

Interoperability with E-Learning Process: Capabilities of Digital Libraries in Supporting Course Websites as a New Domain of E-Services

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ABSTRACT

As learning has become an increasingly central concern to the knowledge-encompassed society, an array of information technologies has been introduced particularly in the educational settings and mainstream to foster the peaceful transition from *papyrus* education into web-based or online learning. It is strongly believed that the Web nowadays has become a wonderful vehicle for delivering e-learning materials, and has significantly increased the ranges of access to a plethora of scholarly information sources within ICT-rich environments resulting in the shift of the educational paradigm from teacher-oriented to learner-centric. Should the networked library have to view e-learning as a new domain of information service? The strong capabilities of the digital library in providing scholarly information have made interoperability with the e-learning process a highly urgent requirement. This paper sketches the outlines of the proposed plan of the United Arab Emirates University (UAEU) Libraries to tackle the challenges that the new e-learning paradigm poses, and explores how to support the linkage of e-resources with course website curricula. The benefits and potentials are discussed and reflected within the realm of good opportunities for fruitful collaboration in the knowledge-based society.

INTRODUCTION

The advent of Web-based IT applications into ever greater areas of societal activities and settings has provided an impetus for fundamental changes. One changing paradigm is the role of distance e-learning in different levels of the educational system. In the ideal learning spectrum, university education forms the knowledge foundation for professional understanding and the development of new skills of in-depth information acquisition, which is the hallmark of talented learners. In this intellectual sphere, e-learning has sprung up in universities and private businesses across the world benefiting from the dynamic advancements in information and communication technologies (ICTs). In the Web-based economy, e-learning interventions are rapidly affecting the organisation's response to the need for continuous workforce training and development while reducing training-related costs (Wentling *et al.*, 2000).

The main advantages of distance e-learning are availability, reduced cost, flexibility and integration. E-learners are able to take their e-courses often at their own pace and when they have time, without disruptions to their daily life. Moreover, travel costs and lost workdays are saved if e-learners have the opportunity to follow necessary continuing education from their workplaces. With the inception of computer technologies in the 1980s and the rapid developments in communications technologies in the 1990s, the potential for improving the quality and effectiveness of e-learning has grown. This has resulted in the development of a wide variety of learning technologies and the incorporation of a number of new elements into e-learning such as multimedia and hypermedia (Beller & Or, 1998).

Effective online education is a blend of pedagogy, technology, and organizational support. The rapid development of the Web from a text-only medium to an expanding multimedia communication system has increased and diversified the delivery mechanisms of quality distance learning. The term e-learning covers course websites, and

audiovisual instruction; it also includes virtual classrooms and digital collaboration and uses. E-learning has come to the fore in many important areas such as: higher education, vocational training in business and industry, government and military, and public continuing education.

The emergence and adoption of web portal systems in the past few years by most learning institutions has led to a greatly enhanced networked e-learning environment for non-traditional learners to pursue further education at their convenience. While considerable research has been conducted into the role of libraries in supporting distance and off-campus learning over the past decades, this paper focuses specifically on how the digital library interoperates with the course-website learning process within the networked e-information service environment at UAEU.

RELATED LITERATURES

Web-based instruction has ushered in a new era of e-learning networks. As a new paradigm of the educational system, a growing body of research literature has accumulated. E-learning library services have also been tackled by many scholars and researchers in recent years. Benbunan-Fich and Hiltz (1999) have critically discussed the use of computer-mediated communication systems (CMCS) in distance education; they also have focused on the convergence of technological and institutional factors involved in the promotion of e-learning. Jorgensen (2002) has highlighted the overall evolution and significance of the asynchronous learning network, and explored how online courses can be used to foster a rich collaborative e-learning environment and virtual classroom, whereas Cannon (2002) has outlined the potential catalytic role of the digital library in supporting the e-learning process. Slade (2004) has comprehensively reviewed the related works conducted to date on the topic of library support for distance learning programmes and identified some priorities for future research.

