The Human Element in the Virtual Library

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ABSTRACT

THIS ARTICLE INTRODUCES THE CONCEPT of the virtual library and also explores how the increasing reliance on computers and digital information has affected library users and staff. In particular, technology has created an expectation for full-text information delivered to the desktop at the user's convenience. As the technologies used by libraries have evolved, library jobs, organizational structures, and working conditions have changed. Some facets of the virtual library present challenges to the intellectual, social, and physical needs of adults and children. In the midst of technological change, the traditional library mission of service and access is still relevant, and librarians are needed more than ever before to help users cope with changing technologies and to humanize the virtual library.

INTRODUCTION

Libraries are part of society and reflect changes that take place in that society. At the close of the twentieth century, electronic technology has permeated all facets of daily life. Digital clocks have become standard in cars, microwaves, VCRs, cable boxes, and even thermostats. Schools teach keyboarding instead of typing. The personal computer is more affordable than ever before, and some companies offer an option for periodic upgrades assuring, for a price, that the machine will never become obsolete. Radio and television commercials now include a Web address as a basic means of contacting a company. Changes such as these have affected people in developed countries worldwide.

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Over this decade, technological change has been the dominant force reshaping libraries. It has affected all aspects of technical and public services, administrative functions, and organizational structures in every type of library. In the process of adapting rapidly and repeatedly to increasingly more complex technologies, users and staff have experienced physical and emotional stress. The same technology that has enabled rapid communication and information transfer around the globe has challenged the traditions and values of the people who use, and those who work in, libraries.

Speaking at a Library Information and Technology Association (LITA) program in 1990, Charles McClure gave a daunting list of challenges facing network users, among which were inadequate education and training, lack of technical standards, complex or unknown procedures, insufficient or uneven network capacity, unreliability of data transmission, poor documentation, inadequate directories, and insufficient connectivity (in Saunders, 1992, p. 69). Many of these concerns have now been resolved through widespread use of the Internet and Web, greater adherence to, and use of, standards such as TCP/IP (transport control protocol/Internet protocol) and HTTP (hypertext transport protocol), and the availability of more powerful and affordable computers with telecommunications access. It seems that technological issues have been easier to solve than human issues. Education and training, for example, are continuing problems as technology changes and as new generations of users come to the library.

Defining the Virtual Library

During the 1990s, the term "virtual library" became a standard way of describing libraries that offer access to digital information using a variety of networks including the Internet and World Wide Web. Other phrases that have been used interchangeably with virtual library are "library without walls," "electronic library," or "digital library." Martin (1992) referred to the virtual library as a concept of information housed electronically and deliverable without regard to its location or time. Gapen (1993) presented a holistic sense of the virtual library with the definition, "of remote access to the contents and services of libraries and other information sources, combining an on-site collection of current and heavily used materials in both print and electronic form, with an electronic network which provides access to, and delivery from, external worldwide library and commercial information and knowledge sources" (p. 1). According to Gapen, the virtual library creates a synergy for users by bringing together technologically the resources of numerous libraries and information services. Essentially, the virtual library is a metaphor for the networked library (von Wahlde, 1993, p. 38).

In the early stages of development, libraries focused on providing dial-up access to online public access catalogs (OPACs). In 1992, the Internet-Accessible Library Catalogs and Databases, compiled by Art St. George and Ron Larsen, listed a total of 92 libraries in the United States and 107 libraries outside the United States (Saunders & Mitchell, 1996, p. 4). In 1995, HYTELNET listed 677 U. S. libraries and consortia (Saunders, 1995, p. 4). By 1997, Web access was pervasive, and Peter Scott found that he could not continue to maintain HYTELNET (http://library.usask.ca/hytelnet), which included an extensive list of libraries worldwide with links to their catalogs. Even in its static format, HYTELNET averaged more than 5,000 hits per day in August 1998 according to a statistical chart at the site. Most libraries now have a home page that links to local information, electronic bibliographic and full-text databases, and the library's online system.

