
A Survey of Networking Education in North American Library Schools

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ABSTRACT

NORTH AMERICAN LIBRARY SCHOOL FACULTIES were surveyed on the adoption, impact, and role of networking concepts and resources in the library and information science curriculum. The findings indicate that, to a large degree, educators have kept up with recent trends and tools in networking in a variety of courses. There was overwhelming consensus on the importance of networked information resources and access tools but less agreement on their places in the library and information science curriculum.

INTRODUCTION

The explosion of networked information resources and access tools, many developed only in this decade, has presented a new set of tools for information professionals. The rapid development of new resources and technologies has left schools of library and information science (LIS) scrambling to keep up with these swift changes. The newest wave of computer-based resources represents the latest influx of information technology spawned by the growth in access to computer networks, particularly the Internet.

The changing role of the information professional—from one dealing primarily with print-based resources to one successfully confronting the growing number of electronic resources—has been underway for several decades. The development of online bibliographic databases in the late 1960s marked an important turning point for the profession. These centrally located resources have

permitted timely retrieval of information from large databases using computing and telecommunications technologies. The latest information storage and retrieval tools now permit access to decentralized resources with uniform ease.

The passage of the High Performance Computer Technology Act in December 1991 authorized funding for the development of the National Research and Education Network (NREN) which will include connections to libraries and the resources in those libraries. The library community's recognition of the importance of networked resources and interest in facilitating access is evident in its recent lobbying efforts (Brunell, 1991). In September 1989, information professionals testified at a congressional hearing that increased access to information through a national supercomputing network could expand the role and usefulness of libraries in the future (McClure et al., 1991). Pending legislation in the form of Senate Bill S 2813 and House Bill 2772, which authorizes funds for an electronic gateway to government databases, specifies free access to this information for libraries (Quindlen, 1992). This newest information resource should further the commitment libraries have to accessing electronic information.

The purpose of this article is two-fold. The authors first explore the current state of networking concepts, tools, and resources in American Library Association (ALA) accredited programs in library and information science in North America. The study also examines faculty attitudes toward the place of networking education and their perceptions of its impact on library and information science. Questions of concern to the authors include: Have LIS faculty kept abreast of the rapid developments in networking? What aspects are being taught? Where in the curriculum have they been adopted? How significant will these developments be to LIS education?

THE LITERATURE

The professional literature has seen a proliferation of monographs, particularly in the last two years, dealing with overviews of networking, networked resources, and specific applications in library and information science. This growth of literature supports the need for educating information professionals in the new networked resources. General guides to the Internet have become quite popular, beginning with Kehoe's *Zen and the Art of the Internet: A Beginner's Guide to the Internet* (1992) and continued by guides developed by Krol (1992); Tennant, Ober, and Lipow (1993); and the *Internet Resource Guide*, which is produced by the National Science Foundation (1993) and made available on the Internet.

The professional periodical literature has also seen a considerable increase in coverage of networking resources and tools since 1991.

Current literature covers the spectrum from general overviews of the Internet and its capabilities (Chadha, 1992a, 1992b; Lynch & Preston, 1992; Page, 1993; Polly, 1992); to specific access tools and resources (Bailey, 1992; Bickley, 1991; Kalin & Tennant, 1991; Nickerson, 1991a, 1991b, 1991c; Simmonds, 1993); to library-specific applications (Notess, 1991; OCLC, 1992; Dillon et al., 1993; Jackson, 1993; Zeeman & MacKinnon, 1993).

A small base of literature focuses on professional knowledge and proficiencies of networked resources and tools and their use in libraries. Larsen (1991), in a paper on the role of libraries in providing access to networked information services, espouses the need for library reference staff "to know how to find materials on the network and how to utilize those resources. Network-based resources are not limited to computers, libraries, and databases; people also are an invaluable network resource" (p. 44). In a study on public libraries and the use of Internet/NREN information services, McClure, Ryan, and Moen (1993) found that 92 percent of the public librarians surveyed felt that librarians have a limited knowledge of what is available on networks. This resulted in a recommendation for research on "how best to develop and implement a national education program for practicing librarians on the importance, uses, and applications of national networking" (p. 29). Tillman and Ladner (1992) report the use of Internet resources by special librarians mentioning that, "the Internet has a special value for special librarians" (p. 127) due to their isolated working conditions and the rapidly changing "world of libraries and the workplace" (p. 131).