Web-based library e-services have been approached from different angles. Kinder (2002) has addressed the central role of the digital library in instructional liaison with distance e-learners. Germain and Bobish (2002) have outlined approaches by which librarians can incorporate and develop a functional web-based tool. Herget (2003) has provided evidence for successful and productive hybrid concepts in e-learning, which are largely based on digital library resources. Ngimwa (2004) has demonstrated the African Virtual University experience in using digital library e-services to enhance quality of distance e-learning, whereas the research study of Rieger *et al.* (2004) at Cornell University library has confirmed the strategic importance of the digital library presence within the virtual learning environments. Markland (2004) has discussed some current thinking and perspectives evidenced in the literature and research on the integration of digital libraries and online information resources into online learning environments.

THE RISE OF DISTANCE LEARNING

The rise of distance learning has resulted from the so-called push and pull factors: advances in knowledge technologies have created user demand for e-literacy and continuing education through distance learning, while extensive usage of information and communication technologies has led to further development in ICT and related applications. Distance e-learning was put into practice with the dawn of industrial expansion in the early 19th century in some European countries (e.g. Great Britain, France, and Germany) and the USA. Although distance learning is neither a recent nor a new educational phenomenon, the advent and adoption of sophisticated information technologies into learning settings often creates this impression (McGorry, 2003). As far as the history of distance learning is concerned, it can be divided-into four generations of distance learning technologies.

The time-frame of the first generation is from 1830 to 1920 and the technologies employed were printed materials (correspondence classes). The second generation (1921-1980) was characterised by the use of multiple audio-visual technologies, but not yet computers (print, fax, radio and instructional television). The third generation (1983-1995) integrated –further advances in computer, CD-ROM–, and space telecommunication technologies to launch two-way interactive instruction. Internet and Web-based classes represent the latest e-learning technologies in the 1990’s and twenty-first century. The extensive use of computer-aided learning technologies and the Internet are the common features for this period. The fourth generation is characterised by two-way interactive real-time capabilities of audio and video, desktop conferencing and video available on demand (Prasolova-Førland, 2000).

Table-1
Milestones of Distance Learning Technologies

Period Span	Features of Technologies Employed
Pre-correspondence education (1700s- 1820s)	Some societal activities in Great Britain involved in supporting those not enrolled in formal schools to continue their education (printed textbooks).
Correspondence education (1830s-1920)	The advent of postal service systems in 1866 supported the delivery of teaching materials to remote learners. In 1886, Pennsylvania State University was the first higher institute to maintain mail-based distance learning in an organised manner.
Audiovisual based instruction (1921-1980s)	Instructional radio and TV blended to give a strong boost for the distance learning system to be a part of the educational process, and motivated more people to enrol in distance learning (visualising teaching materials).
Computer and telecommunications technology (1980s-1995)	ICT has spread -distance learning to geographically remote areas to help effectively in illiteracy eradication in heavily populated countries such as China. ICT integrated TV, video, and computer connections to launch two-way interactive instruction.
Web-based instruction (1995-present)	The Internet introduced a new paradigm of online/virtual learning environments and expanded the capabilities of learning centres to reach off-campus learners.

WIRED HIGHER EDUCATION IN UAEU

The United Arab Emirates has been investing heavily in the educational sector and related activities, as it strongly believes that a robust educational system is a key to future prosperity in the forthcoming Web-based society whose hallmark is its consciousness of the importance of information literacy (Taha, 2004). To maintain this trend, UNESCO introduced the International Computer Driving Licence (ICDL) programme in all United Arab Emirates educational settings (UAE 2004). ICDL provides the basic computer knowledge necessary to use the Web and the word processing packages.