Users' Expectations

Digital technology has changed people's concept of time. Because computers retrieve and process information rapidly, users expect speed in all aspects of their lives, including their transactions with the library. According to Metz (1990), peoples' experiences with technology in everyday life outside the library have changed their expectations for libraries: "The modern user knows it is possible to use an automatic teller card across the country to obtain cash; to change airline and hotel reservations from a car phone; and to fax a copy of an article to Australia. Is it any wonder that our users get frustrated when they can't get what they want when they want it?" (p. 31).

This transition has occurred over the last fifteen years, with the evolution of library technology running parallel with technological change generally. The online catalog gave users flexibility in using keywords and combining terms. When the online system went down, users waited for it to come back up instead of going to a card catalog or microfiche format. Then, when users discovered the speed and ease-of-use of searching bibliographic databases on CD-ROM, they used print indexes reluctantly and only when an electronic version did not exist. Such behavior patterns have continued and expanded to the point where users expect full-text content delivered over the Internet to a workstation in their home or office. As libraries increase the menu of electronic resources, users demand even more. Tenopir (1997) reflected on society's expectation for instant gratification when she stated, "the TV/Nintendo/fast food generation expects more and wants it faster. A two-week lag time for interlibrary loan doesn't cut it anymore" (p. 39).

On the positive side, the Internet as the primary infrastructure for the virtual library enables searchers to investigate resources such as electronic papers, news groups, and e-mail discussions that were not accessible

in the past. In many ways, the Internet has changed the way students and scholars do research. According to Doran (1996), "pre-computerized, pre-networked searching restricted people to a largely linear approach, whereby topics and sources had to be examined sequentially in fixed formats and locations. But the Internet is omnidirectional, geographically and chronologically. Separate categories of sources and differences in format are merging" (p. 8).

A popular misconception has developed, however, that one can find any needed information over the Internet without going to a library. While an extensive volume of information exists on the Internet, a corresponding amount of time is required to search and sift for the quality that has traditionally been associated with printed books and journals. Doran (1996) has concluded that the Internet affirms how the theory and practice of traditional librarianship are still relevant. Left to their own devices, students would not "think to use a print index in tandem with an online database" (p. 10). Librarians cannot be sure that students will go the extra mile and do credible research. Partnerships with teachers are more necessary in the virtual library than ever before to design learning experiences that require multiple formats and critical thinking.

Democratization of Access

Initially the focus of the virtual library was to aid scholars by organizing information on national networks (Turner, 1990). The term "scholars workstation" came into vogue, and research libraries collaborated with the Coalition for Networked Information (CNI), CAUSE, and Educom to create "the virtual library, in which scholars working at their desks have access through networks to a vast range of electronic information resources" (von Wahlde, 1993, p. 29). Research universities and their libraries were ideally positioned to provide leadership in automation ventures and in developing Internet search tools. For example, MELVYL and CARL—two of the pioneering library automation initiatives—were developed by and for the research library communities in California and Colorado, respectively. These ventures were among the first to develop large union catalogs and then supplement bibliographic access to books with tables of contents services and indexes to journal articles. Concurrently, information technologists at other research institutions developed tools to make access to the Internet easier for nontechnical people to use. Among the systems created were the following (Hahn, 1996):

Archie	McGill University	1989
Pine (e-mail system)	University of Washington	1989
Gopher	University of Minnesota	1991
Veronica	University of Nevada, Reno	1992
Lynx	University of Kansas	1992

Jughead	University of Utah	1993
Mosaic	University of Illinois	1993

The Internet was developed by the U. S. Department of Defense and the National Science Foundation (NSF) and used initially by scientists, the military, and computer programmers. Projects such as the Center for Electronic Texts in the Humanities (CETH), the Scholarly Communications Project, and digital library initiatives such as the American Memory Project at the Library of Congress, created content for scholars in the humanities and social sciences. As more academic areas found research and communication value in the Internet, interest grew and expanded throughout academe. Libraries were among the early adopters, and librarians were change agents in the process of educating faculty about the resources available on the Internet. Public libraries and K-12 schools soon joined in the process, using the Internet connections at nearby universities.

