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# Reference in Library and Information Science Education

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## ABSTRACT

TECHNOLOGY HAS AFFECTED THE REFERENCE and information culture in libraries. With the increasing scope of information transfer, users have higher service expectations of library and information science professionals. The emergence of a digital information environment has changed the century-old role of the reference professional. After the rise of the Internet, many skeptics foresaw the end of a need for librarians, particularly those working in traditional positions such as reference. Nevertheless, data from the Bureau of Labor Statistics indicates an increase in the number of information professionals by the year 2008. Reference professionals are becoming more—not less—essential. Graduate programs must examine the curriculum for reference and information access professionals. Greater access to information sources by users has highlighted the need for reference and information professionals to develop new skills including more technological knowledge, a better understanding of user information-seeking, new instructional techniques, and better communication skills. In addition to live classroom instruction, most schools offer reference and information access courses to a more diverse student body by employing distance-learning technologies.

## INTRODUCTION

This is an exciting time to be an information-access professional providing reference services. Abels (1997) broadly defined reference services as “those services that provide access to information through direct or indirect intermediation” (p.136). With the increasing scope and rapidity of

information transfer and the many new opportunities opened up by network technology, the pace of information change has accelerated. In response to expectations placed on the information profession, graduate programs must examine reference and information-access training. The movie *Desk Set* illustrates the fear of replacement that afflicted many librarians after the introduction of the computer. This was one of the first visualizations of the "human versus the machine" debate in the information profession. Although only hired to install a computer to better handle research requests, the presence of the computer specialist causes rampant paranoia as the staff worries about losing their jobs to the machine. Early reaction to the development and growing popularity of the Internet was a sequel to this fear.

On the contrary, the importance of reference librarians is actually growing in this age of the Internet. Keller (2000) reports that the number of reference librarians working at public libraries in the United States has grown from 2,634 reference librarians in 1995 to 4,100 in 2000. In addition, a survey conducted by the Urban Libraries Council in 2000 confirmed that the Internet is not driving people away from libraries. More than three-fourths of the surveyed Internet users reported that they also use libraries. The study found that access to the subscription journals and databases in libraries keeps those users coming back. Crosby (2000) reported in the *Occupational Outlook Quarterly* that the number of librarian jobs is projected to grow about 5 percent between 1998 and 2008. By 2008, librarians will hold 7,000 more positions than they did in 1998 (p. 9).

The *Occupational Outlook Handbook* (2000) describes the changes in the information access profession:

The traditional concept of a library is being redefined, from a place to access paper records or books, to one which also houses the most advanced mediums, including CD-ROM, the Internet, virtual libraries, and remote access to a wide range of resources. Consequently, librarians are increasingly combining traditional duties with tasks involving quickly changing technology.

The *Handbook* specifically defines the need for reference librarians:

Librarians in user services, such as reference and children's librarians, work with the public to help them find the information they need. This involves analyzing users' needs to determine what information is appropriate, and searching for, acquiring, and providing information. It also includes an instructional role, such as showing users how to access information. For example, librarians commonly help users navigate the Internet, showing them how to most efficiently search for relevant information.

Information technology is an ever-changing field that has affected the reference and information culture of libraries. Libraries are in the midst of a phenomenal explosion of technological change that began during the

1990s. From high-speed Internet access to desktop hookups for laptops and computers to full-text electronic books, journals, documents, newspapers, and articles, technology offers multiple ways for today's information user to retrieve, send, or receive information. The advent of the electronic library, digital library, data warehouse, or virtual libraries, however they may be termed, has changed society's thoughts on libraries in general. Libraries, such as the Library of Congress with the National Digital Library, provide access to the library's historical collections in schools and homes. Peek (1998) wrote in an essay on library buzzwords, "In a simpler time, we had no problem defining the term library. Libraries were a collection of information, usually databases called books, held in a specific location. The presumption is that this information was intended to be shared—perhaps not shared with the entire world, but available to a specific community" (p. 36). In her definition of a digital library, Peek (1998) identified three similarities between a physical and digital library: "Both own and control the information; Both provide access to information, not merely pointers to it; and Both must have a unified organizational structure so there are consistent points for accessing the data" (p. 36). Traditional print and virtual libraries have a great deal in common. Crawford (1998), a self-described "lifelong technologist," wrote that the future will include "both print and electronic communication. . . . Both linear text and hypertext. . . . Both mediation by librarians and direct access. . . . Both collections and access. . . . The future means a library that is both edifice and interface."

