

**THE NETWORKED INFORMATION ENVIRONMENT: IMPLICATIONS
FOR EDUCATION OF LIBRARY AND INFORMATION PROFESSIONALS**

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ABSTRACT

Library and information science (LIS) educators are facing a major challenge in view of steady shift from communication of information on printed page to transfer of information through electronic documents. With the development of the Internet, a new pattern of organization of information emerged where documents containing electronic information are hyperlinked instead of the traditional hierarchical order of arrangement of such information. Contents of desired information are now directly accessible to users over a network of computers. These developments will not diminish the role of information professionals but offer them immense opportunities provided they are imparted the need based and state-of-the-art library and information education and training and properly and timely prepared for their new roles. This paper highlights the education and training needs of information professionals in view of the growing use of the Internet in various types of libraries and information centres.

Keywords: Library and information science education; Networked information services; Electronic information environment; Digital resources and services

INTRODUCTION

In the fast changing world of the 21st century, several professions are adapting and pacing with developments for their survival and advancement. The mantra for development in this century is to pick up the people most suitable for jobs at hand, people with effective management of knowledge and ideas, and their timely application to have a competitive edge over others. Thus, there is a growing competition, demand for value-added and innovative services, and quality consciousness in service-oriented professions. The library and information service (LIS) profession which has traditionally been largely responsible for the

Malhan, I.V., & Rao, S.

organization and dissemination of information resources faces an immense challenge in meeting the growing and diverse knowledge requirements of various segments of society and preparing adequate and appropriate human resources for handling the organization and communication of knowledge. According to the Bureau of Labour Statistics (<http://www.bls.gov>), the fastest growing segment of new jobs over the next decade will be information-related, in areas such as computer software development and networking. Therefore, if librarians and information professionals want to ensure "the best and the brightest" for the libraries of tomorrow, we will need to compete with these newly emerging electronic information providing agencies and channels.

Substantial and perceptible changes are taking place in the ways librarians acquire, process, store, manipulate and disseminate information. Enormous and fast developments in the area of information technology and the emergence of the Internet facilitated the fastest exchange of information and helped to overcome the barriers of time and space in the process of information transfer. Digitization of potential sources of existing information, creation of new digital information sources on CD-ROMs and DVD-ROMs will have considerable influence on the storage of information and collection development policy of libraries. Developments of websites, evaluation and organization of information available within them into virtual libraries have attracted the attention of all types of information users. Developments in artificial intelligence, expert systems, comprehensive databases, mobile computing and more focused and specific flow of information through Intranets are likely to have a profound influence on the way we organize the libraries and offer library and information services to our user community. The era of stand-alone libraries is almost over and for the delivery of just in time comprehensive and relevant information, the libraries will need to develop computerised networks. Networking of libraries is essential for resource sharing to facilitate cost effectiveness of services and to collectively and effectively meet the growing demands of information users.

The development of electronic libraries will impose still greater demands on libraries because the less visible the medium is, the greater the need for the intermediary. Just with the introduction of online catalogues and CD-ROMs, a different learning environment and greater challenges have been created for students and for librarians who instruct them in the use of these tools. Although some users will access information directly, librarians will continue to serve as mediators between many users and the information they need. Students and some faculty will continue to require help and instruction in using the ever-changing electronic

The Networked Information Environment

information sources, and librarians will play an important role in teaching information skills to users. Librarians of the future will be knowledge navigators, will need to be proficient with electronic resources and will need to stay abreast of new information technologies as they emerge. Moran (1999) provided a list of tasks of future librarians including multimedia research and evaluation; defining remote access privileges; indexing images and graphical displays of information; providing online help and interactive digital research support; offering remote and digital instructional support; selecting user machine interfaces; and choosing, cataloguing and storing digital publication. These tasks will be important but there will be many other tasks that we cannot yet envision because of our imperfect knowledge of future developments in information technology. But it is safe to say that technological competencies will continue to be extremely important for all librarians.