Initiatives by the federal government continued the spread of the Internet into communities. The National Information Infrastructure (NII) was driven by the vision of Vice President Al Gore who was quoted as wanting a rural Tennessee child to be able to have remote access to the Library of Congress. The High Performance Computing and Communications Act of 1991 (P. L. 102-194) supported the development of the National Research and Education Network (NREN). Later legislation, such as the National Information Infrastructure Act of 1993, provided grant support for expanding Internet access through state and community networks which linked colleges and universities, public libraries, healthcare facilities, and K-12 systems. Use of the Internet was popularized at this time in the media with articles and cartoons illustrating the metaphor of the "information superhighway."

Several landmark developments facilitated the use of the Internet by the public and concurrently created additional demands on libraries. In its Windows 95 software package, Microsoft added a graphical user interface (GUI) that enabled easy point-and-click access to applications. Around the same time, CERN, the European particle physics consortium, adapted the World Wide Web that Tim Berners-Lee had developed during the early 1990s to help people use the Internet with expanded graphical capabilities. These systems facilitated the convergence of digital information, personal computers, and simpler graphical use.

Business and computer companies recognized the potential for using the Internet in new ways. In order to meet the demand for public access, a number of companies such as Oracle, America Online, CompuServe, and Prodigy became Internet service providers (ISPs). Microsoft licensed the Web browser Mosaic and bundled it into the Windows 95 package as Microsoft Internet Explorer. A majority of Web users preferred Netscape's

Navigator as a browser. Search engines such as Yahoo!, Alta Vista, Lycos, WebCrawler, Excite, and InfoSeek proliferated. Business found that the Web offered a convenient place for advertising and marketing.

In an effort to extend the Internet and its potential for helping children to learn, many communities promoted projects to wire schools. An amendment to the Telecommunications Act of 1996 authorized subsidies for Internet connectivity for libraries and schools. Although libraries anticipated benefits such as discounted rates, the telecommunications companies resisted their implementation. Individual states and school districts continue to support local wiring projects that will connect schools and libraries to the Internet.

Human Issues

While research and academic libraries supporting scholars have contributed to the infrastructure and content of the virtual library, the extent of benefit has been much broader. Children in schools and public libraries are now able to search databases and electronic encyclopedias, communicate by e-mail, compare notes with others in chat rooms, and play games with network users anywhere on the planet. Projects such as "key pals"—similar to pen pals—are beneficial to children because they develop awareness of life in other countries and cultures, promote communication and writing skills, and in some cases facilitate practice with another language.

The pressure to use computers has also filtered down to the preschool population, and families are purchasing computers for children who cannot read yet. Perhaps the pendulum has even swung too far, as researchers in early child development advocate that children can be damaged psychologically and physically by spending too much time alone at a computer when they should be playing outdoors and participating in activities with other children and family (Healey, 1998).

Many adults do not want children to have access to those Internet sites that contain sexually explicit or other offensive content. At the federal level, Congress passed the Communications Decency Act in 1996, mandating fines and jail sentences for Internet content providers who distributed indecent materials to minors. In 1997, the U. S. Supreme Court ruled that the act was unconstitutional on the grounds that it was too broad and lacked the precision that the First Amendment requires when a statute regulates the content of speech. In some cities, including Boston, Austin, and Seattle, the city government has decreed that public libraries must install filtering software to block objectionable sites from children (Schuyler, 1997). The American Library Association (ALA) has actively protested against filters, believing them unacceptable censorship. Preferring a proactive approach, ALA offers advice to families on responsible use of the Internet by children (http://www.ala.org). The

controversy over filters and First Amendment rights continues to be an issue for schools and public libraries and parallels the longstanding issues that libraries have confronted on the censorship of print materials. Families who allow children unsupervised use of the Internet also have decisions to make about the issue. The Internet brings into the home or library images that would not have been purchased or promoted in a print format.