During the "Library of Congress Institute on Reference Service in a Digital Age" participants grappled with the issues of delivery and quality of reference provision in digital environments. Over 130 professionals representing 25 states plus foreign countries attended the Institute, which focused on how reference professionals can assist users in making the transition to digital libraries. During the keynote address, Nardi (1998) stated,

The notion of the "keystone species" is taken from biological ecology and centers on the idea that some species are more critical to the functioning of the ecology than others, because of the special roles they play. . . . In the information society, librarians are a keystone species. With the advent of massive amounts of information available on the Internet, librarians are increasingly important. The Internet provides our clients with the same bewildering array of information sources they encounter in the library—only much worse! The intelligent search and filtering provided by human agents needs to be part and parcel of the electronic world. (p. 49)

Issues addressed during the Institute included providing services to diverse users or clients, distance information services, and education. Delivering quality reference and information services in a print or digital environment will require a commitment to providing traditional and remote reference services to widely dispersed users and clients. Information technologies and

advanced telecommunications such as Web-based chat and conferencing programs can provide these services. The role of the librarian has also changed, requiring a much higher level of interactivity.

### TRENDS IN LIBRARY AND INFORMATION SCIENCE EDUCATION

Curriculum changes have resulted from the dispersion of technology throughout the profession. These trends include a focus on the user of information, in whatever context or setting, and on the diversity of information behaviors. A de-institutionalization of the focus of information services is also reflected in education for the information profession. The development of the "library without walls," "the digital library," or the "virtual library" has dissolved the boundaries for providing information in a physical facility or a limited area.

The recent Kellogg-ALISE Information Professions and Education Renewal (KALIPER) project is the most extensive examination of library and information science education since the Williamson Report, published in 1923. The purpose of the KALIPER project was to analyze the nature and extent of major curricular change in LIS education. In a summary of KALIPER study findings made at the Annual Meeting of ALISE in 2000, Durance stated:

The Williamson Report, credited with major changes in education of librarians including the development of the first standards for library education, was quite negative about the state of library education at the beginning of the 20th Century. On the other hand, the KALIPER Scholars have found a vibrant, dynamic, changing field which is undertaking an array of initiatives as seen in the large number of schools examined by the KALIPER Scholars.

Researchers reported a number of trends that are shaping LIS programs in the Executive Summary of the KALIPER research (2000).

1. In addition to libraries as institutions and library-specific operations, LIS curriculum is addressing broad-based information environments and information problems.
2. While LIS curriculum continues to incorporate perspectives from other disciplines, a unique core has taken shape that is predominantly user-centered.
3. LIS schools are increasing their investment and infusion of information technology into their curricula.
4. LIS schools are offering students greater flexibility in tailoring their programs around specific areas of interest.
5. LIS schools are offering instruction in different formats to provide students with more flexibility.
6. LIS schools are expanding their programs by offering related degrees at the undergraduate, master's, and doctoral levels.

The implication is that curricula of graduate programs must be constructed to equip graduate professionals with the knowledge, skills, and techniques to acquire, organize, and disseminate information according to the new demands.

When Melvil Dewey opened the first library school at Columbia University in 1887, the core curriculum was designed to provide students with a set of professional skills to assist users in a particular institutional environment. As Wiegand (2000) wrote in a White Paper for the Congress of Professional Education of the American Library Association,

For more than a century now, information handling has constituted our unique professional responsibility, and teaching efficient ways to acquire, organize, preserve and circulate certain approved and legitimated kinds of information, no matter their textual format, has constituted the content of LIS's core curriculum. That is what was taught in 1887; with minor modifications to accommodate newer information technologies, that is what is taught in 1999, and in the intervening 112 years billions of people have benefited from the professional practice grounded on this core.