Few publications exist that examine the incorporation of networking into the LIS curriculum. Malinconico (1992) points out that, whatever type of work librarians do, they will have to "deal with applications of modern information handling technologies. Thus, their formal education must also advance their technological literacy" (p. 235). A few articles attempt to link networking access and tools to traditional online use classes. Armstrong (1991) provides a history of online training and an examination of current online training, emphasizing computer-aided instruction that might be helpful when thinking about education and information resources. Becker (1992) describes the introduction of the Internet and its resources to Rosary College library and information science graduate students as a part of the online searching course. Kochtanek (1993) provides an educational model for promoting and understanding the Internet in a separate networking and telecommunications course that includes course objectives and a list of recommended topics and proficiencies.

METHOD

A survey instrument was designed to elicit responses on a variety of networking concepts and services. The questionnaire included general topics on networking, information resources and resource discovery, and access tools. Concepts related primarily to autonomous local area networks were not included since the purpose of the study was to examine publicly accessible tools and resources. The first part of the questionnaire (ten questions) consisted of primarily closed-ended questions focused on specific types of network resources, teaching approaches used, related issues, and course information. The second half of the questionnaire presented respondents with open-ended questions on their attitudes and perceptions of networking in LIS education.

A packet containing four copies of the questionnaire and a letter outlining the study was mailed out in the spring of 1993 to the heads of fifty-six ALA-accredited programs in North America. Questionnaires were to be distributed to the most appropriate faculty members within each program.

Responses to closed-ended questions were tallied, and open-ended questions were coded according to the nature of the responses. Since the purpose of the study was largely exploratory in nature, analysis of the returned questionnaires was largely descriptive.

FINDINGS

Sixty-five responses were received from thirty-seven library schools, representing a 66 percent coverage of accredited schools. Schools responding represented all regions of North America and included both doctoral and nondoctoral degree-granting programs. Data were tabulated in two ways: (1) individual responses were tallied over all the schools; and (2) data collected from each school were combined. The authors were primarily interested in individual responses for the open-ended questions and compiled school-level data from each of the questionnaires. In some cases, individuals responded on behalf of the school representing the responses of one or more faculty members.

Each responding school acknowledged that networking concepts and resources have been, or are in the process of being, included in their curricula. Respondents were unanimous in their belief that networking concepts and resources should be included as part of the LIS curriculum.

Curriculum Content

The first part of the questionnaire assessed current topic coverage in LIS programs. A summary of the school responses to the range

of resources and services appears in Table 1. Previous studies of professional use of Internet resources have found electronic mail to be the main resource used by professionals in special libraries (Tillman & Ladner, 1992). Almost all the responding schools indicate

TABLE 1.
NETWORKED RESOURCES AND SERVICES CURRENTLY TAUGHT

| <i>Resource/Service</i> | <i>Number of Programs (n = 37)</i> |
|---|--|
| <i>Electronic Mail</i> | 34 |
| Interest Groups, LISTSERVs | 35 |
| Directories | 20 |
| <i>Remote Login</i> | 30 |
| Library Catalogs | 36 |
| Database Services | 33 |
| Campus-wide Information Systems | 32 |
| Bulletin Boards | 29 |
| Electronic Journals | 26 |
| Freenets | 24 |
| Other | 3 |
| <i>FTP (file transfer)</i> | 34 |
| <i>Internet Utilities</i> | |
| Gopher and Veronica | 31 |
| Archie | 28 |
| Wide Area Information Servers (WAIS) | 25 |
| HYTELNET | 21 |
| World-Wide Web | 15 |
| Knowbots | 9 |
| <i>Commercial Databases and Vendors</i> | |
| DIALOG | 33 |
| OCLC | 26 |
| OCLC/EPIC | 22 |
| OCLC/First Search | 18 |
| BRS | 8 |
| Nexis/Lexis | 6 |
| WilsonLine | 4 |
| Infomart | 2 |
| RLIN | 2 |
| CAN/OLE | 1 |
| Data-Star | 1 |
| Infoglobe | 1 |
| Medline | 1 |
| Westlaw | 1 |
| <i>Other Resources</i> | |
| CompuServe | 2 |
| Prodigy | 1 |
| CD-ROM servers and products | 1 |
| News readers | 1 |

inclusion of the three main services available over the Internet: electronic mail, remote login (particularly for library catalogs), and file transfer capabilities. Resource discovery and navigation tools—particularly Archie, Gopher, Wide Area Information Servers (WAIS), and HYTELNET—are currently being used by more than half of the schools responding.

Using the Internet to access more established technologies in the curriculum—e.g., commercial database vendors such as Dialog and BRS—has also been quickly incorporated, undoubtedly due in part to reduced telecommunications charges. Other information services, not directly associated with the Internet—namely videotex services such as CompuServe and Prodigy—were also reported by a small number of schools.