Libraries and information centres cannot ignore the Internet connectivity as it is the single most comprehensive source of information, which now has billions of web pages covering almost every subject under the sun. Even the important libraries and archives around the world are digitising their uniquely held collections and making them available on the Internet so that the resources are accessible to their prospective users all over the world. The Library of Congress' collections on American history and culture are now accessible on the Internet, as written by Kilbride (2000) "very old books are getting the very newest digital treatment in a new library service...which lays the foundation for an extensive library of archaeological material on the Internet". A number of publishers provide electronic access to their research journals, monographs and reference works through the Internet. In addition to that, there are aggregates of journals and information companies which offer access to vast volumes of scholarly information.

Apart from providing access to vast volumes of needed information, the Internet facilitates the fastest access to new knowledge and information resources. Even a new inspirational quotation can be accessed at the website of the National Library of Australia after every ten seconds. The Internet provides a medium for collaborative work, which can be facilitated through proper division of labour and irrespective of the place of work of collaborators. The Internet can be used to compile comprehensive information sources through resource sharing and ultimately properly annotating the works of individual authors participating in the project. The consumers of information can also directly and instantly interact with authors and are in a position to report their works in segments – a trend which led to the unbundling of information, its repackaging into convenient information products and hyper linking with other appropriate sources of information.

Malhan, I.V., & Rao, S.

The Internet has given birth to a new pattern of organization of electronic information where electronic documents are linked and arranged in the spatial order instead of the traditional hierarchical arrangement of information. Hypermedia documents offer better comprehension of their information contents, which include text, graphics, sound and three-dimensional images. It has been proven that hypermedia has the potential to bring improvements in education and offers much better resources for learning in the interactive environment. Seybold (1992) conducted a study on 30,000 students and found that in just 20 minutes of interactive work a day with a computer, over the course of a school year, yields an increase in reading skills of a year and a half.

IMPACT ON LIBRARIES AND INFORMATION SERVICES

Ongoing advancements in information technology and development of the Internet have influenced almost every facet of libraries and set the process of restructuring, finding new models of planning of these organizations and remodelling of their services keeping in view the needs and conveniences of their information users. The accelerating pace of electronic publishing profoundly influences the collection development policies of libraries. Thousands of refereed journals and reference works are now published in the electronic format and some of the electronic publications are either cheaper than their print counterparts, provide value-added information or offer a better deal to libraries for their money. For instance, the Current contents service offers abstracts of documents in its electronic version and has a different price tag if the more current content service in other subject areas is subscribed. In the highly competitive market of electronic information, an important area of concern for libraries is how to individually or collectively acquire the best of information products and services most economically. As the electronic archives are being built and made available online, libraries can do away with their archival role for some of the information sources and instead of maintaining such information resources for users, they can adopt a model which facilitates buying access instead of buying the source. The frequency of use of certain sources of information and the cost effectiveness of buying access instead of building an information pool for future users has to be studied by the libraries in the near future.

The librarians of today are working in hybrid libraries and librarians of the future will continue to work in such settings although the mix between paper and electronic materials will shift. It is also clear that librarians of the future will be working in an environment that will continue to be turbulent and fast changing. The electronic

The Networked Information Environment

information revolution, mainly fuelled by the Internet, is presently shaping the formation of hybrid libraries where electronic information resources co-exist with the printed sources of information, thereby creating a better information centre where the information is not only disseminated through acquisition, organization and processing of printed sources of information, but also through other media of communication. A library's integration with networked libraries not only provides a convenient mechanism for resource sharing and information exchange but also considerably enhances its capacity to meet the information requirements of its users. Connectivity with the Internet further increases its capability to better serve the user community with comprehensive and timely information. Thus, a brick and mortar library along with a click and mortar library will better serve the information needs and provide convenience to users in their pursuit for information.