Other social problems such as hate mail, stalking, and harassment have been encountered on the Internet. A 1997 survey of 400 colleges discovered that two-thirds of the institutions had incidents of sexual harassment by computer; 60 percent reported that student computer accounts had been used without permission; half found damage or menacing acts by hackers; and 37 percent said that students had been the victims of electronic hate messages. In half of the schools, students had downloaded pornographic texts or pictures into the computers in their dormitory rooms ("Electronic Harassment, Growing Problem in Colleges," 1998). Most academic libraries that offer graphical access to the Web through their online systems must deal with these same problems. While students must sign an Acceptable Use Policy (AUP) to get an e-mail account on the campus network, they usually do not have to sign one to have access to the library system. Community users likewise present challenges because they do not sign an AUP either. Libraries need policies that protect minors and outline the consequences for system abuse.

A study by researchers at Carnegie Mellon University has identified a statistically significant trend: the more time that the individuals studied spent at their computer terminals, the more depressed and lonely they were at the end of the experiment (Adler, 1998). Despite the many social benefits of the Internet as a means to connect people with each other through e-mail, chat rooms, and discussion groups, excessive use tends to foster social isolation, depression, and loneliness.

Studies by MIT psychologist Sherry Turkle (1995) also warn of the dangers of becoming too enamored of computers and the Internet. The language used by technologists has migrated into our daily speech patterns, and "we are learning to see ourselves as plugged-in technobodies" (p. 177). She believes that computer-mediated communication can affect one's ability to relate to other people. Both children and adults who are lonely and isolated like computers because "it can feel like somebody is always there, always ready, always responsive, but without the responsibility of having to deal with another person" (Turkle, 1984, p. 146). Role-playing games, such as MUDs, are particularly seductive because they allow individuals to live in cyberspace with a persona that may be more interesting and satisfying than one's real life.

Research on Internet and computer use has implications for libraries as a warning to librarians to monitor the behavior of frequent users who

may monopolize a terminal in a public lab or those staff who may seem to be growing more withdrawn as they work. Ideally, each job should have a variety of tasks so that staff can get away from terminals for an adequate amount of time for physical movement. Staff who seem to spend excessive amounts of time "playing on the Internet" need to be counseled about job productivity and responsibility. To a large extent, the need to subscribe to some professional listservs has added to the responsibility of reviewing professional literature and staying current in the field. The dilemma is that more time is required to scan through hundreds of messages to determine which are useful, which should be saved or printed, and which can be deleted. Some staff find that it takes a minimum of two hours per day just to keep up with their e-mail, and this does have a negative impact on time management and productivity.

Some corporations have developed policies prohibiting use of the Internet and e-mail during specified hours in order to minimize the loss of productivity. Software monitors are also available that report the time each employee spends online. Such "big brother" approaches impinge on individual privacy and contribute to a hostile working environment. Ideally, staff should be able to contribute to the expectations of the job and discuss the relationship of Internet use and productivity with their supervisors.

Organizational Change

As libraries and their parent organizations have wired buildings, campuses, schools, and corporations for network access, organizations and jobs have changed. Ready access to information and people challenges old hierarchies and reporting structures. According to Sproull and Kiesler (1991), networked communications have the potential to influence the overall work environment and the capabilities of employees to foster new task structures and reporting relationships, to encourage broader participation and involve more people in the decision-making processes, or at least in consultation. In other words, the "networked organization" supports a more collegial team-based work environment with direct communication through all levels.

In 1993, von Wahlde spoke of the networked library in the future tense. She stated that the keys to transform the library are making networking technology available to everyone in the organization and encouraging people to use it. She also stated that "new organizational structures cannot be created until there are new approaches to providing services" (p. 30). She predicted that "innovative ways of using technology to transform traditional services or develop new services may not result in a change in the actual structure of an organization but, rather, a change in how people work, both with co-workers and clients. The way we work will also

be influenced by the increasing interrelatedness of library operations in an electronic, networked environment" (pp. 30-31).