According to the International Federation of Library Associations (IFLA) *Standards for Library Schools*, the core curriculum consists of the fundamental subjects that all students should master first. The traditional core curriculum for the master's degree in library and information science included book selection, cataloging and classification, reference work, administration and management of libraries, history of books and libraries, research methods, and libraries in society (including communication). This core was constant in all schools for the first half-century of U.S. library education.

The introduction and use of computer technology has expanded the knowledge base for library and information science. Marco (1994) identified two factors that greatly diversified and deemphasized this core base of knowledge (p. 176). The first factor was the introduction of technology itself into the curriculum: students must use technology to solve information problems. The second factor was the emphasis on specialization in library practice and the introduction of elective courses. The diverse range of professional opportunities has expanded the knowledge and skills that graduates must possess.

The KALIPER researchers stated in the Executive Summary (2000) "the importance of consolidating the LIS core and clearly delineating what makes LIS distinct—as a knowledge domain—from other disciplines." The researchers found that most schools emphasize a user-centered perspective, and that core curriculum revisions by LIS programs incorporated instruction in information-seeking from the cognitive level to the role of information in society. These factors are and must remain included in the curriculum of reference or information access courses at graduate institutions. The researchers concluded that the focus on users makes library and informa-

tion science distinct from other fields that play a role in the creation, organization, management, accession, and dissemination of information. In other words, graduate programs must prepare information professionals to have a client-centered perspective—to be able to design or adapt information products and services that are responsive to user needs, rather than trying to adapt users to the services.

Barron and Blessinger (2000) reported that the size of the core curriculum for schools ranges from six to 48 hours of courses in master's programs on the semester system and from 24 to 32 hours for those on the quarter system. The average among schools on the semester system is 19 hours. My recent analysis of the core curriculum for all library schools found that the majority of schools still require a reference course. Marco (1994) found that reference was one of only two courses from the traditional core curriculum required by most accredited U.S. schools (p. 183). My examination of the core requirements in 2000 found that 45 of the ALA-accredited schools required a course covering the knowledge and skills associated with reference services or information access provision.

### PREPARATION OF REFERENCE AND INFORMATION ACCESS PROFESSIONALS

Historically, reference professionals have played an important role in the transfer of knowledge and ideas by providing people with access to the information they need and want. Among the major functions in librarianship—collecting materials for a particular constituency, organizing those materials on the shelves and creating public records, circulating materials, and assisting users to retrieve materials and information—reference service was the last to develop, in the late 1800s. Green (1876) outlined the four general responsibilities of reference librarians as instruction, satisfying inquiries, collection development, and public relations and library promotion (pp. 78–79). Over the years these roles have changed only in the methods and techniques used to meet them. Mardikian and Kesselman (1995) identified five “rationales that have changed reference and information services”:

1. Increasing access to resources beyond the library (networked resources including the Internet),
2. Lack of geographic constraints for users (“users may no longer need to come to the library to obtain information”),
3. The need to differentiate services to different populations of users (i.e., inside an organization and outside an organization) in the face of shrinking budgets,
4. Increases in complexity of information resources and the need for specialized knowledge, and
5. New options (primarily in staffing) for answering reference questions (pp. 22–25).

All of these rationales demonstrate the changes in the role of reference librarians. Sutton (1996) defined a four-part typology of the expansion of reference collections from a paper-based, traditional library to a digital library:

1. Traditional. A specific place with a finite collection of tangible information bearing primary entities like books and journals.
2. Automated. A mix of paper and digital reference resources and meta-information that point to non-digital media.
3. Hybrid. Typified by the use of both print and digital meta-information sources and the coexistence of both digital and paper primary resources. This type of library allows for the first time remote access to "some subset of the library's digital collection or to digital resources."
4. Digital. The library as a logical entity. The library without walls—it does not collect tangible information bearing entities, but instead provides mediated, geographically unconstrained access to distributed, networked digital information. (p. 132)

Most libraries and information centers are in the third level of the typology, offering a hybrid of digital and traditional print resources in their collections.