The sprawling growth of the Internet will further accelerate the growth of information and information overload will be the greatest challenge for libraries. Computers and the Internet have created a tremendous explosion in the amount of data available worldwide, leaving people drowning in a sea of information. This has been demonstrated in a study by the School of Information Management and Systems at the University of California, Berkeley (Erlanger, 2001) which indicated that the total volume of information created worldwide is expected to double each year for the foreseeable future. The same study estimated that it has taken 300,000 years for humans to accumulate 12 exabytes (1 billion gigabytes) of information. It will take just 2-5 more years to create the next 12 exabytes. The problem before the humanity in general and information users in particular, is how to bibliographically control, filter, timely retrieve and profitably use this information. Even the most accepted and familiar search engines are not in a position to index the information available on the Internet beyond a certain limit. A keyword search through a search engine may spit out a list of thousands of titles sometimes including entries from unsought areas. Most users confine their search below 50 titles and hardly go beyond a hundred relevant searches. The greatest challenge and golden opportunity for the libraries is to undertake evaluation and analysis of newly reported information, to separate the high quality information packages from trash, and to facilitate the documentation of significant worthwhile electronic documents in various subject areas, so that information users do not waste their time in doing this desirable activity before having access to high quality and reliable information. A lot of relevant information is freely available and can be downloaded or the libraries can collect fragments of such web pages and websites and organise such components properly and aggregate them into a virtual library. The resource-constrained libraries

Malhan, I.V., & Rao, S.

therefore can expand and augment their own information resources during the process of search and evaluation of information on the Internet.

In the anticipated information scenario, libraries will not only be under pressure to invent new information products, but also to innovate new services which will ensure timely access to information according to the requirements and conveniences of various categories of information users. Since a lot of electronic documents will be available in the unbundled form, repackaging of information according to an institution's needs and its customization according to users' requirements may be an important activity for the library. Digitisation of rare and uniquely held collections and their accessibility on the Internet, development and marketing of databases, continuous efforts for improving the quality of services and provision of just in demand information will be critical for libraries if they are to survive in the Internet era.

In this knowledge century, libraries will also be confronted with the problems of providing information literacy skills and managing the desired information technology training for information users so that the available information resources and services are adequately used. A massive effort is required to educate and train a new generation of information users to search for relevant information using Internet resources. Since a lot of information are loaded on the Internet and the hyper linking of various documents, users may easily move away from the actual information search and hence, libraries should help the users' community with object oriented and focused searches and act as intermediaries so that users are not caught in the web or flirt away with undesirable information. Through guided information search processes, users can be made to focus their search on actual information requirements and ponder on the information retrieved. Users should also be trained to use the virtual library and other Internet resources aggregated by the library, keeping in mind their information needs and institution's information interests.

Libraries, like all other organizations, cannot exist without people. To a large extent, an organization's employees are the key to its success or failure. Even in highly automated settings, people are required to coordinate and control the automated functions. Libraries and other information agencies are becoming more automated, but they are still highly labour-intensive organizations. Most of them still devote between 50% and 60% of their budget to employee costs. In such labour-intensive organizations, the human resources are especially critical to success, because almost everything else in the organization depends on them. A library can have an outstanding collection of print and electronic materials, access to a wealth of online

The Networked Information Environment

resources, cutting-edge automated systems, and an award-winning building, but if it does not have well trained, competent staff, the patrons using the library will not be served effectively (Moran, 1999)

The role of the librarians will expand and become more and more of "teaching users the skills necessary to locate and integrate a variety of information resources, assisting the design of local campus databases, and contributing to the design and management of national networked information systems" (Bhatia and Singh, 2000). Computer specialists, librarians and faculty will need to forge and strengthen partnerships to permit the best use of the emerging technologies. Librarians will be part of research teams and may require to work in groups composed of individuals from many backgrounds. The major task before the information professional is to integrate the information technology revolution and traditional professional knowledge to best serve the information users' needs. The need to facilitate this staff training on a continuous basis will be an urgent requirement as training helps the library personnel to quickly adopt and properly adapt to new retrieval techniques, information tools and technology. As Bhatia and Singh (2000) put it, "any large organisation today has to survive, grow and prosper in a highly competitive, dynamic, rapidly changing complex environment, where human obsolescence is as common as that of machines and where survival is only of the fittest".