Throughout the decade, libraries have experimented with organizational structures. Following the trend in business, some libraries have created functional work teams and others have eliminated traditional hierarchies and moved to flat organizations. Which model works best depends on the culture of the institution and the willingness of individuals to support the structure that is established. The concept of the networked organization breaks down if key staff do not participate. Despite the availability of technology, effectiveness within the organization is still dependent upon human factors such as leadership, collegiality, cooperation, and a universally accepted service philosophy.

At the end of the 1990s, most staff in libraries use computers as an essential work tool. In many places the job specifications for civil service employees have not changed to reflect the increasingly more complex requirements and expectations for clerical and paraprofessional positions. A desirable employee can do word processing, can design and manipulate spreadsheets, may know how to create a database, is familiar with the Internet and is willing to use e-mail regularly, and can switch from one system to another and remember the searching protocols for each. Further, such an individual is not afraid to do basic troubleshooting when something does not work. The best employees experiment to find new ways to use the capacity of their networked workstations to solve work problems and improve efficiency or effectiveness. In the frequent cases when a new hire does not have these skills, in-service training is necessary. Release time for staff to attend workshops and upgrade skills is mandatory because it benefits the organization as well as the individual.

One of the great ironies of formal personnel systems such as those in state and city governments is that library work is not perceived as a technological field. In most cases, the staff who maintain computer systems receive the greatest compensation. After that come the staff who work with media and instructional equipment. Last, and lowest on the pay scale, are library workers. Technological change has affected all of these categories and almost all staff work with computers and information in digital format. Library staff often have the greatest stress of the three categories because they have more direct user contact. One of the challenges yet to be addressed is the reassessment of the value of library work in the technological environment.

Librarians, similarly, have to stay current with the technology and with strategies to manage change and supervise staff who may have greater technological skills than they. Woodsworth (1998) discovered that employers look for recent library school graduates who can display their home pages on the Web, have traditional information management competence but can use that competence in high-end technological environments,

and who can manage information to improve decision-making across the organization. A position announcement, in1998, for an academic librarian included such required qualifications as experience with a networked computing environment, development of electronic delivery of services, Web searching and Web page development, knowledge of HTML, development and delivery of technology-oriented instruction, experience in reference services, and knowledge of information sources in a variety of formats. There seems to be a need for professionals who can do everything that was required in the past plus demonstrate mastery of the new technology and its applications.

Library schools now provide continuing education programs to help practicing librarians improve their knowledge of information technology. The Palmer School of Library and Information Science at Long Island University, for example, helps librarians to develop competence in Internet applications, search engines, evaluation of searches, digital library services, and electronic resources. It has also developed a new program on leading and managing change that involves concepts such as training trainers, working collaboratively with outside agencies, and treating users as customers (Woodsworth, 1998). The concept of lifelong learning has become popular, and librarians across the organization need opportunities and support to stay current.

Listservs have provided another avenue for staff at all levels to exchange ideas with peers around the world. Paraprofessional staff, for example, benefit from the ideas shared on LibSup-L, a listserv based at the University of Washington and dedicated to their concerns. One of the earliest library listservs, PACS-L, was initiated in 1991 at the University of Houston, from which it is still functioning (pacs-l@listserv.uh.edu). Listservs are invaluable for the posting of questions and receipt of quick answers. They have facilitated decision-making and communication for many. Listservs and e-mail have also helped librarians in single-person operations or remote areas feel connected to the profession. The concept of virtual communities (Rheingold, 1994) is personified by the numerous ways that library staff connect through the Internet.

Telecommuting is one of the trends in business that has potential for some library employees. Telecommuting allows for certain functions to be performed at home or off site with contact maintained through e-mail. Reference by e-mail can be done wherever a collection of resources is located. Similarly, cataloging can be done remotely as long as materials are transported and telecommunications to a bibliographic utility are available. For the most part, telecommuting has not been widely adopted because collections and services are interrelated and integral to the mission of the library. Exceptions may be made for individual staff to perform specific tasks from home during a medical or family leave. These cases are not the norm, however.