The Internet Web-based access to information has decisively influenced and changed almost every area of reference work, including reference interactions and the availability and accessibility of information for the general user. Wilson (2000) noted that "the continuing viability of reference librarians now depends on: (1) how reference librarians and users mutually adapt as librarians affirm a role as providers of assistance on accessing information and (2) how to clarify in users' minds an awareness of their information needs" (p. 390).

The changes in collections and accessible resources have altered the type and level of information service provided by most institutions. In the past, reference professionals wanted to provide accurate answers to users. With the added networked information resources, that goal has expanded to include facilitating the development of self-reliant customers through a basic level of user instruction. The place of reference is moving and changing from the traditional reference desk to every workstation that now has access to reference tools. Web-based technology allows end users to access information directly. Much of this information, once restricted to use only in the library, is now often available from remote locations twenty-four hours a day. Interactions with information professionals have expanded from traditional face-to-face encounters at the reference desk to electronic mail, information literacy education, and Web-based instruction. The entire reference transaction, from specifying the user's needs to information delivery from the library collection, can be accomplished via the Internet.

During an evaluation of the core curriculum at the University of North

Texas, the faculty discovered that no course has changed more in response to the professional trends than had the reference and information access course. This course has been affected by cultural and technological changes, including virtual information access, a greater focus on the diversity of users, the unique information needs of users in whatever setting, and the diversity of users' information behaviors. The Kellogg-ALISE KALIPER (2000) researchers concluded that "Information technology underlies all aspects of the curriculum. The programs bear the responsibility for keeping their students on the cutting edge of existing and new technologies as they become available." The researchers specifically pinpointed the importance of students learning to access knowledge across all formats—print and electronic.

Greater access to the Internet and Web-based resources has also developed the need for more technological knowledge, a better understanding of cognitive skills, and better communication skills. The course of graduate study must include much more than "how to select, evaluate, use the reference tools." The curriculum must develop graduates who demonstrate excellent analytical, organizational, and oral and written communicative skills. Courses must be adapted to educate librarians to use new technology resources.

### DESIGN OF REFERENCE AND INFORMATION ACCESS COURSES

Most courses can be divided into two parts representing the work of the reference librarian: information services and information resources. In response to technological changes in information and the reconceptualizing of the context and role of reference services, courses have changed in graduate programs. Wilson (2000) identified three components of reference services that must be addressed:

1. Training users to access and evaluate information sources. (The ability to access and evaluate the validity of information sources is a key element in developing information literacy.)
2. The "invisible function" of reference librarians grounded in the fact that many users are not clearly aware of their initial information needs.
3. Service that provides users with information about information (meta-data) as well as factual information from the ready reference sources. (pp. 389–390)

The course at the University of North Texas addresses the issues conceptualized by Wilson in a course divided into two parts. The first half addresses the information services of reference, focusing on the development, management, and rendering of the variety of information services and assistance to user populations. The curriculum includes an examination of the epistemological foundations of information use. The course discusses principles and techniques of information retrieval and access services, information-

seeking behavior, user interaction and systems of access, search and retrieval, communication and reference interviewing, instruction and intermediary services, personnel and management issues, copyright and licensing, and the development of digital libraries. Because of changes in the culture of reference services, topics such as the philosophy of reference service, reference interviewing and communication, instruction and training, and information sources must be addressed differently in the curriculum.

#### *Philosophy of Service*

Because of the changing reference culture, it is important for students to examine its philosophy and epistemological bases. This section of the reference curriculum looks at more than just the day-to-day practice of a reference librarian, examining also the underlying assumptions of the procedures librarians use. Radford and Budd (1997) wrote, "library institutions and the people who work within and use them are operating within epistemological frameworks or normative systems that enable people to understand what the library is, what it does, and how one behaves within its systems" (p. 316). As the role of the reference librarian in the information culture continues to evolve, it is crucial for these issues to be discussed in the course.

