

The integration of information services into an on-line environment

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Abstract:

E-learning, now established as a permanent feature in the teaching landscape, has created long term effects for information professionals. As educational institutions grapple with developing new models of support for this new and growing group of students, so too do information professionals. To enable informed decisions, prepare library services and ensure appropriate support for teaching staff and students, information professionals need to have pertinent information in e-learning. To this end, the presenters of this paper visited libraries overseas to investigate the relationship of the new players within the electronic environment, the needs of the students and the role of the information professionals.

Introduction

Education is experiencing an era of unprecedented change. Since 1995, academics have been talking of a “revolution”, “a new educational space created by local and global information and communications networks” and a “paradigm shift in the way in which academic practice is designed and implemented” (Fowell and Levy 1995). This revolution and paradigm shift involves the rapid emergence of e-learning, which has now become fully entrenched in educational institutions. E-learning is creating profound and permanent changes.

Libraries, not surprisingly, have also been caught up in this new revolution. Libraries have always been changing, moving, and evolving entities. There are many examples over the years that show that libraries are amongst the first to embrace new technologies as they develop. In today's technological environment, libraries are being presented with new challenges, which have the potential to totally restructure their traditional role. The new electronic environment is provoking many libraries to rethink their services and restructure their organizations. There is a well-documented convergence of libraries and information technology centres to facilitate use of information technology. E-learning provides opportunities for libraries to grow and expand into new service areas and for information professionals to broaden their role. Electronic resources entice people into the library where they learn about other services.

From the beginning of the electronic revolution, information professionals have been striving to develop new models of support in order to provide access to seamless electronic services and document delivery systems. Libraries now attempt to reach out to students how, when and where it is most convenient. Students can be learning electronically via the classroom or remotely; either way they should receive the same level of service and support.

Information professionals must also actively educate administrators and teachers that there is more to life on-line than electronic resources. These resources constitute a mere fraction of the services necessary to support on-line students. Reference, instructional, information literacy and IT services are also a vital part of the support needed for on-line students.

This paper will discuss the integration of information services into an on-line environment. The challenge affects particular library environments in different ways. The points discussed here are mostly from an educational library viewpoint although they are applicable to any library environment. "Libraries are now questioning their roles and seeking to find appropriate service scenarios for this very different world" (Brophy, 2000, p2). This paper offers suggestions as to the roles of libraries and information professionals in this new environment and how libraries and their services can be re-created and maintained to suit this new environment. This will be achieved by suggesting what the new librarian and library model's profile will require, as well as providing some examples of electronic client support services and broader strategies for their integration into an on-line environment.

Terminology

There is a whole new language accompanying e-learning with which information professionals need to become familiar. Information professionals should be seen as leaders in the community: they guide people through resources and help people find answers to questions educators, information technologists and other related staff need to establish parameters on what is being said and how these terms are being defined.

Some examples of terms that are currently in use are 'flexible learning', 'e-learning', 'web-based learning' and 'distance learning'. These terms are often used synonymously which also adds to the confusion. It is necessary to understand the lingo is to be part of this phase of librarianship. Appendix 1 produces a list of terms that the authors found commonly used in conference papers, journals and other scholarly articles on e-learning.

Scholarship Objectives

The TAFE Staff Development Travelling Scholarship awarded to the authors at the beginning of 2001 offered the opportunity to investigate the e-learning environment in practice. It funded attendance at the Telecon E-learning Conference and Expo in Washington D.C. and visits to nine community colleges/universities in the United States and Canada. (see Appendix 3) Each of the educational institutions visited offered a unique insight into the implementation of e-learning programs. The exchange of ideas provided a very rewarding experience.

The objectives of the scholarship trip were:

- investigation into how information professionals have embraced their roles in this new environment which incorporates e-learning
- examination of best practices for collaborative communication between educators, IT staff and information professionals
- appraisal of services designed to support e-learning students and whether they are suitable for implementation in Victorian TAFEs
- examination of the move in libraries from sole emphasis on developing resources to developing a wider environment that supports the learner
- examination of how students accept, and perform in, an on-line environment, and the training required to enable students to get on-line and stay on-line
- assessment of the software and hardware requirements and technical support that is required to enable the viability of e-learning courses.

The objectives were met to varying degrees. The information gathered in meeting these objectives will be discussed within the body of this report.

E-learning Environment

In order to determine which places were to be visited, a thorough search of the Internet was conducted and e-mails were sent to various Associations, for example, the Canadian Association of College and University Libraries. A request for the names of libraries which, due to their experience in elearning were worth visiting, resulted in a number of libraries being recommended.

Canada was chosen as it was anticipated that, given its similarities to Australia with its geographically dispersed population, its experiences could lend insight into, and be of relevance to, the Australian library situation.

Our Internet research indicated that the U.S. Department of Education has shown a strong commitment to technology in schools. It has excellent, well-established electronic services and library support systems to ensure their on-line students are not disadvantaged. The number of elearning conferences held each year throughout the States, is an indication of the overwhelming interest in the subject.

The United States

In 1996, the nation's first educational technology plan was released – “Getting students ready for the 21st Century: Meeting the technology literacy challenge”. This report was released by the U.S. Education Department and presented a vision for the effective use of technology in elementary and secondary education. It resulted in huge investments being made in technology for education. In 1999, as a result of the further advances in the affordability and capabilities of technology, the U.S. Department of Education undertook a strategic review and revision of the plan. The outcome was five new national goals for technology in education, detailed in “E-learning putting a world class education at the fingertips of all children” (Office of Educational Technology, 1999). These five goals are outlined below.

National Educational Technology Goals:

Goal 1: All students and teachers will have access to information technology in their classrooms, schools, communities and homes.

Goal 2: All teachers will use technology effectively to help students achieve high academic standards.

Goal 3: All students will have technology and information literacy skills.

Goal 4: Research and evaluation will improve the next generation of technology applications for teaching and learning.

Goal 5: Digital content and networked applications will transform teaching and learning.

It is interesting to note that information literacy (goal 3) is on the national agenda and is a concern for educationalists as well as information professionals. The executive summary of the report states that what is necessary are “information problem solving skills such as how to define tasks, identify information seeking skills locate and access information determine information’s relevance, organise and communicate the results of the information problem-solving effort and evaluate the effectiveness and efficiency of the solution.” (Office of Educational Technology, 1999).

