# How Digital Libraries Can Support E-learning?

© S. Rezaei Sharifabadi, Ph.D

Alzahra University
srezaei@alzahra.ac.ir

## Abstract

Digital libraries offer opportunities for e-learning that are not possible in their physical counterparts. Digital libraries complement other learning environments, such as those provided in distance education and courses offered online, and like e-learning environments, they provide flexibility of time and place. Digital libraries have the potential to offer unprecedented resources for supporting e-learning. Access to current research and needed information within a well developed infrastructure can provide faculty members and students with a unique opportunity to do deep research and to teach and learn more thoroughly.

The paper addresses and discusses such aspects as what is meant by "e-learning", and how can it be supported by library environment, what is the functionality of digital library; and how the e-learning resources are included and organized in digital library.

This paper will also explore the advantages of digital libraries for e-learning and the types of learning that can be supported by digital libraries. There is undoubtedly a keenness to use online information resources for research and teaching, but this seems to be matched by a lack of awareness of how best to integrate these resources into e-learning environment.

The paper concludes with a discussion of the role and influence of digital libraries and online resources on e-learning.

## 1. Introduction

The growth in e-learning, in which education is delivered and supported through computer networks such as the Internet, has posed new challenges for library services. E-learners and traditional learners now have access to a universe of digital information through the information superhighway. New information and communications technologies, as well as new educational models, require librarians to re-evaluate the way they develop, manage and deliver resources and services.

This paper examines how digital libraries are responding to the challenges of delivering core services to e-learners. The paper will examine library practices and technologies being applied in the construction of digital libraries. Challenges and opportunities which digital libraries bring to the support of e-learners, as well as the importance of providing support within a collaborative environment, which stresses human factors, such as communication and interaction will also be discussed.

## 2. Digital Library Origins and Definitions

The term "digital library" is simply the most recent in a long series of names for a concept that was written about long before the development of the first computer. The idea of a "computerized library" that would supplement, add functionality, and even replace traditional libraries was invented first by H.G. Wells and other authors, who caught the imagination of millions with speculative writings about "world brains" and similar fanciful devices.

There is general agreement that much of the early actual application of computers to information retrieval was stimulated by the prominent scientist Vannevar Bush, who wrote about the "memex," a mechanical device based on microfilm technology that anticipated the ideas of both hypertext and personal information retrieval systems [8]. The first real-world applications of computers to libraries began in the early 1950s with IBM and punched card applications to library technical services operations, and with the development of the MARC (machine-readable cataloguing) standard for digitizing and communicating library catalogue information. In 1965, J. C. R. Licklider coined the phrase "library of the future" to refer to his vision of a fully computer-based library [27], and ten years later, F.W. Lancaster [24] wrote of the soon-to-come "paperless library." About the same time Ted Nelson [32] invented and named hypertext and hyperspace. Many other terms have been coined to refer to the concept of a digital library, including "electronic library," "virtual library," "library without walls," "bionic library," and others [14].

There is little discussion and less agreement in the literature about what constitutes a digital library. One may insist on a relatively narrow definition -- based explicitly on the properties of the traditional print

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library or consider a much broader continuum of possibilities. The most inclusive view takes a digital library to be, as its starting point, essentially what the Internet is today. But from this extreme perspective it can be seen that the metaphor of the traditional library fails in several respects.

Gapen defines the digital library as

the concept of remote access to the contents and services of libraries and other information resources, combining an on-site collection of current and heavily used materials in both print and electronic form, with an electronic network which provides access to, and delivery from, external worldwide library and commercial information and knowledge sources. [17]

A digital library is defined by Clifford Lynch as an "electronic information access system that offers the user a coherent view of an organized, selected, and managed body of information" [29].

Many libraries are hybrids, providing virtual access to electronic resources and services, while maintaining and supporting use of a physical collection housed in a library building.

## 3. E-learning Terminology

Different terminologies have been used for e-learning, a fact that makes it difficult to develop a generic definition. Terms that are commonly used include online learning, Internet learning, distributed learning, networked learning, tele-learning, virtual learning, computer-assisted learning, Web-based learning, and distance learning. All of these terms imply that the learner is at a distance from the tutor or instructor, that the learner uses some form of technology (usually a computer) to access the learning materials, that the learner uses technology to interact with the tutor or instructor and other learners, and that some form of support is provided to learners. This paper will use the term "e-learning" throughout.