Technology has also created new jobs and eliminated others. Positions such as Web master, electronic resources librarian, distance learning librarian, and information literacy librarian did not exist prior to the integration of the Web into library services. With the growing need to assist users in the operation of a computer system and to find electronic content, the public services area has expanded. Concurrently, some libraries have reduced their technical services staff by outsourcing specific acquisitions and cataloging tasks to book jobbers who subcontract with service bureaus. Another form of job redesign is the formation of partnerships between staff in information technology, instructional media, and teaching faculty. This "dream team" approach has been effective in producing online teaching modules for students to access on campus and from remote locations (see http://www.ohiolink.net/).

TECHNOSTRESS

Because changing technology has affected library organizations, job definitions, and required skills, it has contributed to a challenging work environment for staff. At various periods during system migrations or upgrades, staff have had to continue to be productive and provide service while using unstable computer systems. The virtual library evolved over a period of years, and staff who worked through wiring projects, network development, and numerous upgrades carry emotional baggage that is sometimes revealed in cynicism and negativity.

In 1984, Craig Brod identified a condition called *technostress* as "a modern disease of adaptation caused by an inability to cope with the new computer technologies in a healthy manner" (p. 16). School librarian Sandra Champion (1988) extrapolated from Brod's work when she identified a number of symptoms of technostress in the library environment: anxiety, denial, resistance, technophobia, panic, conflict, mental fatigue, intolerance, perfectionism, and physical discomforts. These symptoms are indicators of such fears as losing autonomy, losing promotional opportunities, losing control over work environment, being isolated, loss of freedom and privacy, intimidation by documentation, and inability to keep up with rapid change.

More than twenty years after Brod's work, psychologist Weil and educator Rosen (1997) described the more subtle impact of technology on our lives in terms of irritation from pagers and cellular phones, the feeling that we should be able to work as fast as our computers, the sense that we never have enough time, and the feeling of being behind because we cannot surf the Web as well as our children (p. viii). Countering Brod's definition of technostress as a disease, Weil and Rosen define it "as any negative impact on attitudes, thoughts, behaviors, or body physiology that is caused either directly or indirectly by technology" (p. 5).

Marshall Keys (1998), executive director of NELINET, predicted that the technostress experienced by librarians will soon be felt by users in the form of "info rage" (p. 7). He states that the positive aspects of technology allow librarians to achieve things never dreamed of a few years ago. Now our users have come to expect more of libraries and will possibly turn to anger and violence if denied what they want. The opportunity for librarians at this time is to help users understand the difference between what they want and what they need online.

Another author who works in the information technology field (Willner, 1998) expressed the same phenomenon: "we are now synchronized to Internet time, expected to change our data representations and our tool sets as frequently as we change our clothes" (p. 54). He states in a matter-of-fact manner that frequent changes in moving from one word processing format to another and one typesetting format to another have a negative impact on productivity and produce a loss of information in the translation.

The goal that most institutions have been striving for is a computer on every person's desktop and a three-year replacement cycle. Even in this best case scenario, standards are decided by a systems or technology department, and staff have little control over what technology they use, little training on how to use it, and little respite from the constant stream of information and innovation (Weil & Rosen, 1997, p. 176). The top five complaints of employees surveyed by Weil and Rosen are: system problems, computer errors, the time it takes to learn new technology, the reality that time-saving technology seems to end up requiring more work rather than less work, and the fact that technology is always changing too fast to keep up (p. 178).

Another term applied to the anxiety experienced by those whose work has become dependent upon computers is "computerphobia." In most libraries, online catalogs are now the norm, but users unfamiliar with the new technology still ask for the card catalog. It is embarrassing and frustrating when faculty assign students to use the card catalog, which, if it exists at all, is not maintained. While staff presume that students need to use the online system, which usually has links to online databases and Internet resources, and not a nonexistent or out-of-date card catalog, it is difficult to second guess a faculty member who may not have visited the library since the online system was introduced. For some authors, the card catalog is symbolic or representative of an era of quality research. They believe that computers do not provide the same intellectual process, and that card catalogs in particular are cultural icons (Baker, 1994). An artistic statement celebrating the value of the card catalog can be found in the new San Francisco Public Library where catalog cards were decoupaged to the walls. Perhaps this is intended to provide a familiar and comfortable reminder of the past or homage to our print heritage.