In addition, the bipartisan, congressional Web-based Education Commission recently presented the findings of its report to the Congress and the President, urging the United States Congress to make e-learning a centrepiece of the nation’s education policy. This report, “The power, of the Internet for learning: from promise to practice” (2000), found that there is “sufficient evidence to know that the Internet – if used wisely – enhances education. We know it works. It is an empirical success in schools, an empirical success in the private sector” (Web-based Education Commission, 2000).

The report calls for:

- the development of powerful new Internet resources, especially broadband access, widely and equitably available and affordable for all learners, so all students can access high speed Internet
- the provision of continuous and relevant training for educators and administrators at all levels
- a new research framework of how people learn
- the development of quality, on-line content

- revision of outdated regulations
- sustaining funding

The students who have benefited from the far-reaching vision and commitment to technology are now moving into higher education. Their confidence and skills in using the Internet and computers as the medium for expression and communication will mean that on-line learning will be embraced without reservation and without fear in the near future. In 2000, already 60 percent of American universities were offering some coursework on-line. (Wolinsky, 2000)

Private corporations are also in the vanguard of e-learning in the United States. Corporations see e-learning as an effective and less costly means of training their staff. In 1999, 20 percent of corporate training took place electronically and that number will double by the year 2003 (Wolinsky 2000).

Canada

Similar to the United States, “many provincial governments and institutions have set in motion, serious efforts to mount online learning programs as a means of meeting the growing demand for lifelong learning programs and responding to the interests of a new Internet-savvy college generation” (Advisory Committee for On-line Learning, 2001). These efforts have been mounted since 1993. In 2001, the Council of Ministers of Education, Canada and Industry Canada founded the Advisory Committee for On-line Learning. The committee’s mandate was to provide advice on the means to optimize on-line educational opportunities, as well as investments required to build a world class Canadian presence in on-line learning, at a federal level. There is concern that Canada is falling behind despite provincial efforts as they are “handicapped by fragmented jurisdictions, while institutions in other countries are able to take advantages of national strategies.” (Advisory Committee for On-line Learning, 2001).

The resulting report, “The e-learning e-volution in colleges and universities: a Pan Canadian challenge” (2001) is similar to the American report, “The power of the Internet for learning: from promise to practice”. The Canadian report calls for improved access, developing a new paradigm for the knowledge based society, the development of quality, on-line content, greater support for teachers developing online materials, and greater access to library resources.

At each of the Universities and Community Colleges visited in the United States and Canada, we were exposed to this growing emphasis on developing elearning programs. Each institution had an elearning department, each were attempting to increase the number of courses developed and the number of students enrolled in online learning. However, we found that rather than offering fully online courses, the current trend was towards offering technologically enhanced courses, that is, courses which have both on-line content as well as classroom contact.

Australia

This is also true of our research in Australia. In a recent Age newspaper article, it was reported that within the Victorian TAFE and private provider sector, “there are 78 course providers supporting 13,500 on-line students. The number of students is growing at 1000 a month” (Wilson, 2001). The article also reported that e-learning systems are being used to support traditional education methods, rather than replace them. Increasingly, what is happening is that most courses have an on-line component. But very few have on-line components alone. The

reason for offering courses in such a manner is to allow total flexibility to students (Wilson, 2001).

E-learning is being embraced by institutions because of the need to keep up to date with the rest of the world, if we do not create on-line courses in Australia, then local students may seek this flexible teaching medium overseas. Because it is a global market deliverable anywhere, anytime, students are no longer limited to local institutions for education. Institutions that excel in this new delivery method, no matter where in the world they are located will gain competitive advantage over those that do not. Existing institutions are now in competition with private providers and new universities with minimal building infrastructure but with advanced IT, which offers electronic alternatives to traditional education. In this environment no institution can afford to be left behind.

Because of this, universities are rapidly moving in the direction of the fully on-line environment. Helen Hayes, Vice Principal (Information), Melbourne University Library has predicted that there will be a greater swing towards more fully on-line classes (Hayes 2001).

Limitations of the E-learning Environment

Physical Layout of Libraries

It is easy to be impressed by technology and its capabilities. The reality is that many libraries do not have the finances or infrastructure in place to make these new applications a reality. The equipment required to offer electronically based services can be a problem for libraries. The skills to run these technologies also need to be acquired by library staff. This issue will be discussed below in the section titled 'Redevelopment of the Library Service'.

In the past, libraries changed physically mainly to expand their collections. In recent times libraries have changed to incorporate computers, network connections and other technologies. It has been suggested by Bazillion (2001) that as the need for storage space for physical collections reduces, shelving can give way to furniture and workstations.

From our travels, it was noted that the physical layout of the library environment had a great deal to do with the success of e-learning. The physical layout from the successful venues we visited had changed dramatically from a traditional library's 'shelving' type model to a more 'technological' model. Without technology, e-learning is difficult. This was clearly illustrated at the libraries we visited. The layouts of these libraries can be viewed at their web-sites. (See Appendix 3)

The Scotiabank Information Commons located on the first floor of the main library at the University of Toronto has a futuristic atmosphere. The unusual design is definitely a move away from the traditional library environment and was helped by the fact that previous commissions by the architects, included nightclubs. The lighting alone, which appears cloud like, is far removed from the normal bright fluorescent lighting of most libraries. There are 200 larger than normal workstations with PC's, scanners, cameras and other technologies. The students have access to a huge range of electronic databases and software packages. Two Help Desks have been established. The first provides an on-the-site help while the second provides phone assistance to off-campus students. This service is similar to that of a call center. The vision statement of the Information Commons reflects this value placed on a high technological environment.