The range of courses in which networking topics are included is quite large, having found its way into both traditional core courses and specialized courses. Table 2 summarizes the courses in which networking concepts and/or tools are covered. Typically, such topics are found in the more technology-oriented or information science-oriented courses. However, the relatively large number of schools reporting courses like Information Sources and Services (twenty), and Special Libraries and Information Centers (sixteen) gives a clear indication that many of the responding schools view networked resources as important in several areas of the curriculum. It should be noted that the courses with the highest tallies generally reflect more mainstream courses. For example, courses in library automation and online information retrieval may be offered more frequently and by more programs than specialized courses in telecommunications/networking. It may also be the case that some courses listed in the questionnaire may not correspond to courses offered at all library schools. One respondent indicated that the courses listed in the questionnaire did not “map” well to their curriculum.

Respondents were asked about teaching methods used when dealing with these topics. A large percentage reported that a variety of teaching techniques were used. Hands-on training was viewed as an important approach (thirty-five of thirty-six schools), followed by lectures (thirty-four of thirty-six), demonstrations (thirty-two of thirty-six), discussion (thirty of thirty-six), and guest speakers (twenty-three of thirty-six).

In addition to concepts and access tools, general issues discussed in the classroom were surveyed. A large percentage of the schools selected many of the issues listed on the questionnaire. Accessibility issues (thirty-three of thirty-six schools), services for libraries (thirty-two of thirty-six), the National Research and Education Network (NREN) (twenty-nine of thirty-six), virtual libraries (twenty-eight

TABLE 2.
COURSES IN WHICH NETWORKING CONCEPTS/TOOLS ARE TAUGHT

| <i>Course</i> | <i>Programs (n = 36)</i> |
|---|------------------------------|
| Library Automation | 29 |
| Online Information Retrieval | 28 |
| Information Technology | 22 |
| Bibliographic Control | 20 |
| Information Science | 20 |
| Information Sources and Services | 20 |
| Special Libraries and Information Centers Management | 16 |
| Government Documents | 12 |
| Telecommunications/Networking | 10 |
| School Libraries/Media Centers | 8 |
| Public Libraries | 7 |
| Specialized Information Sources and Services | 4 |
| Collection Development and Management | 3 |
| Microcomputer Applications | 2 |
| Academic Libraries | 2 |
| Economics of Information | 1 |
| Indexing | 1 |
| Information Industry | 1 |
| Information Policy | 1 |
| Issues in Information | 1 |
| Serials Management | 1 |
| Systems Analysis and Design | 1 |

of thirty-six), and standards (twenty-eight of thirty-six) were all selected as being incorporated into the curriculum by more than 75 percent of the schools.

FACULTY VIEWS ON ELECTRONIC NETWORKING IN LIS EDUCATION

Four open-ended questions were asked dealing with teaching and the impact of networking developments.

—*What aspects of networking should be taught (forty-three respondents)?*

Responses indicate that there is great variation in what is perceived as being necessary in the curriculum. Forty percent (seventeen of forty-three individuals) felt that all the specific resources listed previously in the questionnaire should be covered. More general topics and issues were also listed by a number of respondents. The most commonly cited are summarized in Table 3. After tools and general concepts listed previously in the questionnaire, applications and social issues were listed most frequently by respondents. Other

topics listed by one or two respondents included policy and legislation, organization of networked information, and personal information management. One respondent summarized frustration with the increase in available resources by stating: "It's expanding too rapidly to limit...."

TABLE 3.
NETWORKING CONCEPTS/TOOLS THAT SHOULD BE TAUGHT

| <i>Networking Concepts/Tools</i> | <i>Respondents (n = 43)</i> |
|--|---------------------------------|
| Topics already mentioned in the questionnaire | 17 |
| Library uses, applications, and issues | 8 |
| Access, social, and ethical issues | 8 |
| Navigation, location, evaluation, retrieval issues | 6 |
| Telecommunication principles | 5 |
| Creation and design of network resources | 4 |
| Administration and management issues | 4 |

—*Where in the curriculum should networking concepts be taught (forty-seven respondents)?*

Respondents generally agreed that networking concepts are too broad to be limited to a single course. Fifty-one percent (twenty-four of forty-seven) felt networking resources should be included throughout the curriculum. Sentiments toward their inclusion across the curriculum are echoed in responses such as "A separate course treats it like a new discipline—it isn't..." and "It's another tool and should be included in all areas." Other respondents listed specific courses they considered to be most appropriate for networking topics. The most frequently mentioned courses are listed in Table 4.