E-learning is the term used to describe teaching and learning resources or experiences that are, in some way, delivered electronically. E-learning is meant to be more than just educational websites or computer software. It includes all aspects of electronic delivery – so watching an educational video, using a digital camera, using a computer to edit pictures, text or sounds for a presentation or project, or using an interactive whiteboard in a lesson can all be considered implementations of e-learning.

There are many definitions of e-learning in the literature, definitions that reflect the diversity of practice and associated technologies. Carliner [11] defines e-learning as educational material that is presented on a computer. Khan[21] defines online instruction as an innovative approach for delivering instruction to a remote audience, using the Web as the medium.

However, e-learning involves more than just the presentation and delivery of the materials using the Web: the learner and the learning process should be the focus of e-learning. As a result, in this paper e-learning is defined as:

"the use of the Internet to access learning materials; to interact with the content, instructor, and other learners; and to obtain support during the learning process, in order to acquire knowledge, to construct personal meaning, and to grow from the learning experience."

## 4. Benefits of E-learning

Increasingly, organizations are adopting e-learning as the main delivery method to train employees [34]. At the same time, educational institutions are moving toward the use of the Internet for delivery, both on campus and at a distance. However, for organizations and institutions to make this often expensive move, there must be a perception that using e-learning provides major benefits. Some of the benefits for learners and instructors are outlined below.

For learners, e-learning knows no time zones, and location and distance are not an issue. In asynchronous e-learning, students can access the online materials at anytime, while synchronous e-learning allows for real time interaction between students and the instructor. E-learners can use the Internet to access up-to-date and relevant learning materials, and can communicate with experts in the field in which they are studying. Situated learning is facilitated, since learners can complete online courses while working on the job or in their own space, and can contextualize the learning.

For the instructor, tutoring can be done at anytime and from anywhere. Online materials can be updated, and learners are able to see the changes at once. When learners are able to access materials on the Internet, it is easier for instructors to direct them to appropriate information based on their needs. If designed properly, online learning systems can be used to determine learners' needs and current level of expertise, and to assign appropriate materials for learners to select from to achieve the desired learning outcomes.

Now as never before, educational organizations are surrounded by alternative methods of delivering education to learners. A significant change in learning environments is that the quality of someone’s teaching is no longer a personal and/or departmental matter. Faculty behaviour in the classroom is brought out of the dimension of a personal contribution, to a service that is evaluated for its quality, just like other services.

University administrators start trying to assert university ownership over the development of e-learning programs designed to be offered over the Internet. There is great concern on many campuses about faculty being allowed to teach courses they have designed for online delivery (including other universities).

Important trends are characterized by the new requirements imposed on the knowledge industry in partnership with educators and librarians to provide adequate changes in education methods and information infrastructures to support e-learning as a lifetime activity, learning anytime and anywhere.

In this competitive era the role of the traditional library as the primary provider of information to its community is less and less unique. Local collections and staff are

no longer the only source for information services to students including e-learners and support for faculty in their research and teaching. Users (students/e-learners) are beginning to perceive the library as something used at the end, or at best the middle, of their information search. This has important implications for the education programs, as well as for understanding library users' behaviour. Users want control of their own information environment. It is important to them to have some items owned for convenient personal consultation. The user's impression is that the information available free on the Web is the information that gets used. If students do need to ask a person for information help, they go to a friend or colleague because that person already has an understanding of that person's context for either the problem or their level of understanding.

One of the natural responses to the above challenges consists in introducing the digital library for supporting e-learning as a learning environments and resources network:

designed to meet the needs of learners, in both individual and collaborative settings;

constructed to enable dynamic use of a broad array of materials for learning primarily in digital format;

managed actively to promote reliable anytime, anywhere access to quality collections and services, available both within and without the network. [28]

## 5. The role of digital libraries in e-learning

Introducing digital libraries into the education process was well prepared by distance education that is being developed by years. With the Internet and the web distance education programs can mount sets of materials on web servers to support online courses. One of the basic ideas is to join learning materials on various topics and written by many educators in a digital library of courseware. Digital libraries have the potential to significantly change fundamental aspects of the classroom in ways that could have an enormous impact on teaching and learning. New pedagogical methods should accompany digital libraries as an emerging technology for education to reach the compelling vision of the education:

"Any individual can participate in on-line education programs regardless of geographic location, age, physical limitation, or personal schedule. Everyone can access repositories of educational materials, easily recalling past lessons, updating skills, or selecting from among different teaching methods in order to discover the most effective style for that individual. Educational programs can be customized to each individual's needs, so that our information revolution reaches everyone and no one gets left behind". [33]

The digital library must not be seen as merely a digitised collection of information objects plus related management tools, but as an environment bringing together collections, services, and people to support the full cycle of creation, dissemination, use and preservation of data, information, and knowledge. A number of intermediate goals are formulated for digital libraries and the way in which they can support e-learning, among them:

Improve student performance

Get more students excited about science

Increase the quantity, quality and comprehensiveness of Internet-based science educational resources

Make these resources easy to discover and retrieve for students, parents, and educators.

Ensure that these resources are available over time [26].

In e-learning environment, digital libraries are considered as a federation of library services and collections that function together to create a digital learning community. The range of supported materials includes curricula and courseware materials, lectures, lesson plans, computer programs, modelling and simulation, intelligent tutoring systems, access to remote scientific instruments, project-based learning, tools, the results of educational research, scientific research reported both formally in journals and informally in web sites, raw data for student activities, and multimedia image banks. Digital libraries should provide services for authors and instructors such as annotation, evaluation, and peer review of donated materials. For students and faculty, it will offer the capability to search for desired information by subject area, to have access to scientific data sets, to interact with peers, to provide archiving, location-independent naming, recommender systems, selective dissemination of information, copyright management. Faculty, students, and other clients such as independent learners will be able to participate in forums. Interdisciplinary activities, lifelong learning, and the process of education will all benefit. In this way, digital libraries will be much more than the sum of its parts, and will promote change and innovation in scientific and technical education

## 6. E-learners, digital libraries and Information utilization

With the tremendous growth of the Internet, e-learners have access to an overwhelming range of information sources available at the click of a mouse: library resources; government information; news sites; advertising; and many other forms of resources. Librarians have traditionally selected and organized resources with great care. In building digital libraries, librarians have the opportunity to provide e-learners with direction and to rescue them from information overload.

A digital library can link e-learners to library catalogues, licensed journal databases, electronic book collections, selected Internet resources, electronic course reserves, and tutorials, and to forums for communication and interaction with others. The digital library permits e-learners to access library and networked resources and services anytime and anywhere that an Internet connection and computing equipment are available.

Borgman and her colleagues at a working session of a national conference on digital libraries presented a

model of the "life cycle" of information, which attempted to capture the idea that digital libraries are both repositories of resources and interactive communities[4]. The Information Life Cycle represents three broad phases of information use and life in a social system: creation, searching, and utilization. In the contexts of universities and academic libraries, a great deal of emphasis is put on information searching; there is a strong sense in which once the librarian helps to locate specific information, his or her job is finished. This short curve of interest in information is also evident in digital library research, largely directed toward the needs of specialized professional communities. When such research does point to phases of information utilization and creation, it is often only to better consider how specific searching technologies might be made more effective. Additionally, the Information Life Cycle itself implies a particular view of information use that is characteristic of academic communities: Through activities of "retention" and "mining," information leads to the creation of more information, which can be searched and used by others in similar fashion.

What can one say about information creation, searching and utilization in e-learning environment, and what meaning does these terms have for the development and use of digital libraries? By and large, searching and locating precise information is often less significant than are the entire range of goals prompted once a resource becomes available. What body of resources could one claim is necessary for academic digital libraries? While current and diverse resources are helpful and can contribute in significant ways to curriculum, in many cases one resource can be substituted for another to achieve an educational goal—the processes of use are far more significant than is the availability of a fixed data set.

Educators' goals may well include the "mining" and "retention" of resources, but they also want students to share, manipulate, analyze, critique, oppose, and become increasingly curious about the resources they encounter. They want students to consider not only the resources themselves, but to look behind them and understand the processes of producing them, their intended audiences, and their possible meanings. Many educators value student learning certain inter-textual connections between resources, but they also want them to develop their own categories, relationships, and understandings. Perhaps in e-learning environment, most importantly, educators want e-learners to develop the kinds of skills and understanding that would enable them to create resources of the kind they would find in digital libraries. Thus, e-learners are potential authors for the library. This is a role few seriously imagine they can play with respect to traditional libraries.