It reads:

- enabling access to information resources through technology
- knowledge access through technology
- opening doors to knowledge at the University and elsewhere
- information access for the University's community (Scotiabank Information Commons, 2001)

The University of Calgary has an award winning Information Commons. It is similar to the Information Commons at the University of Toronto, if not in design, certainly in its focus on technology. It has a more traditional layout, but includes 235 computers giving students integrated access to the Internet, the library's electronic services and resources, e-mail, and office productivity tools (word processor, spreadsheet and presentation software). At Centennial College, wireless networks are being developed giving greater flexibility to students. Grant McEwan established an Information Technology Services unit as part of their Learning Resources Center (LRC). This unit provides a variety of technology services to the students working within the LRC and the Learner Center, (the LRC's open access PC lab, housing approximately 100 PCs). It also provides support to staff throughout the Institution. Seneca College has recently opened its showcase campus at York, located on the same campus site as the York University. This is know as the technology campus within the Seneca College and the Information Commons houses 200 PCs, an electronic help desk staffed by IT professionals, and there is emphasis on purchasing electronic resources rather than building up a print collection. Finally even the smallest community college that we visited, Sir Sanford Fleming, had a Resource Center which incorporates 230 multimedia PCs.

The Digital Divide

Access to computers and the Internet, and the skills to use these electronic technologies are important. Providing access to on-line technologies is necessary for ensuring equity in access to resources, allowing capitalization for people offered this medium.

In Australia, Internet usage is increasing very rapidly. However, some inequities do still exist. These occur in groups of people who have a low income, have no tertiary education, live in rural or remote areas, have Aboriginal or Torres Strait Islander heritage, are disabled, have a first language other than English and or are aged over 55. "For those unconnected Australians, the barriers they face in achieving on-line access is similar to those experienced by the disadvantaged in other developed industrialized countries: set-up and access costs; lack of physical access; a perceived lack of relevant content; security concerns; lack of skills and training and illiteracy... ABS states 67% of households are not connected to the Internet" (NOIE, 2001).

The Australian government is addressing these issues (for more information see <http://www.noie.gov.au/projects/access/communities/digitaldivide/Digitaldivide.htm>).

The issue of the digital divide is global, affecting even the most industrialized countries, such as the United States, Canada and Australia. In establishing an on-line environment for students, it is important to bear in mind that many of the students will not have access to the required technology. It is important to be aware of and sensitive to, this client group and ensure provision of additional support. It is easy to neglect this group when technology is perceived as being

prevalent in all households. Unfortunately, while on our trip we did not see any evidence of the schools visited making allowances for the digital divide. Resources were exclusively provided for their own students.

Client Profile

There have been changes in the way information is presented to people in many areas of their lives. People can now purchase groceries on-line, change their address for their vehicle license registration on-line and receive news and buy and sell shares on-line. This has fueled the client to have different expectations from the library. Clients have an expectation that services will be delivered to their venue of choice.

Information professionals need to understand the changing expectations of the client group with which they are dealing. Students who are fully on-line require access to full text databases, on-line literacy sessions and user support, to ensure they are not disadvantaged compared to students on campus. However, all students require accelerated access to print and electronic course-relevant information. This results in increased expectations from libraries with respect to technology, facilities and support. Part of this new consumerism demands full text information being delivered to the desktop. There is zero tolerance for delay in information delivery.

This is supported by Parnell (2001) who states that "for many students, not only is something better than nothing, it's better than waiting." With this in mind, it's important that information professionals are activists in the development of on-line courses and investigate all possible implications and impacts on traditional library services. These may include changes in the way reference inquiries are handled.

Information professionals could be involved in live reference chats with students whether the students are off campus, in a PC lab on campus or in a library attended by paraprofessionals only. Instead of having a number of reference librarians staffing a library, a reference librarian could be on-line, having reference questions queued to them from many institutions.

Research also indicates that many of the students opting for on-line courses are older, mature age students (25-45years old) constrained by distance, home and work commitments. By the very fact that they have a family or a well-established career and their age, these students are highly motivated and exhibit ambition. Rosenquist-Buhler found in 1996 that, while some online learners may be "already familiar with the library, many possess limited experience with library research and are unfamiliar with electronic resources. Likewise their technology backgrounds may be more limited, and they may have less access to technical computer support with the bulk of their experience gained in the work setting (Cooper, Dempsey 1998)

Younger students are beginning to opt for a mixture of classroom and on-line modules (Kirk 1999). It is expected that these younger students in the future will continue to opt for on-line courses, and will continue to demand far more improved services. These students will have experienced the benefits of e-learning and have expectations about support services.

Some people take to electronic services. They are pushing the boundaries constantly asking why some services are not available. This group, classified as early adopters of technology, sees the benefits these services provide immediately.

However, there is another group that is more reluctant to use this medium. They need to be treated with care for fear they will reject the technology and miss opportunities. For these people

in particular we must carefully market our services proving the benefits to them before they even try them. Most people who are shown 'what's in it for them?' are more willing to try new things, especially when a time/inconvenience saving is shown.

Library Services in an e-learning environment

Electronic Reference Services

Email

The first step in providing a reference service in an on-line environment is the provision of an email-based service. E-mail reference services have been around for a number of years with great success.

Even a quick Internet search of e-reference services offered by universities and colleges globally, will provide numerous examples of the 'Ask-A' services, Ask a Librarian, Ask A Question etc. The user will be invited to send a query to the email address provided or they will be supplied with an on-line form, which they complete and post to the reference desk. The librarian responsible for these e-mails has a certain time frame in which to respond – usually 24 hours.

The 'Ask A Question' service provided by Grant McEwan Learning Resources Center in Canada is no different, with the exception that it was developed and is maintained by a consortium of libraries. The concept began in 1998 at an Alberta Association of College Librarians. Provincial Government funding was secured and a librarian was employed to coordinate the project. Today there are 13 libraries that are part of this consortium. The service ensures that qualified staff, with subject expertise across the institutes, respond to the numerous questions quickly. It has a continuously updated, searchable database of questions and answers that enables the students to look for questions similar to their own. The IT department of Grant McEwan worked in collaboration with library staff to ensure that the software was well designed and user friendly, hardware ran smoothly, appropriate help was available, routing was possible between sites and statistics were generated automatically. This resulted in a successful service.

The success of this service belies the many inherent limitations and problems with e-mail reference. It does not offer the instantaneous response and immediate gratification of face-to-face interviews or web-based searches. It does not allow a reference interview to be conducted and the burden of answering questions falls on the librarians.