IMPLICATIONS FOR LIBRARY AND INFORMATION EDUCATION

a) Infusion of Information Technology into the LIS Curricula

Professional LIS organizations and schools are concerned about the challenges of recruitment and keeping curricula relevant for new jobs in new settings and new responsibilities in old settings. Since the mid-1990s, library professional associations and LIS schools are concerned with the future need for information professionals, the present state of LIS curricula, and how curricula should change in the future to meet new needs. Some library schools have already adopted and introduced the desired changes in curricula. Recruiting more students into revitalized programmes has now become a bigger challenge with the need to fill expected vacancies. At the end of the 1990s, professional organizations, notably, the Special Libraries Association (SLA) and the Medical Library Association (MLA), studied what roles information professionals will play in organizations in the future. SLA and MLA identified essential competencies needed for special librarians. These competencies, which can be translated into recommended coursework, are knowledge of information resources, information management, information access, information

Malhan, I.V., & Rao, S.

systems and technology, research, and information policy (Tenopir, 2002). In the current highly competitive and complex information scenario, there is thus a need for a new breed of multi-skilled information professionals who are competent enough to handle printed, electronic and tacit information resources.

Library personnel are increasingly handling the Internet based resources, working in networked environments and dealing with the process of developing or acquiring library software packages. Every library professional, irrespective of his future place of work, must have the knowledge and skills for handling information technology as well as the creation and collection of information on the Internet. The course contents must incorporate practical training in information technology and the Internet to the extent that the library professional should have knowledge of database development, handling familiar library software packages, able to create dynamic web pages and collect information fragments and documents on the Internet and aggregate them into the virtual library resources of the institution. The information professional should also be imparted training in independently handling computers, networking equipment and related technologies such as handling emails, CD, DVD ROM operation, scanning, and word processing. As libraries and information centres are becoming more complex, the management skills for handling problems and achieving objectives of such institutions are getting as important for the information personnel as the information processing competencies. Courses such as Information Technology Applications, Internet Resources Based Services, and Library and Information Centre Management should thus constitute a part of the core curricula of LIS schools.

b) Specialization of LIS in a Named Discipline

A modern LIS education institution should not merely confine its manpower development to the needs of the libraries, but offer a broad-based flexible system of education that helps to meet the information personnel requirements of several sectors of economy. The LIS schools should also cater to the needs of specialised areas such as medical informatics, bioinformatics, agriculture information, business, financial information, legal information, chemical and pharmaceutical information, science and technology information systems, and environmental information systems. There is an abundance of web presence related to such specialised domains which merits a study along with other course materials. The different types of library, information and knowledge systems also have their own unique needs, for example, a study of a public library system is supposed to include courses in context to community and wider societal information needs whereas a special library system mainly concentrates on the needs of the organization which the library serves. The

The Networked Information Environment

specialised areas of study can be offered to learners as optional subjects. Apart from offering courses for acquiring basic skills and techniques in information handling, library schools can offer a wider choice for learners to select a combination of courses to suit their interests and aptitudes which match their qualifications and meet their more individualistic needs. However, the knowledge resources in each specialised area of information studies are growing fast, the major challenge for the library schools in the anticipated future will therefore be, how to justify and articulate such expanded specialised areas into course curriculum of library and information schools.

c) Skills in Developing and Marketing Information Product and Services

In the past few decades, library and information educational courses were mainly developed keeping in view that information services as humanism in practice and curricula were developed considering libraries as major agencies responsible for acquisition, storage and dissemination of information. With the opening of markets in several parts of the world, liberalization of economies and with the world becoming the global village mainly due to fast communication networks, demands for information in various sectors are growing. The LIS educational programmes besides focusing on social areas should now also develop the curricula to meet the requirements of economic and other areas. In the emerging information society, libraries are not only institutions storing and providing information. Libraries may have to compete with other institutions offering information services and hence, development and marketing of information products and services may come forth as an important area for professional education and training. Only quality information products and services having worth, value, content and convenience will stay in the market place. LIS schools should train information personnel in information product development, assessing market needs and opportunities and impart knowledge and skills for developing strategies of marketing information in this era of information explosion.