ERGONOMICS

Staff and users working in the virtual library often sit in front of computers for extended periods of time. Beginning with the time that libraries were converting card catalogs to online format, staff have become more aware of physical problems resulting from intense computer use. Eye strain, neck pain, and repetitive strain injuries (e.g., carpal tunnel syndrome) have affected numerous computer users. Ergonomics is the term for the field of study that considers human performance and well-being in relation to the job, the equipment, and the environment. As applied to the library environment, ergonomics includes the safety and health of both staff and users, their comfort, and their productivity and efficiency.

As libraries have expanded the installation of computers, they have had to invest in workstation furniture that allows the proper placement of computer monitor, keyboard, mouse, and document holders. Chairs used for computer work should have adjustable height and back support and should be on wheels for ease of movement. Accessories may include antiglare screens that fit over the computer display glass and footrests that reduce stress. In libraries in which staff take turns sharing a common workstation (OCLC terminals, for example), adjustable chairs are a necessity. These chairs will also wear out faster because many individuals use them. Allowing staff to customize their individual workspace to fit their physical needs supports their willingness to adapt to changing technology and improves their productivity.

Too often the public computer areas are the last spaces to be upgraded. Lacking funds for replacement, libraries usually recycle reading room tables as computer workstations. Inevitably these tables are too high, and their matching oak chairs are too low. These furnishings do not encourage users to do research for long periods of time. As libraries have the opportunity to construct electronic classrooms, they must include the cost of appropriate furniture. Likewise, as K-12 libraries incorporate computers, they need furniture that allows children of different ages to be comfortable.

A secondary consideration in the arrangement of computers is the need for variety and privacy. Selected workstations may be arranged for express service with stand-up only access. Work areas with a place for books and papers may be needed in computer labs. The distance to networked printers and the ease of using debit-card printers also need to be factored into the arrangement of furniture. Librarians who supervise labs and electronic resource areas also need to be able to see users who need assistance. Finally, some users will want privacy to view content which others may consider offensive. Anticipating the needs of individual users and organizing public computer areas accordingly will minimize complaints and problems.

Assessment

Many variables determine whether the virtual library is a positive good to society or whether it is a fad, moving libraries away from their true purpose, or whether it is a mixture of the two. Postman (1992) cautions against viewing computers or machines as having human attributes and, conversely, expecting people to perform like machines. He questions the value of automating processes for efficiency when the more appropriate question is whether the processes are necessary or important (p. 114).

Asking big-picture questions is an appropriate way to begin to assess and plan where libraries should go from here. What are we doing? What should we be doing? What should we be doing next? What should we not be doing? Next come strategic questions that identify environmental conditions, competitors, and possible partners. Librarians should create a list of values and identify a mission statement that everyone can support. Tennant (1998) advises us "to talk with experts in other professions, read nonlibrary journals, and query users. We need to think imaginatively, by first throwing out our common assumptions and frames of reference and then brainstorming possible solutions" (p. 33).

Stating that "the dominant ethic of librarianship is service" (p. 8), Crawford and Gorman (1995) pose the following question which can be used in assessing the concept of the virtual library: "How will this change improve the service that this library gives?" Another way to approach the matter is to transpose the question: "What is the level of service that this library will offer if it does not change?" If libraries do not adapt to technological change and offer new services, users might judge them obsolete and irrelevant.