Service, a fundamental principle of reference work, is becoming more important. Stieg (1990) defines service as a "contribution to the wealth of others, as useful labor that does not necessarily produce a tangible commodity, and as a facility supplying a public demand" (p. 46). Technological advancements have given individual information users greater access to information sources and a higher expectation of information service. The sheer quantity of materials is daunting. New information resources often require librarians or information professionals to stay abreast of database changes in order to offer the optimum service expected by sophisticated and many times autonomous clients.

#### *The Information Intermediary and Reference Communication*

Greater accessibility to information, made possible by Web-based databases and information resources, virtual databases, and other resources, make it imperative that users have access to experiences and assistance that encourage critical evaluation. Reference professionals are becoming more essential to the information society. As users have become more computer savvy and systems easier to use, some librarians predicted that reference services such as interviewing and instruction would not be needed. On the contrary, the role of "information intermediary" or "information mediator" is more crucial. Wiegand (2000) wrote, "Dewey looked upon librarians as information handlers. Librarians were supposed to function as intermediaries between groups of people and the objects of cultural and intellectual authority to which some members of these groups wished access."

Reference service still consists of personal assistance to users, but there is much more emphasis on teaching and guiding users in their own pursuit of information. Tenopir (1995) concluded, "Instruction with electronic resources is not so much a *problem*, but an opportunity to reach more students, faculty, and other users than ever before" (p. 1). Nardi (1999) used the term "information therapy" to describe the reference interview process (p. 80). Communication skills have always been considered essential for good reference and information services. Interpersonal relations are even more essential in an automated environment where some users are afraid of the information tools and other users are remote. Good communication with users in the reference interview, whether done in person, on the telephone, through electronic mail, or via two-way video is more important in today's library and information environments. Providing these intermediary services without the visual cues or body language indicators available through in-person assistance is more difficult and requires the development of other abilities and skills to gauge the users' response to questions and ultimately their information need. These new skills are taught in courses so graduates will be able to balance digital environments and meet user expectations for accurate information.

#### *Instructional and Training Role*

While the kinds of people seeking reference assistance have changed as users have become more sophisticated and independent, there is now a greater need for user instruction. Surprenant and Perry-Holmes (1985), in discussing the future and evolution of reference service, accurately predicted that "education may gain equal status with the provision of information as a prime reference function. Education librarians will assume responsibility for assisting the general public in understanding technologies and procedures to access information" (p. 235). Graduates must know what constitutes information literacy and critical thinking skills. They must understand learning and motivation theories and know about and use different instructional techniques. Reference and information access courses must prepare students to perform an intermediary role in classroom settings, one on one, at the point of use, through published instructional tools, Web sites, or other materials, and through remote instruction. There is also a social responsibility for reference professionals to develop education skills during their graduate programs. Pfaffenberger (1990) wrote of the moral and ethical responsibility of reference professionals to provide training, "The assertion that electronic databases contain information or knowledge is philosophically and linguistically incoherent unless the *user* of the information is capable of decoding the text that the databases contain. . . . Databases cannot be said to represent a valuable social resource in the absence of skilled decoders" (p. 55).

Because the development of instructional tools to support user-

centered service is crucial, graduates must also learn technical writing skills to create tools that will truly assist all users. Earlier studies testing students' comprehension of terminology used in instructions and guides found that many of the terms routinely used have no meaning to users. Massey-Burzio (1991) correctly predicted that "methods of library instruction will undoubtedly continue to evolve, and will likely place additional demands on our oral communications skills. . . . In addition to verbal skill, writing skills are also needed since a considerable part of a reference librarian's life is spent preparing brochures, pathfinders, flyers, point-of-use instruction guides, articles . . . and other written communication" (p.73).

Another important change is in the role of the reference librarian. As the intermediary role has become more important, it has become more proactive. More reference professionals are taking on work such as information analysis, consolidation, and repackaging.