There is an exponential growth of electronic information and the typical user will mainly try to have access to qualitative, reliable, worthwhile information presented in an interesting format whose contents are digestible, appreciable and will develop an appetite for more learning. Information evaluation, analysis and repackaging therefore will be an important activity in modern libraries. Some libraries in advanced countries have already started the evaluating electronic information resources. For instance, Healthweb (www.healthweb.com) provides access to evaluated medical information resources available on the Internet and selected by library and information personnel at 22 academic medical centres in Midwest USA.

Malhan, I.V., & Rao, S.

Library schools must realise that in this century, highly skilled professional jobs will not just demand information but ideas which can be very helpful for users. Ultimately, the job of highly competent library personnel will be to fish out ideas from the sea of information using his fingertips on the keyboard of a machine connected to the Internet. A course package on information evaluation and analysis should therefore be offered in LIS programmes.

In cases where the LIS students are imparted immense training in development and marketing of information products and are fully trained in Internet-based information services, they will not only be in demand in libraries but also in other institutions which need to employ information personnel. Job opportunities in the whole information sector should be properly studied and the growth and development in certain related areas should be properly perceived to bring changes in LIS education and training. For instance, there is considerable growth in the subject area of e-commerce and hence, courses in business information services, information evaluation and analysis, market research services can lead to employment of information personnel in business and industry. The education should be constantly oriented towards the desired direction so that the LIS personnel remain in demand and those undertaking the courses also become self sufficient in securing an income from their learning. Presently, there is no dearth of library and information manpower but there is definitely a shortage of people having skills and competencies.

d) Courses on Digital Libraries

The emerging demand for digital librarians and digital libraries may warrant the restructuring of the library and information science programmes. The development of a "digital libraries" track for information students that focuses on the technical and human aspects of the web and digital libraries seems inevitable. In the USA, several universities have reorganized existing library schools to emphasize digital information and online services. Two notable examples are at Berkeley and Michigan. The TICER summer school at Tilburg University in the Netherlands and several of OCLC's (Online Computer Library Centre) programmes aim to update the skills of experienced librarians. In addition, there are numerous specialized courses, ranging from creating web sites for computer scientists to seminars on intellectual property for lawyers. Nevertheless, the number of courses that are specifically on digital libraries is surprisingly small (Spink, 1999)

e) Courses on Information Management

The widespread change, internationally, from "School of Library Science" to "School of Library and Information Science" and on to schools of "Information", of "Information Management," of "Information Studies," and so on, can be viewed as an expansion within the "document tradition." However, a problem with an expanded scope, whether in depth of analysis or breadth of application is that more extensive expertise is required. Some relief is possible by moving to a greater level of generality or abstraction, but abstraction carries risk if the complexity of real world becomes too neglected. It is reasonable for a graduate programme to include the course components such as information users and society, organization and representation of information, management of information organizations and services, economics of information, information retrieval, information technology, systems analysis, design and implementation of information systems, information policy, law and information management, and so on. But to do this, it is likely to require individuals with background in communications, computer science, economics, information retrieval, librarianship, law, and other diverse fields as well as familiarity with professional practice in the application areas to be covered. A great range of expertise is needed if the scope is to be broad and superficiality is to be avoided (Buckland, 1999)

f) Review of Admission Procedures

Modern information education will not only offer ample job opportunities in diverse settings but also entitle the information professionals to dynamic roles and challenging jobs. It is therefore essential that LIS should also have excruciating admission procedures and some screening mechanisms should be applied so that only the ablest students may join the information profession. Students having intrinsic intelligence not only can easily learn the skills but also work for professional advancement as they perform their jobs with confidence, innovate services and make their place in the organizations they work. The Internet holds the key for modernizing libraries and information services and is constantly influencing information institutions. It offers both challenges and opportunities for the LIS discipline. However the most important challenge for the profession is how to attract creative, intelligent, ethical people, intensely train them to impart them state of the art knowledge and skills so that they can encash on existing opportunities. The windows of opportunities shut very fast and we must start efforts to restructure our educational programme to make it needs based, market oriented and in harmony with technological developments and advancements.