As libraries change, librarians need to continue to explore new assessment measures. We have moved away from the purely quantitative measures of the ownership model. In the access environment, other measures, such as user satisfaction, must be considered. The latest library accreditation standards from the New England Association of Schools and Colleges (1992), for example, acknowledge the role of access and services to remote learners and require libraries to document how they meet the following: "Through the institution's ownership or guaranteed access, sufficient collections and services are readily accessible to students wherever programs are located or however they are delivered" (p. 23). Additional internal evaluation factors suggested by von Wahlde (1993) include ease of use; downtime and response time of the network; turnaround time for document delivery; and availability, accuracy, and usefulness of the information (p. 34).

Strategies for Success and Survival

The impact of technology in creating the virtual library has produced a challenging work environment. Change, technostress, and ergonomic

issues must be addressed in a positive and responsible manner. Those conditions will not go away and may even escalate. The human response to technology demands a personal approach involving honesty, respect, and creativity.

Managers and staff need to be sensitive to the personal needs of individuals through the evolutionary changes taking place, whether major, as in the case of migrating library systems, or minor, as in delays in system response time. Strategies for reducing the stress of implementing planned changes for staff and users include communication, training, implementing changes in phases whenever possible, and documenting new policies and procedures. Staff meetings, memos, newsletters, e-mail, internal listserv discussions, and even mini-conferences can provide appropriate venues for managers and staff to express feelings about the proposed change. Some staff are hesitant and others are hostile. Even though most staff acknowledge the need for change, it creates anxiety. It is important for staff to have a degree of control in determining their future. Frequently the questions of staff will pertain to the operational details that managers have overlooked in their focus on the big picture. Staff task forces and committees can be instrumental in brainstorming the implementation issues and making recommendations to administrators.

Supervisors should lead in the adoption of technology, especially if there is an expectation that staff must use it. Further, technologies such as voice mail and e-mail must be available for all staff regardless of position if they are to improve communication and efficiency in the organization. This means that all staff must have the training necessary to use the appropriate hardware and software and that time must be allowed during work hours for practice after the training. Various strategies have been used by libraries to integrate the use of technology into their organizational culture. Training sessions called "tech breaks" were used by one medium-sized academic library to encourage staff who had mastered a particular application to share their knowledge with their co-workers. This was a supportive environment that fostered staff development and leadership. Smaller organizations may need to collaborate through a community or regional association or network in order to provide training sessions on a variety of topics at an affordable cost. One value of staff going outside the library for training is the opportunity to discuss issues with others who are having the same experience and to vent frustrations without fear of judgment or reprisal.

Those staff who are early adopters of technology can be mentors and advocates. They can be particularly helpful if they support and convince the reluctant adopters. One technique for encouraging early adopters is giving them the newest model of computer each time there is an opportunity. They can be responsible for testing out the hardware and software

and serving as a resource for others. Often these high-end users can improvise and create new systems and procedures that benefit everyone in the entire organization. They may also be able to provide simple documentation for other staff members.

All staff should have choices in implementing technology. They should have the freedom to customize their work space and select other elements, such as screen savers, that reveal their individuality. All staff should have recognized baseline skills, and all workstations need to have standard software applications. No one should determine that individuals do not need to have a program when the case may well be that the person could use it but has not had the opportunity. When staff participate in decision-making, they have greater satisfaction and motivation, increased productivity, more creative uses for the technology, fewer errors, and less sick time and attrition.

There are many strategies for libraries to apply to making technology easier for staff and ultimately for users. Sponsoring contests to create Web pages, encouraging volunteerism, partnering with community agencies or campus departments, and creating internal user groups are just a few. Successful libraries create a culture in which technology is a means to the mission and not the mission itself.

Looking Ahead

Recognizing that high technology will probably go higher, librarians must affirm the need for a human response to counterbalance the threat of new technology (Naisbett, 1982, p. 39). The very technologies that have enabled the virtual library have allowed us to provide new services that have been meaningful to users. Nostalgia about the library of the past and fear of developing technologies of the future do not warrant a change of evolutionary path. Only librarians can create a virtual library that is a place for people, with services for people, and an organizational center for access to information using appropriate technologies and resources. This is the challenge and the opportunity of the present as we build on the success and wisdom of the past.

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