The success is also eclipsed by the success of the number of dot.coms challenging this core service. The Internet search engine AskJeeves receives 3 million hits a day and a number of other sites have been established such as AskMe.com and AskAnything.com, which have recruited librarians to assist in building up a storehouse of information. (Weissman 2001). These dot.coms are “fully automated solutions providing access to an answer/knowledge base. [They] have a storehouse of information which will do a keyword match and send information to requests” (Missingham, 2000). This makes searching the Internet more efficient and is preferable to waiting 24 hours for a librarian to respond to your query with possibly several transactions required to complete the query. E-mail transactions, which were thought to be a breakthrough, are now viewed with frustration by customers, who would like an immediate answer and a reference interview such as they would have face to face (Borchardt, Croud 2001).

Synchronous Chat

The next step in the evolution of electronic reference services is synchronous chat. Chat addresses many of the problems of email. It puts a human face to the online reference service in that it allows a librarian to conduct an interview in real time.

It is suitable for short questions and as an initial access point for students. The software can be run on a PC and is simple for clients to use. Most chat software, such as Human Click, which is becoming a very popular choice amongst librarians, allows the student to click on a button from the library's website and participate in an interactive reference interview with a librarian. There is no software or extra plug-ins to download. The software is also simple from the librarian's point of view. They are able to talk in chat areas and send predefined scripted messages.

Some of the more expensive chat software such as Library System and Service (LSSI), 24/7 and Convey, also enables co-browsing, pushing web pages to the student, previewing the web page prior to sending, and capturing and sending screen shots. In addition, the software allows the librarian to walk the student through slide-shows, web sites, databases and elaborate searches, transfer calls to other librarians or other libraries and produce a transcript of the session. The transcript can then be used as the basis for Frequently Asked Questions (FAQs).

Unfortunately, we did not see an example of chat reference being utilized in any of the libraries we visited. However, we have recently learnt that York University and Seneca at York are investigating the implementation of the Virtual Reference Desk software from Library Systems and Service (LSSI). A number of public libraries across America have brought this software and now provide live reference services via chat software.

Closer to home, Southbank Institute of TAFE in Queensland have successfully established a chat reference service using Human Click.

Chat also provides a vehicle for information literacy sessions to be conducted with distance education students. At the University of Toronto, we met with librarians who were successfully using chat to support online students in developing independent research skills and as part of their online course The Virtual Library. They were initially invited to participate as a guest "speaker" on a regular chat session held between the teacher and her students. The focus of the talk was to discuss how to successfully research which e-resources were applicable for their assignments, when to use e-journals and when to use the internet and so forth. In other words, they were presenting an information literacy session via chat. This eventually resulted in the librarians developing an extensive online information literacy course called the Virtual library.

For students to be able to access a qualified reference librarian from wherever they are studying is an exciting leap in the quality of customer service.

24/7

This topic has been included here, as it was something that was discussed frequently with many librarians overseas. This was despite no library even contemplating the implementation of 24/7 reference. It is an area that is hotly debated and an area that many people are divided on. However, the Internet and web-based electronic databases and journals have created 24/7 access to information. Current research shows that there is a definite trend towards the decline of reference statistics in the traditional settings. If librarians are not to lose students to the Internet, we must begin to think about reference services becoming 24/7. All the online software lends itself to 24/7.

While the Internet has certainly provided us with the tools to do so, such an undertaking would be beyond the scope of any one library. Co-operative ventures are starting to enable the development of such services. Global collaboration is very useful due to time-zone issues. National Libraries are already paving the way.

The 24/7 Reference Project (<http://www.247ref.org>), a co-operative effort amongst all public libraries in Los Angeles and Orange Counties, is an example of a solution to the “web-driven mandate of 24/7” (Helfer 2001). LSSI’s Virtual Reference Desk is a service offering live synchronous reference assistance 24 hours a day. It also involves the co-operation of a number of libraries. LSSI’s website describes itself as a reference referral network being shepherded by the Library of Congress. (Library Systems and Services, 2001).

Many universities and National Libraries are collaborating to provide 24/7 reference. The Library of Congress, the National Library of Australia and the National Library of Australia, is one such collaborative project. These three libraries are realizing that “there is real potential for collaborative 24/7 reference on a national or even global scale and collaboration is essential” (Schneider, 2000).

On-line Information Literacy

If librarians are to be developers of on-line teaching packages, they must first learn and understand the new pedagogy for on-line learning.

When learning/teaching is transferred to text based course mediated by a computer screen, you effectively remove 93 per cent of how we usually acquire learning. People read differently from a computer screen; compared with a printed page, the screen’s resolution is poor. Only 16 per cent of readers read pages intensively while 79 per cent just scan pages. We read 25 percent slower on screen than on paper and feel less comfortable. (Lambe, 2001)

Understanding of best practice, style, format and content for on-line learning is still in its infancy and new developments are occurring constantly. If e-learning is to compete with face-to-face delivery for richness, then there is still a lot of work to be done on pedagogical tools and strategies to compensate for sensory loss. (Lambe, 2001)

Recently, there have been many studies conducted to investigate the factors that affect students’ satisfaction with a web course. Howard Wolinsky neatly sums up the results of these studies in his article: ‘Students crowd e-classrooms’ (2000) “The secret of online learning is in the pedagogy, the fancy word for the science of education. There are still textbooks. But no more lectures and no more teachers’ dirty looks”. Students now learn through doing, not lectures. Information online cannot be too wordy – it is difficult to read from a computer screen. The information should also be broken up so that students can concentrate on what they don’t know and gloss over the parts they do know. It should be visually stimulating in order to maintain the student’s interest. The information should not be a case of pasting classroom notes onto a web-page. Armed with this new knowledge and Information Literacy standards, many librarians have attempted, quite successfully, to transform traditional information literacy sessions into on-line versions. There are two types of on-line courses, which were observed overseas and found through our research. The first is the on-line course that requires some face-to-face contact and the second is completely on-line course.

On-line courses – with some face to face content

Both Seneca College and San Francisco City College provide this type of information literacy. Both courses are delivered over a semester, are comprehensive, interactive and require assignments to be completed and marked by the lecturer. San Francisco City College also has mid semester and end of semester exams, which requires the student to be on campus.

Seneca's series of information literacy courses entitled 'Research For Success' took a number of months to develop. These resulted, from a close partnership between teachers and instructional designers. Librarians conceptualized the material and provided a logical framework. They reported that it was a challenge to ensure that it was not wordy, that everything fitted on the screen and the essence of what they were trying to teach came across. The instructional designers developed the HTML, the graphics and the technical aspects. The teachers developed assignments and assessed students' results.

