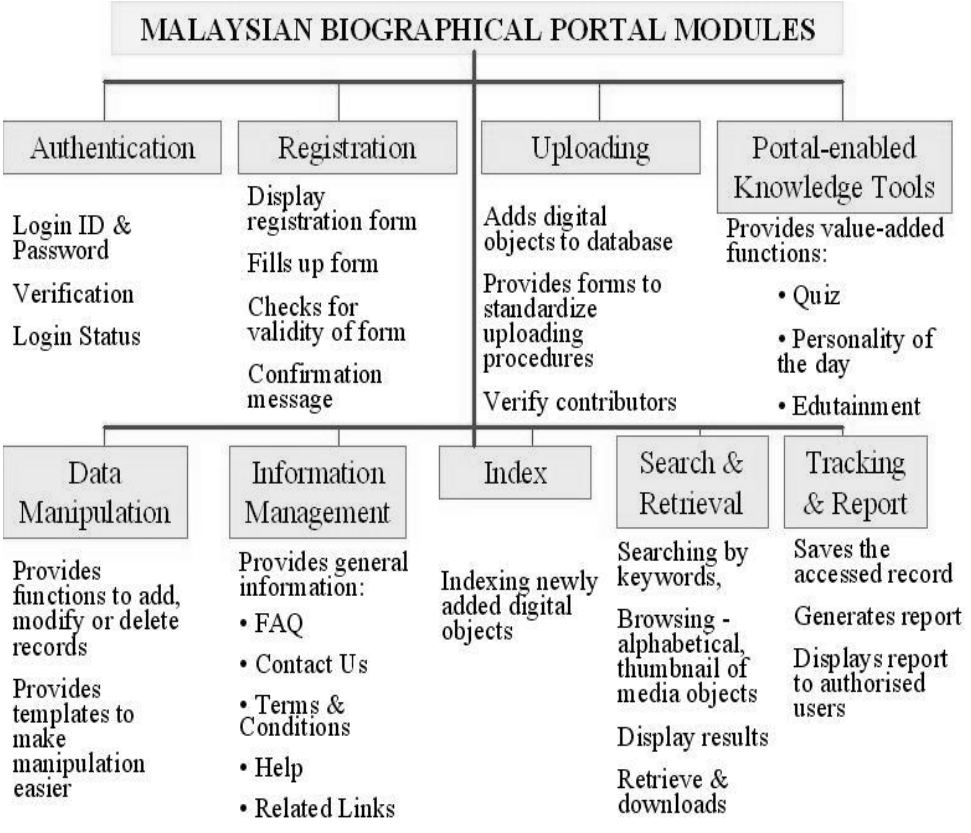
CoreDev for Malaysian Secondary School Students

CoreDev (Collaborative Resource Development) has been conceived, and is being constructed to meet the needs in support of the development of local historical resources for secondary school students. As a test case the system is currently supporting a portal of Malaysian resources on prominent personalities, historical buildings and places. The system can host uploads of full-text documents, digital audio files, video clips and images from a number of clients or partners. The basis for choosing resources on personalities, buildings and places at this initial stage is to support information needs of students in lower secondary schools in conducting their school-based history projects which usually centres around writing a report on local personalities, historical buildings or places. It is in this context that students use various means of obtaining information. A pilot sample of students interviewed indicated that their quest for information involves library search, scanning the mass media, browsing the Internet, obtaining information from friends or parents, going to actual sites to obtain leaflets and interviewing personalities. The history project forms a good testing ground for developing information literacy skills among students, ascertaining that they know how to assimilate, consolidate and present the information obtained into new meaningful knowledge.