Higher education was introduced to the educational system by the opening of the UAE University in 1977 as the first national university, modelled on the American university system. UAEU paved the way for establishing a series of High Colleges of Technology (HCT) in 1988 to provide more innovative, technically-oriented education. By the turn of the twentieth century, five private universities had found their way into the higher education sector. Such an expansion in university education has sparked strong interest in providing off-campus education based on Web technologies. Most of these universities are currently providing some form of e-learning courses.

UNDP has highlighted United Arab Emirates as the most advanced e-learning country in the Arab world, which is especially manifested in the ICT infrastructure of Dubai *Internet City* and Dubai *Village of Knowledge*; both have attracted many e-learning providers to be based at these locations. For instance, eTQM is the world's first online school providing TQM e-learning <http://www.etqm.net>. UK e-Universities (UKeU) and other Australian universities are currently providing accredited web-based e-learning programmes in UAE. HCT made a crucial step in blending technical education with the needs of the labour market through the Centre of Excellence for Applied Research and Training (CERT), which employed the latest ICT-based e-learning (UAE 2004).

UAE University: from Papyrus to Course Websites

In 2002, the UAEU introduced course management software (CMS) to launch the *e-Blackboard™* portal <http://blackboard.uaeu.ac.ae> for providing integrative course websites. CMS incorporates a wide range of teaching and learning tools into a web-based interface. UAEU's *e-Blackboard™* portal offers a suite of features to facilitate some key administrative process such as group communication and self-learning assessment.



Fig. 1
UAEU e-Blackboard™ portal

Selim (2003) has conducted an empirical study on UAEU student acceptance of course websites as a teaching and learning tool in the UAEU. The course website acceptance model (CWAM) has been used to measure students' adoption of and satisfaction with the web-based courses delivered by the College of Economics and Business. The study revealed four major critical factors for CWPU:

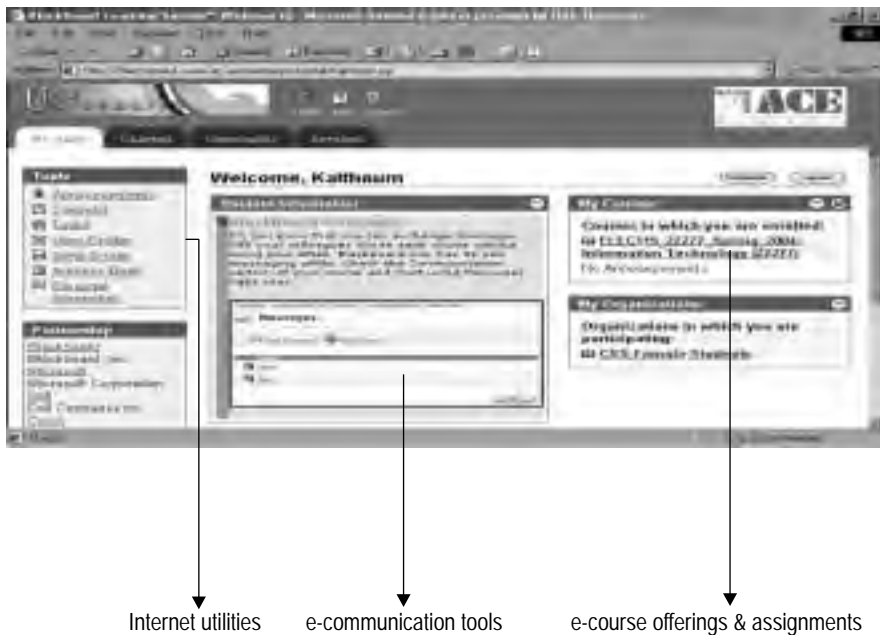
- ▶ Course-work interactivity allowed students to engage conveniently in instruction,

- ▶ Online components (e.g. multimedia modules) encouraged students to accomplish their assignments on time,
- ▶ Friendly use of the course website materials, and
- ▶ Increased academic productivity students through using interactive tools.

The drawback of this study is the fact that it ignores the crucial role of e-literacy and library e-services in encouraging acceptance and efficient use of course websites components (Taha, 2003).