The information literacy module developed by San Francisco City College was developed solely by the librarians – content, design and assignments. The module meets the Information Literacy standards set by the American Library Association. It is a full university accredited module and students who are intending to articulate to a university course are encouraged to undertake it.

On-line courses, such as those developed by San Francisco City College and Seneca College, are fast becoming prevalent, not only in community colleges but also in universities and TAFEs, both overseas and in Australia.

On-line tutorials

There are a number of libraries both in Australia and overseas that have developed general, non-subject specific Information Literacy tutorials that are available freely from their websites. These tutorials are self paced and for the self motivated student or any member of the public. The Queensland University of Technology, Texas University and York University have examples of this type of on-line tutorial. These tutorials do not require any special software to be downloaded by the students, and are quick, simple and straightforward. All attempt to achieve good design elements. These include information that is not wordy, with little scrolling on each screen; information that is broken down into very specific topics that enable students to skip areas that they are familiar with and have visually stimulating screens to maintain students' attention. All include quizzes to mark the progress of students and demonstrate their understanding of the subject matter. Some of the quizzes are also interactive. All succeed to varying degrees.

In many cases it is not clear whether or not distance education students are required to complete these courses as directed by the teachers or whether they are simply available for the interested student.

An excellent example of an on-line information literacy tutorial designed for the remote distance education student is the Virtual Library at the University of Toronto. This tutorial was developed through an exceptional partnership between faculty and library.

The Virtual Library is designed for a specific course, with plans to modify it for other courses. With over 13,000 full text journals and 300 databases available at the university, the Virtual Library course was designed to ensure that distance education students were fully versed in the correct databases and journals they required for their course. As previously mentioned, best practice design for on-line packages is yet to be established and there is still a lot of work that

needs to be done to ensure the richness and success of the medium. The team at the University of Toronto has achieved this success by combining all the powerful opportunities of on-line learning – tutorials, collaborative interaction, group work, dialogue, coaching and feedback.

The Virtual Library, although the team leaders acknowledge that it still needs extensive reworking, was the only example we observed of this type of fully online, subject specific Information Literacy tutorial. The librarians reported that they were excited with its development, as were the students. They felt that the elements they included gave it strength. These elements included it being self-paced, bulletin boards, email, chat and threaded conversations. The librarians were available on-line to discuss research skills and relevant databases and e-journals. They were also available via email to discuss individual problems and they encouraged communal discussions about research via threaded discussions.

Initially, University of Toronto's Virtual Library students experienced technical problems and there was a huge student dropout rate because of these frustrations. These problems have now been sorted out, due to the flexibility and ease of use of the software (everything is point and click) that facilitates ease of use.

Portals

The first effort in customization of the World Wide Web experience was through the creation of homepages. These were, initially, institution-centric slabs of information, which could be read but not interacted with. In the second phase of this phenomenon there were various services made available through the homepage within the context of the overall service being offered by the institute/library. The addition of some services being offered via the page was a major advance but clients were still only seeing the institute's view of itself. All clients saw the same screen despite client's varied needs and preferences (Strauss, 2001).

The new model of customization is the web portal. This is user-centric and interactive. Portals have been defined in many ways. In simple terms a portal is a web-site that incorporates content from other web-sites both external and internal to an institution in a structured way. (Millichap, 2001) In more advanced terms it "provides a gateway to the web that allows the plethora of information available both on the Internet and Intranet web-sites to be organized and customized through a single entry point" (Connolly, 2000). As well as this it incorporates new services to clients. Some institutions have merely changed the name of their homepage to portal, which is not accurate.

Latest developments in portals include voice portals that "let you talk your way to web based information from any phone" (Manes, 2000). For details on the different types of portals see <http://www.traffick.com> which is known as the portal to portals.

Library portals

A library portal is a "niche portal" or "vertical portal". This means it has information relating to a specialized area, in this case libraries, information and research. It is content rich, portable and customizable, pushing relevant data to clients through profiles which pull their interests in from data gathered so that relevant features and information can be pushed to the client.

There are a number of web-sites providing free library portal software such as 'My Library'. These 'freebies' are limited in scope and a number of universities have taken the concept and

developed their own 'MyLibrary' type portal. Below is a description of one that the University of Toronto has created.

My Library - University of Toronto

The University of Toronto's library network is in an enviable position; they have their own Information Technology Services Department with 26 staff. One of their more innovative developments is the 'MyLibrary Portal'.

The MyLibrary Portal has many features: it is a window to all the library's services and resources. It is customizable, private, focused and portable. Staff and students appreciate being able to choose items for resource/reference lists by the click of a mouse button. (Poulter, 2001b)

Portals have been described by Lakos and Gray (2001), as "the means to free up information professionals to do their 'real work', a powerful concept". IT people create or maintain the portal platform while information professionals advise of their needs and provide information for inclusion within the portal as the content experts. This allows specialists in each area to work together in a collaborative relationship that benefits everyone (Lakos and Gray, 2001).

Why does a library need a Portal?

In many ways, the library portal may have similar features to the traditional library web-page. These include the web's ability to:

- achieve a more proactive, user-centered, service-oriented library model by providing access to e-books, e-journals (possibly via links on the catalogue) and e-reserve items such as lecture notes. Such a process puts the client in control of their resources, preventing them from information overload
- raise the profile of the library, both within the institute and externally, and retain the image of information professionals as trailblazers, being at the forefront of new technologies and presenting new ways of organizing information (Eustis and Miller, 1998)
- provide on-line access to catalogue services such as placing holds, suggesting titles or renewing items on loan
- promote interactive on-line experiences with library staff, for example, e-reference services and chat sessions regarding library issues such as research and by implication will create healthier local learning communities
- help contribute to positive learning outcomes and help achieve the development of lifelong learning skills.

There are some unique benefits to the creation of a library portal. A library portal is required to:

- integrate information and provide seamless access to services including databases. This includes the ability to undertake simultaneous searches over a variety of on-line databases and subject gateways, possibly over different disciplines.
- push relevant information to people and personalize their web experience using information provided by the client on their profile, for example, keeping clients up to date via alerting services when new materials arrive that are of interest. Also, separate interfaces for different client groups ensure only services related to that group will be offered to them.