Even from this brief discussion, the diverse and sometimes contradictory uses of information resources in e-learning environment become evident. A significant challenge for digital library design and use in new era will be to support the range of goals that are already alive in the classroom, rather than simply modifying information. How can digital libraries and their use open up an e-learner's inquiries, rather than bring them to closure? How might they enhance an e-learner's critical thinking, rather than dulling it? How might they assist in teaching e-learners search processes, rather than mystifying or suppressing this instruction? Without asking the real value of using digital libraries or any educational technologies, educators risk failing to see their transformative potentials, and at worst, they risk importing a contrary set of values that are embedded in such systems from their histories in other locations. For digital libraries, such an implicit value could be summarized as "complete information access leads to better education," just as it may lead to better academic research and work. However, the many educators and librarians who have stacked unused textbooks and shrink-wrapped software packets in the corners of their rooms know that access is only a beginning.

E-learners use of different technologies, whether they are traditional materials or digital resources available via the Internet, will be informed by and in turn will help construct the kinds of values that retain significance in education. As long as the educator and the assignment follow the status quo, any related source of information is likely a smart choice by e-learners according to their assessment of what to do for assignments. It follows both the form and content of what an eventual report should look like. Further, e-learners are often pressed for time, either by university scheduling or procrastination, and will often find the most efficient ways of completing work, a quality that educators find both admirable and dismaying. The stated and unstated values of an educational context will further intersect with the interests and needs of the e-learners, as well as with availability and nature of technological tools she or he is using.

## 7. Digital libraries and e-learning linkage; Institutional concerns

The literature would suggest that effective and efficient linkage of e-learning environments and digital libraries needs to be recognized by senior management in the long term strategic planning of the individual institutional mission, identifying their own specific cultural, social and educational requirements. Kovel-Jarboe concentrates on the potential for the linkage of e-learning environments and digital libraries to produce additional and innovative ways to enhance the teaching and learning experience. However, as a result of the change in teaching and learning methods, there is a potential likelihood for the blurring and uncertainty over professional roles within an institution [23]. Due to the fact that the integration of digital library resources into the e-learning environment is likely to draw heavily upon the experience of library staff, authors such as Davies[13] and Edwards[15] have explored the changing roles within the information sector. Increased responsibilities of library staff may mean they are required to teach new information

retrieval skills, as well as provide content development and input, deal with legal matters, maintenance and evaluation of the new learning materials.

As for the teaching methods and reaction to change, Jaffee [20] has commented how “in academia, obstacles to change are closely associated with the established practices and cultural traditions of the teaching faculty." Similarly, Browne [6] has identified how “academics are likely to recognize conceptual shifts within the subject, [while] support staff will be most alert to IT developments."

In reviewing definitions of the digital library, Sloan [38] identifies an emphasis on the technological and informational building blocks, and a neglect of human components, such as the service tradition and human interaction. The continuing changes in technology have been truly astonishing, and the scope for building new information services and new ways of representing content seem unlimited. However, it is very important to remember that investment in human capital is also a strategic investment, especially when introducing new technologies, procedures, and processes. Although technology is the key infrastructure of the digital library—a tool used to support library goals—human factors are the most important determinants of the success of the digital library.

The digital library serves mainly as a facilitator in organizing and providing knowledge and resources to its users. Sharing knowledge and information among library staff, researchers, faculty, students, and other departments within the institution encourages them to work together, develop their skills, and form strong and trusting relationships.

A focus on collaboration between the library and the faculty promotes a responsive approach to course design and supports teaching and learning objectives, particularly when this collaboration incorporates student contributions and feedback. All parties must have a common vision in which each one participates actively by contributing their skills and perspectives to the building of a genuine partnership. This new approach considers the library as an active partner of the learning community, helping learners to become “information literates” by integrating information literacy skills into the curriculum. For example, the library can help learners to evaluate critically the authority and authenticity of the resources they find, and to enhance their critical thinking skills. The library can also offer support to learners, and can mentor their work by offering one-to-one communication and interaction, and by achieving a deeper level of understanding of what learners need.