#### *Teaching the Diverse Formats of Information Resources*

The second half of the class looks at information access by addressing the examination, analysis, evaluation, selection, and use of diverse information resources. Reference collections now include print resources as well as subscriptions to databases, indexes, encyclopedias, and other commercial materials accessible on Web-based platforms. In an interview for *Library Journal* on the changes in reference tools, Kate Wittenberg, Director of the Electronic Publishing Initiative at Columbia University, commented that combinations of "gray literature, journal content, book content, and online-only information—are not 'officially reference.' . . . They are seen that way by a lot of librarians; one librarian recently told me the future of online reference is these aggregations. . . . Depending on how broadly you stretch the definition, I see this as one model of reference" (Bryant, 2000, p. 9). Even as many standard reference tools are moving to the Web and Internet reference materials are being created, certain essential reference sources will not be reconfigured. Hopkins (1991) stated that all professionals "need to have a firm grasp and understanding of a basic corpus of reference materials. . . . A set of routines, involving a knowledge of the reference interview, search strategies, and reference sources, must be stored in the memory in order to allow the reference worker to respond to reference questions in both an effective and an efficient manner" (p. 78). With the digitization of many reference sources, education for reference professionals still must include development of skill using standard print sources.

#### *The Impact of Distance Learning Technology on Reference Education*

The widespread use of interactive videoconferencing and the Web have made feasible many new forms of collaborative distance learning activities. In the last decade, distance education has done much to improve the delivery of master's programs to under-served areas. Results of the Library and Information Science Students Attitudes, Demographics, and Aspiration

Survey (LISSADA), research by Heim and Moen, told educators that the majority of students attend programs in their own states. These data confirmed the need for offering graduate programs at other locations and in diverse formats. Distance and electronic courses remove the geographic boundaries of information science education.

According to the *ALISE Statistical Report* (2000), 76 percent of the responding accredited schools offered one or more courses away from the home campus during the 1997–98 academic year. Forty-four schools reported 489 courses taught as distance education, with an average of 11 courses per school. Saye (2000) observed, in the *ALISE Statistical Report*, that 43 of the 50 responding schools had off-campus enrollment. Total full-time off-campus enrollment for all schools was 1680.5 students for the Fall 1999 semester, for a mean enrollment of 43.1 full-time students. Responding schools indicated a number of ways in which they offered distance education courses away from the home campuses, including at distant sites, via Internet delivery of Web-based courses, via closed-circuit two-way interactive audio/video conferencing or compressed video, or via television.

Most ALA-accredited programs offer the reference or information access course as both a face-to-face course and using distance-learning technology. In an analysis of the Spring and Fall 2000 course schedules for the accredited graduate programs, 25 schools only offered the reference and information access class on campus, while 22 offered the course either way. Seventeen schools offered both an on-campus and a distance section of the reference course during the same semester. Only one school offered the reference and information access course only through distance learning.

As distance-education technologies have developed, pedagogical approaches are being discussed by educators. Muirhead (2000) described four competencies necessary for success in these classes: computer skills, literacy/discussion skills, time-management skills, and interactive skills. Participating in distance-education courses does include a learning curve related to the student's ability to master a computer-mediated system. Many educators wonder whether the online format provides adequate opportunities for the dialogue and social interaction that are vital elements in the learning process. Web-based course-management software, such as Blackboard and WebCT, provide the mechanism for individual or group communication between students and faculty. Students interact with their course materials through reading their textbooks and required readings and working on collaborative exercises. Students can communicate with teachers and receive immediate feedback online. This communication can be immediate (via chat sessions or a phone call) or delayed (through a discussion forum or email). Seminars and workshops can also be conducted without the physical limitations of the classroom. With computerized technology, guest speakers can interact with students from different geographical locations, even different nations.

At the University of North Texas, distance-learning courses serve students in urban areas and remote parts of the state through face-to-face off-campus courses, televised, live-interactive videoconference courses, and online Web-based delivery. The School of Library and Information Sciences has been a pioneer in offering distance-learning opportunities. A goal of the School is to aggressively expand graduate educational opportunities for two populations: those in the many remote Texas cities and counties where library staffs are otherwise unable to continue their formal education, and those others across the country who are geographically isolated from access to a site-based library and information science program. The Center for Distributed Learning provides support services for the distance-learning infrastructure and manages the WebCT Internet-based-course management software.