- change libraries' organizational culture and bring what is offered more into line with what people require, particularly in the case of e-learners. It should provide the e-learning user group with resources directly relevant to their special needs. As the web is the preferred tool used by many clients to search for information and communicate, services need to be offered in this medium. To ignore this opportunity to reach clients may make libraries irrelevant or less effective in the future (Lakos and Gray, 2001).

Dynamics between key players

There is a need for key groups to work together based on an effective model to ensure courses are created that will provide adequate learning resources, enabling students to learn effectively. Without the correct setup and resources, students are at risk of becoming lost.

In the educational environment the key players in creating and supporting courses are educators, information technologists and information professionals. In the past, there has generally been a fractured relationship between these groups. These groups tend to compete with each other within an institute, each wanting to prove their expertise. It is a competitive environment with departments fighting for continued and improved funding and status.

Some institutions have been forward thinking in reaching a solution to this problem. The following are some of the solutions observed. University of Toronto has an Information Technology department within its library, ensuring they do not have to compete for IT resources and expertise. This means they can be on the cutting edge of creating new services and resources. Another example is at the Sir Sandford Fleming College where their web production technologist, who creates courses, is based in the library. At San Francisco City College they have a Distance Education librarian dedicated to creating on-line information literacy.

Geographically co-locating the key players in close proximity makes a difference in their relationships. If management makes it worthwhile for these departments to work together, and takes away the competitive aspect by creating an environment based on collaboration rather than department performance, the culture will change and benefits will result. Collaboration, not competition, is the key.

Broader Library Strategies for Integration

It is clear that libraries need to restructure and information professionals need to learn a new language and techniques for providing services to fit this new environment. However there are also methods of change that do not require remodelling, changing furniture/equipment or re-skilling staff. There are changes that can be undertaken by any library, at no cost.

Collaboration

We can "share to survive or perhaps collaborate or crash" (Harvey, 2001).

Collaborative efforts can save time and money. The new catchphrase of effective institutions should be "do nothing alone" (McLean, 2001). This is further emphasized by Myton (2001a) who states "A new Institute mindset has to be developed which recognizes and develops its assets, works more in partnerships and deals more beyond its borders". This can be applied to all levels within an institution and also between institutions and SIGs (Special Interest Groups).

Collaboration can be achieved at many levels. An immediately recognisable example of collaboration within an educational institute is the 'E-learning module creation' model at Sir Sandford Fleming. This Canadian Community College ensures educators, information professionals and information technologists collaborate at the conception of each new e-learning module. A team is created consisting of all key staff to examine the viability and development of the course.

"Collaboration is increasingly seen as a source of competitive advantage and a way to help people take full advantage of the potential of the new technological and information age" (Ahern, 2001). An example of collaboration between institutions is the Bibliocentre of Ontario, Canada. The Bibliocentre negotiates subscription prices for electronic resources on behalf of the community colleges in the province of Ontario as well as the cataloguing for these libraries. This consortium arrangement ensures that even the poorest college is able to afford and provide electronic services to its students. The Bibliocentre won a CTCL (Community and Technical College Libraries) Award of Merit for its significant contribution in the design and delivery of a college or technical institute's library service. (Paradis, 2001) Distributing the burden of services through a consortium is a 'share the pain' approach.

As mentioned earlier, 24/7 digital reference service will be unattainable without collaboration, as staffing budgets would be prohibitive. The group that developed the Virtual Reference Desk states "The Internet model is one of collaboration and cooperation. Building the Virtual Reference Desk as a single site or within a single service would be difficult, counterproductive and would overlook the incredible work already being done by existing Internet Service providers" (Coffman and McGlannery, 2000).

Corporate Relationships

Collaboration may also extend to seeking financial or other assistance from sources outside the organization. Many libraries and institutions have chosen this path to supplement income from their parent organization. Partnerships with corporate bodies have been described by Professor Tom Stannage as "central to our repositioning in the affairs of a nation and in the new economy. Through such ventures we will also better serve our students" (Myton, 2001b).

Benefits corporate relationships offer:

- building capabilities and accessing resources, to better meet the needs of students and clients
- enhancing the institution's profile, reputation and brand image within the community
- sharing of intellectual and other resources with partners
- facilitation of economies of scale and the non-duplication of activities
- accessing opportunities to provide better services to the community and gain improved understanding of community needs.

Overseas we saw firsthand the benefits of corporate relationships. At Sir Sandford Fleming College and Centennial College they had built their computer networks and computer/library environments with monies gained from their corporate relationship with Bell Communications, the Canadian equivalent to Telstra.

Success in establishing effective collaborative and corporate partnerships will maximize the potential for initiatives to make real changes to the Australian information and learning economy. However, these relationships need to be carefully managed to ensure that the benefits

outweigh the potential disadvantages as sometimes these relationships can cause the library's autonomy to be undermined.

Communication

Effective communication ensures that everyone is aware of what others are doing. This prevents duplication of effort and promotes sharing of ideas and resources.

Communication builds empathy and trust progressively between groups which may traditionally not have worked effectively together. It helps cement collaborational values into the new organizational structure. It is the best mechanism available to bridge the gap between disparate organizational cultures and deliver quality outcomes for the client (Sayers, 2001).

Communication models can include regular meetings to discuss latest developments, regular project planning and strategic development days to make sure everyone is aware of projects currently running and to help prioritize which ones will be undertaken next.

Mailing lists are advisable to communicate all relevant developments to all stakeholders. Formal communication groups could be set up between key departments, ensuring information and resources are being shared, rather than departments working on the same project competing against each other. Communication provides an integral element to effective collaboration and should not be overlooked.

Building Communities External to the Library

Communication is also important between e-learners as they help in the creation of communities. Communities in the library are important, bringing together people who have similar interests or needs for information. "It would be a grave error to think that information and communication technology can or should replace all human contact" (Brophy, 2000, p3).

"The construction of meaningful social context and interactions is now uppermost in the minds of teachers, web designers and support personnel working in this field" (Landy, 2001). This was illustrated at the University of Toronto by a group of students studying on-line "asking around when a student hadn't logged on in a while" and "wanting and achieving an on-line party at the end of their course" (Poulter, 2001a). While "many adult learners have neither the time nor inclination to attend face to face classes or take part in the wonders of campus life" (Landy 2001), they still want to be part of a community. Studies have shown that when students work in isolation there is a higher drop out rate. Conversely, if they feel a part of a larger learning community, there is a higher success rate. Learning communities help maintain students' motivation on-line. Through regular communication students can benchmark their performance with other students, as they would in a face-to-face classroom environment.