From a research perspective, a number of models can be involved in creating an environment that is responsive to the scholarly information needs of a diverse group of e-learners. Librarians locate, select and describe quality Internet resources, and provide access to journal databases and electronic book collections, providing e-learners with full-text content from a wide range of online resources and publications, including peer-reviewed journals. Within this framework, the library works with faculty, researchers, scholarly societies, and publishers in developing and managing a collection of enriched online scholarly resources. Such a partnership enables researchers to interact with others, exchange experiences, and publish their works online. The library role is thus transformed from simply being a provider of library resources, into meeting the ongoing support needs of the parties involved. The library also serves to foster research skills by encouraging students and other learners to search, investigate, discover, and take advantage of these valuable online resources.

Management support is as much a key to success in developing the digital library as in any other project. University's strategic plan should incorporate a distinct section related to library strategies and projects, and explains how these strategies are aligned with the overall mission of the university. A digital library should have a high profile leader, a key person who can work to obtain the support of the institution's management and promote a climate of change. [5]

Technological changes have been the dominant force reshaping library services. Instilling a culture of sharing, motivation, equity, and active partnering encourages library staff to respond positively to the changing roles, responsibilities, and skills that the integration and use of technology requires. A well-designed, ongoing training program enables library staff to upgrade their skills to their new assignments, and helps them to understand and control fear of change.

## 8. E-learners' Expectations from Librarians

Communication is not just important to break the isolation of students in an e-Learning environment but also for a much more basic reason: whatever one person says or writes, the receiver of the information will always interpret the information in the receiver’s personal context, created through upbringing, culture, language, etc. This does often lead to deep misunderstandings.

The only way to make sure that information is properly understood is not by reading, hearing, seeing, but by being able to check if things have been understood and by asking questions: this is why an e-Learning system that ignores the importance of communication will not work.

Historically, librarians have sought to provide services to distance learners that are equivalent to those available to on-campus learners [37], and this aspiration is grounded in the philosophical frameworks of the Canadian Library Association's Guidelines for Library Support of Distance and Distributed Learning in Canada [10] and the Association of College and Research Libraries' Guidelines for Distance Learning Library Services [2].

Both the Canadian and the American Guidelines recognize that distance learners frequently do not have direct access to the full range of library services and materials, and that in this situation, the goal of equity makes it necessary that librarians provide services that are more "personalized" than might be expected on campus. The library literature provides a rich record of

service models and best practices, and there has been an explosion in publication as librarians consider ways to support learners in a networked environment [36].

What do e-learners need from librarians? Suggestions advocating change in librarians' roles in support of e-learning in the information age appear throughout the literature: librarians “must assert themselves as key players in the learning process thereby changing their roles from information providers to educators” [12]; they have become providers of technical support [19] ; and they have been transformed from “information gatekeepers” to “information gateways” [18]. Lippincott advocates librarian involvement in learning communities: “The librarian can shift the focus from explaining library resources to meeting the ongoing information needs of the students in the broad information environment” [28].

In responding to the need to provide ongoing digital library support, librarians have worked at translating what they do in a traditional library into virtual or digital environments, while customizing their services and resources for e-learners. Traditionally, libraries offer circulation services, interlibrary loans, course reserves, an information desk, a reference desk, and library instruction. To serve learners connected to their institutional library primarily through a computer network, librarians are providing remote access to, and electronic delivery of, library resources, and are using communication technologies to deliver electronic reference services and instructional support.

As literature suggests e-learners are a wider community of learners than “students”. An academic library's learners may include students, faculty, staff, researchers, and so on. The library is seen as a source of training and guidance to a community of learners who are concerned with navigating the complexities of locating and using digital resources and services. Moreover, the move toward a digital environment has resulted in a shift from the systematic one-to-one information flow of the past to a new model in which the users and the providers of information are able to relate in a many-to-many, dynamic relationship. For example, in the traditional model, a librarian provides a bridge between learners and information providers by selecting and cataloguing resources and by providing assistance with these resources. In the new model, the library serves as a facilitator by offering ongoing support enabling learners to interact and exchange knowledge with others, to communicate directly with the publishers and vendors of information resources, and to participate in a collaborative endeavor to make available rich collections of online scholarly information resources.

## 9. E-learners and Digital Library Resources

Technology offers opportunities to be innovative, as the following discussion of electronic resources and services demonstrates, but it is important to bear in mind that not all e-learners are equal when it comes to access to computing equipment; the availability, speed, and stability of Internet connections; or the information skills that are needed to make optimum use of digital libraries.