The student's *e-Blackboard*TM account usually includes course syllabi, lectures, assignments, outlines, supporting materials, and links to cited websites. It also offers e-communication facilities for group discussion, for online contact with supervisors, and for promoting the exchange of ideas and documents between virtual classmates. Therefore, CMS creates a kind of "invisible college".

Fig. 2
Student Account in UAEU e-BlackboardTM Portal



On the other hand, the UAEU Library is rich in e-collections; its web portal at <http://www.libs.uaeu.ac.ae> provides options to reach and search a range of e-services and e-resources. The integration of *EZ-Proxy™* <http://ezproxy.uaeu.ac.ae> into e-services has greatly expanded permanent access to library database holdings from anywhere, and has equipped the library with strong capabilities to provide timely and effective access to scholarly information, which would virtually support the e-learning process (Taha 2004).

Fig. 3
EZProxy™ Databases Menu (15 Textual and 20 Bibliographic)



TYPES OF DISTANCE E-LEARNING

Distance e-learning generally involves two teaching modes: i- Asynchronous education tools support communication and collaboration between instructors and learners, which takes place across time and space; and are usually provided via the Internet, Web-based virtual classes (CMS, e.g. e-Blackboard) and, computer-based training modules; ii- Synchronous tools support communication and collaboration

at the same time by means of using an interactive distance learning network (IDLN) set. IDLN allows the instructor to be seen and heard by the audience; the audience feedback is latent since they communicate only via e-messages. In many cases both synchronous and asynchronous teaching modes are used during the different phases of a course (Prasolova-Førland, 2000).

E-LEARNING-DIGITAL LIBRARY INTEROPERABILITY MODEL

The ubiquity of the Internet along with the increasing availability of Web-based technology in library settings has significantly enhanced off-campus access to e-resources. The term distance learning library services (DLS) refers to those library services in support of college, university, or other post-secondary courses and programmes offered away from a main campus by means of electronic transmission. The phrase is inclusive of courses in all post-secondary programmes designated as extension, extended, off-campus, extended campus, distance, distributed, open, flexible, franchising, virtual, synchronous, or asynchronous (ACRL 2000).

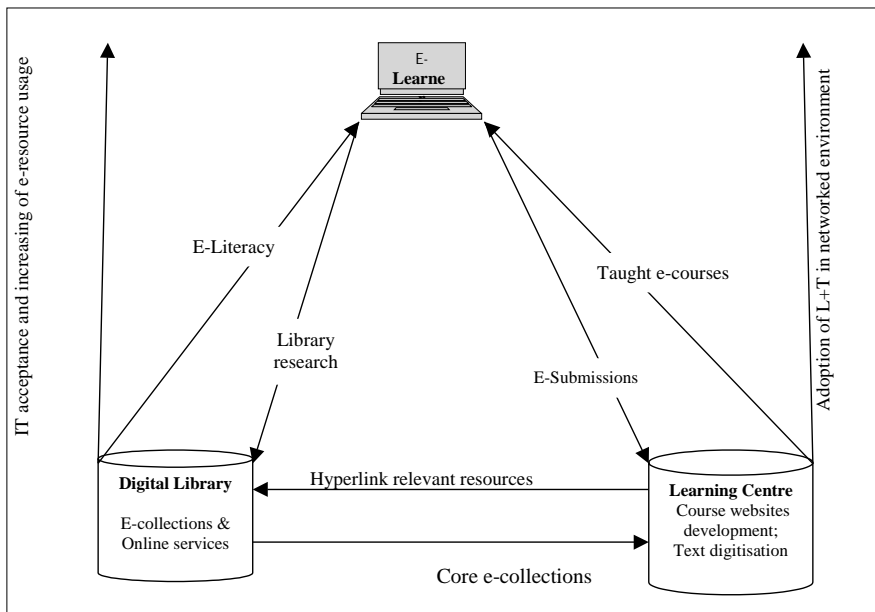
The proposed model aims at delineating the potential interplay between the digital library and the e-learning process within the networked environment. The main ingredients of the model are concisely explained as follows (see *Fig. 4*):