In building a community, "people have to feel that their contribution matters, and have a sense of obligation or bond to the group. This may be because they share similar interests or are like minded on certain issues" (Ahern, 2001). "Face to face contact is useful in creating a sense of community but this may not always be possible or necessary, it's far more important to feel a connection to others" (ibid, 2001).

According to Clint Smith, Field Manager for professional development at TAFE Frontiers in Victoria, the successful community has been achieved but "one or more persons must drive the group to keep it on track and create the community spirit...like a face to face group needs a

president, treasurer, secretary...virtual learning groups need a moderator to encourage and motivate the group...or perhaps someone to help with IT problems" (Laing, 2001).

"Education is not merely an acquisition of new information and skills, but a social activity, where knowledge and skills are demonstrated, criticized or merged" (Laing, 2001). This has been demonstrated successfully at the University of Toronto, in the section 'On-line Courses for Distance Education Students'.

Redevelopment of the Library Service

With all the changes currently in motion libraries are beginning to restructure to become more of a hybrid library service. Libraries have already been described as evolving entities. What 'hybrid' is really flagging is the difference between services provided face to face and the addition of those provided via electronic media. According to Brophy (2000), a hybrid library "offers a carefully managed blend of digital and traditional information". This mix requires libraries to think strategically and redesign the library service at least in some areas.

The New Library Model

The new library model has traditional services as well as the following features:

- Its design will meet the needs of the client, not what we think the client wants. This will be undertaken by information professionals gaining input from clients on what they want and measuring their satisfaction afterwards. There will be commitment to continuous improvement.
- It will understand the importance of presentation and publicity of services to all clients and have a budget and staff structure that reflects this.
- It will have a library portal, putting all the key services at the fingertips of its clients.
- It will have technology equivalents of traditional services such as electronic reference services eg. e-mail, chats and bulletin boards to replace the traditional suggestion box.
- It will offer wireless access for those with laptops, docking stations or network connections, allowing flexibility, so people can choose where to sit and research or study.
- It will have strategic documents clearly leading the library service. These include strategic technology plans for the umbrella organization.
- It will support clients by: assisting faculty to integrate technology into their teaching and research activities, maintaining a high level of staff expertise concerning developing information systems, helping students distinguish between surfing and researching and providing an atmosphere in which technology enhances education, such as special facilities and equipment, for example high-end workstations and interactive TV connections (Bazillion, 2001).
- It will aim to deliver its services at a time and a place that suits the customer needs. This will be developed by careful examination of what clients require through methods discussed later in 'measuring clients expectations'. Staffing and services will be carefully examined to maximize their potential, for example, new methods of rostering will be established to ensure longer opening hours or to staffing the physical and virtual reference desks simultaneously. By instituting continuous customer focused assessment libraries can ensure the clients needs are being met.

The New Information professional

The new Information professional will be pro-active and have the skills to set up, run and maintain the new library model. They:

- will be constantly searching for new methods to improve their services both electronically and traditionally.
- will be pro-active in taking up new technologies and services as things evolve
- will develop collection development policies that reflect the need to acquire information in varied formats
- will moderate chats and other on-line events, guiding students through resources
- will be aware of the interconnectedness between local, national and global issues which represent opportunities and obligations for Australia in an increasingly globalized information environment (Kallenberger and Todd, 2001)
- will analyze policies, standards and plans related to the future of the library service and contribute to their creation and application
- will have a high level of Information Technology skill.

Not all of the points mentioned above will be relevant to every library service, although they may prompt the planning process to allow e-learning services to be met.

One way to ensure information professionals have electronic skills is to incorporate into library courses information on e-learning and related issues. One suggestion is to include a compulsory on-line module to teach library students first hand the difficulties in e-learning and the type of support that will work when they are out in the field.

It would be advantageous if there was a refresher course offered on electronic services on a periodic basis, as many information professionals cannot afford to go to every staff development course or conference on the latest developments.

Measuring Client Satisfaction

We need to develop ways of evaluating the success of the structures built to offer and support e-learning and on-line services. Even though this type of learning is supposedly client-driven, how many places are actually evaluating clients needs? Measuring client satisfaction will be an important tool in the building of a library service that adequately supports its client group.

Client satisfaction can be measured by a variety of means. The technology clients use to access new services needs to be evaluated to establish its robustness.

Technology

The effectiveness of technology can be measured by the following:

- systems availability
- percentage of target population reached by electronic services
- number of logins both internal and remotely per capita per month
- number of electronic documents delivered per capita per month
- reference enquiries submitted per capita per month
- library computer workstation use
- number of computer workstations per capita of campus attending students

- average waiting time for accessing a computer workstation
- rejected logins as a percentage of total logins (Wilson, 2000)
- speed of Internet connection
- database availability.

Human side

The measures above address the technology but not client satisfaction. They can be modified to do this, for example 'Reference enquiries submitted per month' could be included in a client survey as 'Successfully answered reference enquiries for the month.'

Statistical reports can also be used, which include data such as:

- active borrowers compared to student enrolment
- use of virtual services compared to face-to-face services
- opening hours and people in library during these times
- reservation turnaround
- resource budget
- number of people offered and attending Information Literacy sessions.

Human based measures could include:

- client satisfaction surveys
- materials availability surveys measuring clients' success at finding what they want
- benchmarking of information services (Wilson, 2000).

To alleviate the potential gap between the differing expectations of clients and staff it is a good idea to have service standards to ensure everyone has a realistic expectation of what services are going to be available (Nitecki and Hernon, 2000).

Conclusion

Libraries are clearly facing a new age. They must shape the information environment by doing what they have always done adapting new technology and re-developing the library service to exploit new opportunities. This shaping includes learning new terminology, collaboration and communication between all key players in the new environment.

E-learners are a complex user group that will grow exponentially in the future. They have special needs that have to be addressed if we are to provide them with similar services and resources to those offered to face-to-face clients. Although services being developed will aid the ease of use for clients in an on-line learning environment, we have a long way to go and much planning needs to take place. These changes may include the building of communities to ensure that on-line students are not isolated, thus preventing large drop out rates.