Access to print-based library materials continues to be important, because not all of the information resources that e-learners need are available in electronic format: many of our most valuable research materials are still print-based. The Digital Library Federation and the Council on Library and Information Resources commissioned a survey of the use of print and electronic scholarly information resources at institutions of higher education across the United States. The survey found that, although almost half of undergraduates report using electronic resources all or most of the time for their coursework, this was the case for only 35.2% of graduate students. Only 34.7% of faculty indicated that they use electronic resources all or most of the time for their research, and just 22.7% said this of their teaching [16].

Although there has been a shift away from purchasing print materials to be housed in a physical building and toward providing access to licensed digital resources made available over a computer network, librarians continue to work to resolve issues pertaining to distance delivery of resources that are unavailable in digital format. Online catalogues and indexing and abstracting systems provide e-learners with convenient access to bibliographic information about valuable scholarly documents. When those documents are not available in full-text form online, a demand is generated for delivery from a library's print collection or from the collections of other libraries through interlibrary loans. Typical solutions for delivery of non-digital formats include the use of mail and courier services, the establishment of collections at designated sites, and the negotiation of agreements with other libraries through consortia.

Given that a growing number of learners are accessing library collections online, librarians are working to develop an integrated approach to providing access to electronic resources that facilitates retrieval and reduces confusion. A library Web site can function as an information gateway, an entry point to a range of online resources, with key components being the library catalogue and journal databases. Most online catalogues permit the integration of electronic books and electronic journals, enabling learners to locate items from digital and physical collections with one search. User services—such as the ability to check due dates, renew materials, and request materials online—are also provided. Gateways may also organize collections and incorporate directories.

As libraries work to enhance their presence on the Web, a growing number are investigating the potential of electronic course reserves (e-reserves). The traditional course reserves desk of an academic library, with its limited copies, short loan periods, and high late fines, can be a considerable source of frustration for students. In the e-reserves model, the library makes available, through the World Wide Web, items that faculty have selected and “placed on reserve” for students in a particular course. San Diego State University (SDSU) pioneered e-reserves in the early 1990s [35]. Many

other libraries have initiated their own projects. Electronic delivery of course reserve material has become a hot topic in the library literature [1, 9, 25, 41]
Managing the remote access and authentication issues involved in making digital resources available has become a significant area of support to users of the digital library [19]. Librarians may be called upon to respond to questions concerning log-in and password information, browser configuration, software installation, and a range of troubleshooting needs. Access problems are hugely frustrating for e-learners, and must be resolved quickly. Ensuring that front-line library staff are adequately trained, providing clear instructions on the library's Web site, and coordinating support activities with computing services personnel can contribute to effective technical support. E-learners also benefit from having a variety of means of contacting the library, including e-mail, Web forms, and a toll-free telephone number.

## 10. Digital Library Reference Services

E-learners require more than access to e-resources. Traditionally, a reference librarian acts as an additional type of resource, one who can be counted upon to provide expertise in making sense of library systems and research tools, and to offer a helping hand along that often slippery path known as the research process. Digital library users face additional challenges in mining relevant information out of a computer system that "obstinately" returns zero hits in response to a query that does not match the character strings in its database files.
The most common means of providing electronic reference services to remote users has been e-mail, the advantages and disadvantages of which have been well documented in the literature[36]. The around-the-clock and around-the-world accessibility of e-mail allows users to connect with librarians beyond the walls of library buildings and outside the usual hours of operation. E-mail provides a written record of requests and responses, permits the electronic transmission of search results, and allows librarians time to reflect on requests. One of the most serious concerns about e-mail reference services is their impact on the traditional face-to-face reference interview, particularly the absence of the verbal and non-verbal cues that typically assist a librarian in effectively responding to a question.
Hulshof [19] identifies three issues related to the use of electronic communication in serving virtual patrons (e-learners): immediacy, intricacy, and interaction. Because it is so easy for a learner to send a request electronically and have it arrive at the library instantly, there is a perception that the librarian's response will be as immediate. The learner may become frustrated, not realizing that the process of locating information and developing a response takes the librarian just as long when the request is made electronically as when it is made in person or in any other way. The more complex the request, the longer it will take for the librarian to clarify it and respond appropriately: a series of e-mail messages may be required, which will further reduce the immediacy of the e-mail request.
E-mail reference service can be enhanced and supplemented with additional technologies that raise the level of interaction with real-time or live communication. Chat technology allows e-learners and librarians to send text messages back and forth instantly, using a form of communication that is familiar to most Internet users. There have been a number of library experiments with Web contact center software, which is modeled on the private sector's online solution to providing customer support. Web contact center software provides a higher level of interaction than does basic chat software, allowing for queuing and routing of messages, as well as enabling librarians to "push" Web pages to users[22, 30]. Providing e-learners with a toll-free telephone number remains an effective and convenient reference services strategy, particularly for intricate inquiries. The telephone reference interview works best when both librarian and e-learner are working in front of computers connected to the Internet.