Malhan, I.V., & Rao, S.

g) Continuing Education of Library Educators

There is an urgent need to convert LIS schools to learning rather than teaching institutions. In the wake of intensified competition, information explosion and accelerating change, the library and information educational institutions will have to develop so as to provide worthwhile library and information education and training. Such institutions will have to continuously identify what needs to be developed in facilities, and what have to be added and discarded in the curriculum keeping in view the new competencies and tasks desired from library and information personnel. To continue to ride the wave of change, continuing education of faculty members and availability of funds for expert lectures are also desirable, as indicated by Toffler (1971, p. 403), "Johnny must learn to anticipate the directions and rate of change...and so must Johnny's teacher." Learning is no more an exclusive, one time effort for acquiring knowledge and competency. Continuing education and training of faculty members will have a profound impact on the quality of education and knowledge imparted to students and will assist in designing needs based curricula. Faculty improvement and development programmes should be regularly organized as only a good teacher can provide better education. Through the efforts of international agencies like UNESCO, an international LIS school should be designated where the latest facilities are made available for the continuing education of faculty members from all over the world. There are certain listserv available on the Internet through which library and information science educators can exchange their knowledge and experience, communicate their concerns and jointly work for the improvement of professional education.

Schools cannot effectively prepare students to function well as professionals over the long term and to function at top efficiency from day one. In educating for a profession, it is the long-term effectiveness of the education that must be the focus – an orientation that dictates emphasis on basic principles, theory, and foundations, not on the details of AACR2 or LCSH or on how to search DIALOG. These details should be woven into the fabric of courses that focus on the design, structure, and access. We should always aim for education in our schools, not training. If we are merely providing training, education for librarianship does not belong in a university setting. And as mentioned earlier, no one's professional education will be sufficient to maintain knowledge and skills over the course of a profession. Continuing education will be more important. One of the most significant demographic trends over the next 20 years will be the aging of the baby-boom generation resulting in a

significantly older workforce. Providing support for continuing education for intermediate and late-career staff will be one of the most challenging issues facing library administrators in this century (Moran, 1999)

CONCLUSION

This paper has highlighted the education and training needs of information professionals in view of the growing use of the Internet in various types of libraries and information centres. The education and training needs have resonance with the six trends reported in the KALIPER (Kellogg-ALISE Information Professions and Education Reform) project that are shaping LIS curricular change as indicated below (ALISE, 2006):

- a) LIS curricula are addressing broad-based information environments and information problems. Though jobs in libraries remain important in designing LIS education, most schools now also offer education that prepare students for jobs in other environments and other situations.
- b) A distinct core of skills and commitment has taken shape that is predominantly user-centred. Faculty and approach may come from multidisciplinary areas, but a focus on understanding users and meeting their needs distinguishes LIS curricula.
- c) LIS schools and programmes are increasing the investment and infusion of information technology into curricula. LIS schools integrate the use of information technology into all aspects of the LIS curricula.
- d) LIS schools are experimenting with specialization within the curriculum. Since students cannot learn everything in a master's degree programme, schools offer specializations in areas such as archives, school media, medical librarianship, or records management.
- e) Instruction is offered in different formats, providing students with flexibility, including distance education, variant scheduling, and collaborative courses with other departments or other universities.
- f) Curricula are expanding into related degrees at the undergraduate, masters, and doctoral levels. New undergraduate programmes are growing rapidly.

The manpower development programmes of LIS schools must match the changing work requirements of libraries and information centres, contemporary information systems, growing and diverse information demands of society, changing information seeking methods and channels, and constantly adapt to the new information scenario created by electronic publishing and the Internet. The current expertise required for

Malhan, I.V., & Rao, S.

hybrid libraries and information institutions for their operation are improved and enhanced role-playing. The knowledge and skills imparted at library schools should be in harmony with each other. LIS education and training must be planned in a way which enhances the current and further professional potential to meet varied information needs of various levels and types of information users in the networked environment. It may even solve some of their problems or lessen their burdens by providing timely information prescriptions and even knowledge solutions.

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