E-learning is now intrinsic to the educational experience. Adapting services to an on-line environment is very important if we are:

- to maintain a client group. It is very easy for people to assume they can search the web and no longer require professional assistance. In order to survive and stay relevant to our clients, we have to create an environment that responds to their needs in a direct, interactive and timely fashion. Library services offered need to be perceived by clients as better than alternatives offered by competitors

- to provide a more efficient, technologically rich library service to clients and in the process reach a larger client group, making ourselves more essential to them, thereby ensuring our survival
- to add value to the organization and receive recognition and continued funding.
- to demonstrate relevance in a competitive environment where there are a growing number of alternatives for information provision
- to assist the parent organization to maintain a competitive advantage in the marketplace.

It was our observation that many of the libraries visited were successful in providing at least one of the new services, whether it was a portal, online information literacy, or chat reference. Few libraries at this stage have been able to develop more than one service. Information Services in this new emerging online environment, other than email reference, have not been around for a long time. Each library is considering and prioritizing the service they feel they are best able to develop and implement, given time, staffing and expertise constraints.

However, each library, as with the institution as a whole, is cognizant of the fact that elearning will create changes to the way courses are taught, the demands of the students and the services provided. Each library and institution is beginning to formulate policies and services that will facilitate the many expected changes. Already the physical layout of all libraries have changed to embrace the electronic environment. Other services will slowly been developed.

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Appendix 1 - Commonly used words in e-learning

24/7 - 24 hours a day, seven days a week.

Andragogy - How adults learn

Asynchronous - Any learning event that is delivered after the original live event. Also used to describe learning events that are delayed over time such as correspondence.

Chat - On-line real-time interaction with other people who are on-line. Can be by text (text chat using appropriate software) or actual voice (where you need a microphone and speakers on your PC using the appropriate software).

Community - A group of people united by a common purpose who share information and knowledge with one another.

Computer based learning - Learning using a computer not necessarily with an Internet connection, can be via a CD-ROM.

Distance Learning - The term used to identify learning away from a traditional learning environment. Involves the use of e-learning or computer based learning or on-line learning or traditional correspondence methods.

Digital Divide - Term "used to describe the social implications of unequal access of some sections of the community to information and communications technology and to the acquisition of the necessary skills." (NOIE, 2001)

E-book - Organized text in electronic form such as PDF. Can include graphic and text organized into lessons or chapters.

E-learning - Learning using a computer, usually assumes user having an Internet Connection, can be via a CD-ROM.

Electronic classroom - A classroom that has multimedia facilities to augment traditional face to face learning such as a data video projector.

Extended Campus - American term. See Distance Learning.

Face to face - Often abbreviated to as FTF. This means communication/learning/exchanging information with involved people being present physically - face to face with each other.

Flexible learning - Flexible learning refers to the different modes available to students to learn. They can include face to face, electronic and distance.

Hybrid Library - A library that offers a carefully blended mix of digital and traditional information (Brophy, 2000).

Instructional Designer - A person who applies systematic methodology using instructional theory to create learning events.

Off Campus - American term. See Distance Learning.

On-line learning - Refers to studying on-line via a computer with an Internet connection.

Pedagogy - Deals with methods of teaching or learning.

Real time - Something that is being exchanged at the same time - there is no lag between responses. Also referred to as 'synchronous'. Includes chat.

SCORM - Sharable Content Object Reference Model. Standards are very popular; that is why there are so many of them. SCORM is the Federal government's standard. It seeks to track and manage courseware developed by various authoring tools using a single system. Built on the work of AICC, IMS, the IEEE, and others. See <http://www.adlnet.org> for the latest.

Synchronous - Real time learning that can include immediate, two way communication between participants.

Web-based training - Any instructional event that can be accessed via the web.

Appendix 2

Email Reference

Grant McEwan Community College
<http://www.lrc.gmcc.ab.ca/research/ask/>

AskUsQuestions
<http://www.AskUsQuestions.com>

Queensland University: Ask a Cybrarian
<http://www.library.uq.edu.au/askcyb>

Griffith University Ask a Librarian
<http://www.gu.edu.au/ins/lils/frameset4sub5.html>

Holmesglen Information Commons Virtual Information Desk
http://www.ic.holmesglen.vic.edu.au/virtual_reference_desk/virtual_reference_desk.htm

On-line Tutorials

Texas University Information Literacy tutorial (TILT)
<http://tilt.lib.utsystem.edu/>

Queensland University of Technology (PILOT)
<http://wwwlib.qut.edu.au/pilot/index.htm>

Griffith University Library Research Tutorial
<http://www4.gu.edu.au/shr/lrt/>

Digital Reference Desk Projects

24/7 Reference Project
<http://www.247ref.org>

The Virtual Reference Desk
<http://www.vrd.org>

The Internet Public Library
<http://www.ipl.org/ref/QUE>

Library of Congress Collaborative Digital Reference Service CDRS
<http://www.loc.gov/rr/digiref>

Macquarie University Library
<http://www.lib.mq.edu.au/ask>

Appendix 3

Universities and Community Colleges visited.

Sir Sandford Fleming College

<http://www.flemingc.on.ca/OtherPrgms/LRC/>

Centennial College

<http://www.lrc.centennialcollege.ca/>

University of Toronto

<http://www.library.utoronto.ca/>

York University

<http://www.library.yorku.ca/>

Seneca College @ York

<http://www.senecac.on.ca/home/library.html>

University of Calgary

<http://www.ucalgary.ca/library/>

University of Alberta

<http://www.library.ualberta.ca/>

Grant McEwan College

<http://www.lrc.gmcc.ab.ca/>

San Francisco City College

<http://www.ccsf.cc.ca.us/Library/>

New production line management technologies are required and adopted recently with the development of modern manufacturing industry. In this study, a production line three-dimensional (3D) visualization monitoring system based on OpenGL modeling, open database connectivity (ODBC), and database management technology is established on a VC++6.0 platform to satisfy effective production. When compared with the analysis results of production line capacity, the key parameters possess the same optimal values, and this proves the accuracy of production line 3D visualization monitoring system. The system provides effective data support for production line monitoring and management in enterprises.