## 11. Digital Library User Instruction

Library instruction has always been a significant role that librarians have played. A survey of academic librarians indicates that librarians' involvement in instruction has increased in recent years as library databases and the Internet have increased the students' need for instruction and information literacy [39]. To address this need, reference librarians provide tours, introductory and subject-specific classroom instruction, as well as on-the-fly, at-the-point-of-need instruction in the reference department.
The new challenge for librarians is to provide similar instruction to a growing population of remote and/or distance e-learners. With the increase in digital library collections that are accessible outside the library via the Internet, students are visiting libraries less frequently. Telephone and e-mail reference allow reference librarians to provide short and sometimes detailed reference assistance to e-learners but these media are too cumbersome for remote instruction. However, with the advent of real-time virtual reference, librarians now have the ability to provide instruction to remote and distance learners.
E-learners are frequently silent and invisible as they search and explore a digital library's resources, and they do not have the same access that on-campus learners have to formal library instruction sessions. With the array of digital resources available to them, the multiplicity of interfaces and search tools, and the need for evaluation and critical thinking when using the Internet for research, "information literacy" skills are a must-have for e-learners. Information literacy refers to competencies with information sources in a variety of formats. According to the Association of College and Research Libraries[3], an information literate individual is able to

- Determine the extent of information needed

• Access the needed information effectively and efficiently
• Evaluate information and its sources critically
• Incorporate selected information into one's knowledge base
• Use information effectively to accomplish a specific purpose
• Understand the economic, legal, and social issues surrounding the use of information, and access and use information ethically and legally.

Further still, Bundy [7] has observed the role information literacy has to play in participative citizenship, personal empowerment and social inclusion. A recent definition proposed by the 'Prague Declaration' goes yet further by proposing that information literacy constitutes a human right:

"Information Literacy encompasses knowledge of one's information concerns and needs, and the ability to identify, locate, evaluate, organize and effectively create, use and communicate information to address issues or problems at hand; it is a prerequisite for participating effectively in the Information Society, and is part of the basic human right of life long learning"[31].

Supporting the integration of information literacy skills training into the core curriculum has become an important issue for libraries [36]. As an extension of their traditional role of providing library instruction sessions and developing instructional materials, librarians are designing online tutorials and courses that promote information literacy and encourage active learning.

Many libraries provide instruction to e-learners by making information available on their Web pages, including frequently asked questions, library glossaries, research guides, and "how-to" pages. Online tutorials usually operate on a model in which the e-learner interacts in isolation with a computer. Their effectiveness can be enhanced by the addition of more interactive forms of instruction. The librarians at the Florida Distance Learning Reference and Referral Center, for example, have experimented with chat software to simulate a virtual classroom and open up "live" group instruction to e-learners [40]. Librarians can also work with faculty to develop a library thread in a course discussion area, or to open a discussion forum on the library Web pages.

## 12. Conclusion

In this paper, the author hopes that he has supplied a reasonably comprehensive summary of the current key areas of necessary interaction between the e-learning and digital library worlds, and also some perspective on common services that both of these worlds should draw upon rather than re-develop them.

In summary, digital library services are an essential component of a quality e-learning system. As access to Internet-based courses grows, an increasing number of e-learners are dispersed around the globe, often in parts of the world where physical access to the collections of large academic and research libraries is impossible. These learners are largely dependent on the quality and academic usefulness of services that the digital library can offer electronically. The strength of digital libraries and digital collections depends on the relationships libraries develop and maintain with the creators, publishers, and aggregators of e-resources, as well as with those who use, learn from, and evaluate these resources. Providing ongoing technical, reference, and instructional support to e-learners requires that libraries redefine their values and services, collaborate with their users, and approach their tasks creatively.

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