Functional Roles of the Digital Library

- ▶ Virtual reference desk (VRD) assistance and e-mail enquiry service
- ▶ Reliable and secure access to library academic e-resources e.g. databases
- ▶ Web-based OPAC services
- ▶ Library research consultation services (expert subject)
- ▶ E-literacy programmes to develop e-learning information search skills
- ▶ Acquisition of core e-collections specifically meeting e-learning needs.

Fig. 4

A Model Depicts Digital Library Support e-Learning Process in Networked Environment



- ▶ Prompt document delivery using electronic transmission
- ▶ Promotion of library e-services to the e-learning virtual community.

Functional Roles of the Learning Institution

- ▶ Development of innovative web-based e-courses using multi-media effects and simulation
- ▶ Integration of a variety of core e-collections such as digital resources, formats, new contents, etc., that are related to the e-courses
- ▶ Hyperlink the e-courses with the library e-reference resources such as e-books and e-journals, as well as with the web-based open-access resources
- ▶ Digitisation of textbooks and other learning resources
- ▶ Possible permanent updating of e-course contents

- ▶ Integrated web portal design provides friendly access with efficient browsing and research abilities

Functional Roles of Expert e-Librarian

The proposed model would have an expert e-librarian as:

- ▶ Knowledge explorer to locate and retrieve required academic information from different sources for support of e-courses
- ▶ Editor to accumulate and compile related information in easy-to-read fashion
- ▶ Consultant to assess information quality and help in Web-based e-course
- ▶ Innovator to look for improving efficiency of information delivery
- ▶ Educator to assist in promoting e-literacy among e-learners
- ▶ Information therapist to assist in obtaining relevant and usable information in a convenient way, e.g. relieve computer-search anxiety

DISCUSSION AND CONCLUSION

The provision of digital library services to support e-learning is an area of growing recent concern for academic libraries worldwide. The strong capabilities of the digital library in providing off-campus e-information services have made the interoperability with the e-learning process a highly urgent requirement. UAE University is positioning itself well to support e-courses through a range of electronic resources and other online services. The e-collection wealth of the library would usher in a new paradigm of interoperability with exponential growth in the number and variety of e-courses provided by the UAEU programmes.

Rapid advances in digital technologies have resulted not only in a proliferation of the amount of information available to students, but also in the packaging of that information in an increasing variety of digital formats. It is within this context that the expression of *e-literacy* has achieved its current popularity. The term embodies a

challenge to the library to mandate a new paradigm for training e-learners to make effective use of course website materials and to receive the full benefit of the rich knowledge resources available.

In an age where a growing number of students do not see an appreciable difference between what is offered by library e-services and web search engines, the seamless linking of course website and networked library becomes even more crucially important. To maintain the momentum of e-learning in the UAE, the university libraries should view e-learning as a new domain of e-services by means of linking e-resources with course websites. The potential future developments for support web-based curricula would lead to:

- ▶ improvement of the link between library e-collections and e-services with course website materials
- ▶ development of full e-literacy and search skills programmes
- ▶ liaison between expert librarians with teaching staff involved in the development of course website curricula
- ▶ more emphasis on handheld and wireless devices, to increase accessibility.

In this study, the following assumptions are taken into account:

- ▶ Knowledge is constructive information.
- ▶ Learning is more effective if the 'learner' is provided with a strong incentive to take responsibility for self-learning.
- ▶ Learner's motivation is a strong determinant of the outcomes of the success of the online learning.
- ▶ Encouragement of instructors, faculty and the like to incorporate ICT into their classrooms is a success indicator of online learning.
- ▶ The constant emergence of new computer technologies will lead the distant education concept to further evolve and change.

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