TABLE 4.
SUGGESTED CURRICULUM AREAS FOR NETWORKING COVERAGE

| <i>Area</i> | <i>Respondents (n = 47)</i> |
|--|---------------------------------|
| Throughout the curriculum | 24 |
| Information sources and services/reference | 12 |
| Telecommunications/networking | 9 |
| Computer-applications/information technology courses | 8 |
| Information science | 6 |
| Library automation | 6 |
| Cataloguing/bibliographic control | 5 |
| Online information retrieval | 5 |

—*What teaching approaches should be used (fifty-one respondents)?*

Faculty were also asked what approaches should be used in teaching networking concepts—e.g., theory versus practice. Seventy-one percent of the respondents (thirty-six of fifty-one) felt that a balance of theory and practice should be presented, with hands-on training being a vital component. Sixteen percent (eight of fifty-one) felt that emphasis should be given to practical training with only some theory or general concepts. One individual felt that only practical aspects should be taught. One respondent thought the approach used depended on the environment.

—*What is the future impact on education (forty-three respondents)?*

Respondents generally agreed that the impact of networking technology on library and information science education would play an important role. Forty percent (seventeen of forty-three) used terms such as “crucial,” “significant,” or “very large” when describing the impact. Two respondents likened the level of significance as being similar to that of the introduction of online databases in the late 1960s and 1970s.

Responses revealed a variety of perceived impacts both short term and long term. However, there were few overlaps in perceived impacts where even two or three respondents listed similar conclusions. Areas of concern or impact listed by two or three respondents included greater access capabilities to information resources, difficulties in keeping up with rapidly developing and changing technologies and its integration into the curriculum, education of professionals, course delivery and teaching methods, and funding issues for access.

Several respondents indicated that networking concepts should be of great concern and urgency within LIS education, as revealed in such remarks as, “If we don’t respond, our position will erode” and “We must deal with it and be involved in shaping its policies.” Another respondent noted that, “We currently learn from others. Libraries should be active rather than passive participants.” More strongly, another respondent lamented, “We’re losing it to every little VAX administrator reinventing...subject access every day!”

DISCUSSION

Based on the range of questionnaire responses, it can be concluded that library and information science schools are keeping up with the rapid changes that are taking place in information and communication technology. Networking concepts and resources have already found their way into many courses throughout library schools in North America. Several schools have even reported developing

specializations in networking. The rapidness of developments in networking is evident even in the short span between the development of the questionnaire for this study and the time of the writing of this article. In that time, the utility, Veronica, then only available for several months, has since become a standard feature on Internet gophers and a new search tool; Jughead has been made available and is also quickly becoming a standard feature on Internet gophers.

Most respondents felt that the coverage of networking technology defies any well-defined course boundaries since the applications and concepts span numerous areas of LIS. However, specific aspects could be contained within selected courses with standards, protocols, and technical topics being left to specialized courses in telecommunications. The majority of respondents felt that a balance of theory and practice should be included in the class, indicating that networking concepts, tools, and resources are not just a skill to be mastered by students.

The lack of any general consensus on specific future impacts of the technology on education underscores the rapidness of change within the education system. Respondents agreed that the impact will be significant but could not agree on short- and long-term impacts. The technologies are still too new, and change is occurring too rapidly to determine ultimate impacts. One aspect of these developing services that respondents felt quite strongly about is the crucial role of information professionals in shaping future policies and development of access tools to ensure effective design. This is also echoed in the literature by McClure, Ryan, and Moen (1993) among others.

Despite the quickly growing number of information resources and the rapid development of access tools in this decade, the questionnaire results indicate that the responding schools have been keeping abreast of changes in the area of networking education and diffusing this knowledge to students. The wide range of courses in which these resources are being taught indicates that a large group of educators teaching in information technology-oriented courses are diffusing these ideas throughout the curriculum.

CONCLUSIONS

The development of greater accessibility to networks, navigation, and access tools has undoubtedly led to a shift in library and information science education. In this study, the authors have attempted to determine if and how library schools have kept pace with these rapid developments. Based on the questionnaire responses to closed-ended questions on networked resources and access tools, it can be concluded that responding schools are indeed keeping up with these changes. Even tools and resources available for only a few months

at the time of the development of the questionnaire have already found their way into LIS courses.

Respondents overwhelmingly agreed on the importance of integrating networking concepts into the LIS curriculum. However, there was less agreement about the most appropriate locations in the curriculum for these topics. Approximately half of the respondents agreed that, while these developments should be covered throughout the curriculum and should not be isolated in specialized courses, the more technical issues and topics might lend themselves to specialized coursework. Although there is general agreement that the impact of these developments on library and information science education will be profound, there is little consensus on the specifics of that impact.

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