The School of Library and Information Sciences participates in distance learning via three pedagogical methods: face-to-face off-campus courses, live-interactive videoconferencing, and through the Internet. Full-time faculty members traveled to teach students in Houston and Lubbock for a number of years. Since 1998, the School has used distributed interactive videoconferencing to offer courses in other locations, including Dallas (at a second campus), Texarkana, Wichita Falls, Abilene, Edinburg, Corpus Christi, and Tyler as well as Minneapolis and St. Cloud, Minnesota. This distance-education technique enables the School to offer these courses on campus and at the distance sites simultaneously, with live lectures delivered via interactive videoconferencing to two to five sites.

The SLIS faculty set as a goal the offering of the complete master's degree program over the Internet by Summer 2001. To achieve that goal, the faculty committed to develop new courses and convert much of the school's curriculum to Web-based delivery formats. The SLIS curriculum requires nine hours of core courses, including a course addressing reference and information access. SLIS 5600 (Introduction to Information Access and Retrieval) is a four-credit required course. It is also offered as a required course for undergraduate students matriculating through the Information Science and Legal Information Management programs. The first reengineering of the core curriculum for distance learning was funded by a university grant in 1998. Since the successful reconfiguration of the class, it has been distributed to the nine above-mentioned sites in Texas and two cities in Minnesota using learning technology supported by Web-based course material and communications systems.

Currently the course is organized into modules for each topic. The subject content and exercises provide an academic foundation for meaningful dialogue within the class. Instructional materials and resources are published on the Internet through WebCT; the digital classroom Internet site is password protected. The site includes information about the learning objectives, required readings, a glossary of terms, collaborative learn-

ing activities, assignments, projects, lectures, downloadable PowerPoint lecture-note slides, and hypertext links to databases and other reference sites on the Internet. The students in each class are divided into teams to work together throughout the semester on all collaborative assignments. The cooperative work projects provide a framework within which students develop peer relationships. The availability of course materials on the Internet allows students to access learning modules, laboratory exercises, and assignments at their own desktops. Offering the reference course using this technology gives students experience in using distance-education techniques—experience they will be able to utilize in their professional work. One of the most exciting uses of the distributed technology is the ability to present select guest lecturers, industry professionals and representatives of database vendors and publishers, to the class.

The WebCT e-mail communications system is used for collaborative activities such as conferring with professors, working and communicating with other students on team projects, and submitting assignments. The professor, a doctoral-student teaching assistant, and master's-student teaching assistants are always available to answer questions. Instructional support assists the graduate students who have diverse learning and cognitive styles, educational needs, and varying abilities to perform as self-directed learners. The university libraries at each course site have supported the course by setting up policies for access for enrolled students. Negotiated policies include agreements for interlibrary loan, circulation, availability of reserved resources, and computer laboratory access.

The effort to prepare this course for delivery primarily on the Web required changes in design, distribution of course content, and teaching methodology, including employing interactive and multimedia techniques to support individual student and group participation during the learning process. The conversion included development and digitizing of multimedia lectures and presentations, learning modules, online assignments and information resource Web sites; WebCT programming and testing; and implementation. The course was taught in an institute format during Summer 2001 on the University of North Texas campus in Denton and remotely during the Fall 2001 semester on the University of Minnesota campus in Minneapolis with 80 percent Web-based delivery and 20 percent face-to-face delivery (approximately 40 contact hours). The substantive course content delivered in 14 topical lecture units was distributed into 18 instructional units or learning modules for Web-based delivery. Each instructional unit included digitized assigned core readings; exercises; supporting topical outlines, explanations, and definitions; and student-teacher collaborative conferencing, group discussions, and interactive role-playing exercises. The units also include detailed guides for computer laboratory experiences, information searching, and resource evaluation exercises. The collabora-

tive assignments will be organized according to the topic being studied and discussed during the learning modules.