CoreDev provides the platform for building resources collaboratively by member partners in three ways: creation of original digital works, digitization of paper-based resources and providing linkages to other relevant web sites. The prototype portal incorporates the five main basic features proposed by IBM DB2 Digital Library (1998). The digital library functions are as shown in Figure 1. The system allows uploads of reports, images, audio files and video clips by students themselves, other individuals and teachers. This practice enhances the sharing and discovery of information between various user groups and requires the practice of properly acknowledging and quoting sources used. In order to safeguard the system's integrity, the digital objects are uploaded into a temporary file which can be viewed and scanned by the system's administrators who may be teacher librarians or librarians at the State Educational Resource Centres or the Ministry of Education. These administrators could further edit and enhance the description of the multimedia resources through a user-friendly indexing template. All objects which are finally verified by the administrators are instantaneously searchable over the Internet. A full text documents and objects are searchable through the descriptions assigned to them. Particular attention is given to the system's search and retrieval functions since it is expected that this type of digital

portal is likely to be overwhelmed by numerous electronic information. Users can submit simple keyword searches or apply Boolean operators to achieve precision. A ranking algorithm has been built into the retrieval functions, which assigns a relevancy score to each of the search result. Novice users are allowed to browse the total contents of the portal or can choose to view contents by category of objects. Users can also opt to view thumb-nail images to ascertain relevancy before clicking for a full view. Another unique feature that is incorporated is the reporting module, which provides administrators with the information about the degree of participation activity of individuals or groups within participating schools for a particular state or for all states.

Figure 1 Functions of the Collaborative Digital Library for Historical Resources



Reuse of contents is one of the primary goals of a DLE in order to support teaching and learning. In order to facilitate this, efforts are on the way to develop services such as peer review and areas for online discussion. These services are devoted to help students adapt the contents for their own use. Subsequent phases of this digital library project will further expand contents, incorporating history lessons, teaching tools and question bank on history for lower secondary schools.

Perceived Benefits of Collaboratively Building Digital Libraries

Why do we need a national digital library for secondary schools students? Hunter and Mardis (2001) outlined the wide range of reasons that can be thought of in terms of resource discovery, learning to conduct inquiry using digital resources, expanding the repertoire of quality learning resources, and public interest in meeting students' unique needs in cyberspace. We perceived the benefits of engaging in collaborative resource development in digital libraries for education as being able to :

* Provide access to valuable local contents that might otherwise be unavailable
* Provide more than one type of resources to students in a single location
* Impart the skills to reference or cite resources used correctly
* Impart ICT awareness and skills to the educational community
* Provide mutual professional learning and support that occurs when partners commit to and work in such collaboration
* Reduce the dollar cost in purchasing and storing resources

Careful collaboration can help educational communities develop practical partnerships to create and expand local knowledge that will subsequently nurture knowledge sharing at all levels of the society. Teachers and students must recognize the importance of their participation in creating the digital contents and accept the reality that the richness in the content of a digital library is very dependent on their active participation as partners.

Conclusion

Digital libraries will be the main tool for education in the 21st century (Masullo and Mack, 1999) since the Internet is emerging as a powerful tool in teaching, training and exchanging information reflecting a new vision of learning in the educational process. The rapid rate in the growth of information and information technology requires great efforts to develop enhanced teaching skills and dynamic teaching curricula. The increasing role of multi-

media computer-based learning must be coupled with the retraining of teachers in national educational institutions to improve their abilities in computer and IT. Currently used methods of education and training must be modified to suit future information technologies. Reengineering of educational methods must be carried out to meet future national and international learning demands.

It is hoped that digital libraries can be used together with other educational materials to bring about dramatic improvements at all levels of education. Digital libraries should be seen as an entity which will educate our children and future generations with sufficient knowledge, skills and criteria. It should enrich our educational programs and enhance teaching methodologies. The introduction of computer assisted learning for school children is the only way to overcome the technological gap between national and international educational systems.

The collaborative digital library is proposed as an aid to complement existing teaching methodologies. However, its successful usage is highly dependent on efforts to be made by all concern to collaborate. Teachers are a repository of knowledge and they are the contents provider within the collaborative digital library concept.

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