The success of a course lies in its design and pedagogical model. Two lessons have been learned from teaching this course using the distance learning technologies:

- Collaborative assignments and activities must be an integral part of the course framework. These assignments encourage students to communicate and to work with distant partners in order to complete the course work and to construct new knowledge. These exercises should be developed to construct meaningful learning.
- Group or team composition should be equitably determined with care to ensure interaction between campus-based and distant students.

#### *Graduate Assistantships*

In a survey of the reference departments of the libraries of institutions with ALA-accredited programs, Womack and Rupp-Serrano (2000) found that 64 percent employed graduate assistants (p. 121). Of these institutions, 87 percent employed students only from the graduate program in library and information science. Many assistants go on to work in professional positions in reference departments. To support the reference and information access curriculum, the University Libraries of the University of North Texas offer graduate library assistantships for students in the master's program. These opportunities allow students to acquire valuable training, pre-professional experience, salary, and benefits such as in-state tuition. Graduate assistants provide reference assistance supporting the professional staff and handle routine questions. They also conduct bibliographic instruction sessions and library tours, as well as developing print and digital training materials. The library is able to take advantage of the students' development of technological skills as they complete courses such as advanced database searching, Web authoring, document digitization, and database building. In addition to staffing the traditional reference desk, the assistants also contribute to other access services of the University, including work on the library's Web and database maintenance team and on a document digitization project. Graduate library assistants also work as "virtual reference assistants" for students taking distance learning and Web-based classes.

#### *Continuing Education*

How competent is the new graduate six months after completion of the master's program? Five years after? Ten years? The one fact that educators and professionals must accept is that continuing education is essential to maintaining competence and competitiveness. Administrations are pouring millions into library and information technology to better connect users to information resources. Librarians must know how to utilize all infor-

mation tools and continue to create innovative information services using these new technologies. Each professional must make a lifelong commitment to continuous development and education, because the goal of competence is a moving target.

Partnerships should be forged between employers, graduate schools, professional associations, and professionals. Employers must demonstrate and provide support for employees through articulated policies and programs for development and job training, released time, and financial support. Graduate school participation in this ongoing professional development is crucial. In addition to providing students with the basic competencies from a core curriculum and specialized knowledge through elective courses, a program must also instill in its graduates an understanding and acceptance of a responsibility for continuous learning. This is done through curricular efforts and through the demonstration of professional behavior, such as encouraging participation in professional associations. Distance learning technology allows professionals to pursue continuing education and to expand their knowledge base by participating in courses, degree programs, conferences, or workshops addressing the latest issues that connect them to colleagues throughout the country and abroad. Through these new multimedia educational offerings, continuing education can be pursued through dialogue with fellow professionals in a low-cost and convenient manner.

## CONCLUSION

Today's courses must prepare graduates to provide information with a combination of technological competence, traditional knowledge of information resources, and re-calibrated (but traditional information) services with a client centered perspective. As Nofsinger (1999) wrote, "In order to cope with rapid technological and societal changes, reference librarians need excellent communication skills, a strong public services orientation, and extensive training and retraining. Knowledge, skills, and attitudes must be constantly updated as users make more complex and sophisticated reference requests than in the past, while demanding a higher level of service, accountability, and competence" (p. 17).

Through the curriculum in graduate schools, reference and information access professionals must be prepared to adjust to the different levels of user experience and sophistication, to adapt to various roles as providers of assistance on accessing information, and to assist users to clarify their information needs in physical or virtual environments. Graduates must be prepared to implement and design services with an understanding of cognitive styles and their effect on the information-seeking behavior of users. Information providers must understand and consider the contextual setting in which people seek, use, and create information. In addition, information professionals must provide information services and products to

increasingly culturally diverse populations. Drucker predicted that the most important profession in the next century would be knowledge workers. White's (1999) view on Drucker's prediction specifically addressed the need for reference librarians, stating, "The most competent ones are likely to be reference librarians using sophisticated hardware and software, tools which the end user does not know how to use (p. 277). With distance learning technology, these courses can be reconfigured to meet the educational goals and needs of on-campus and off-campus students.

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