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In this Issue

Special Focus—The Internet

**The Wide World of the Web:
A Liberal Arts Perspective**

Science Librarianship and the Internet

The Salem Public Library Internet Project

**The Impact of the Internet
on Library Education**

... and more!

*Summer 1996
Vol 2 • No 2
Oregon Library
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OLA QUARTERLY

The Internet

Over the last five years, use of the Internet and, more recently, the World Wide Web has spread from academic libraries to public libraries to school libraries. The editors decided to take a reading among Oregon librarians on how the Internet has affected their professional lives. What are the Internet's good points and bad points? How has it affected our jobs? Many of the articles address these issues from different viewpoints: the sciences, the humanities, general reference, collection development, technical services, school libraries, and the library school student. Two articles present unique approaches to the World Wide Web: Salem Public Library's venture into becoming an Internet provider and Oregon State University's Web site for U.S. government statistics.

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Denise Allen Thompson



Denise Allen Thompson (shown with her husband, John) presided over the Publications Committee and edited the first issue of *OLA Quarterly*. In addition, she spearheaded production of many publications for the Corvallis-Benton County Public Library.

*“Life is short and we
have not too much time to
gladden the hearts of those
who travel the way with us.
Oh, be swift to love. Make
haste to be kind.”*

—Henri Frederic Amiel

Denise Allen Thompson was born and raised in the San Francisco Bay area. A lifelong reader and lover of learning, she spent her childhood playing “librarian.”

Denise received her degree in American Studies at Willamette University in Salem. She realized her childhood dream when she secured a position at the university library.

While at Willamette, Denise met her future husband, John Thompson. After moving to Corvallis with John in 1975, she began a long and rich career at the Corvallis-Benton County Public library. Denise grew into every new challenge that came her way. She infused library services with her spirit and love of community. In addition to starting the library volunteer program, she assisted with the library building project from initial design through campaign, construction, dedication, and day-to-day service. Her official title was circulation services manager, but Denise filled many roles at the library.

Denise’s interests and energies extended beyond the library to include her sorority, Alpha Phi; gardening; cats; and needlework. She was dedicated to community causes. She was active in the Corvallis Sister City Association and served her alma mater as an alumni recruiter. Denise’s professional involvement included serving on the Oregon Library Association’s Executive Board and Publications Committee. She edited the first issue of *OLA Quarterly*.

Denise was preceded in death by her parents, Bernard and Dorothy Allen. She is survived by her loving husband John; her sister, Jan Goodenough; her in-laws, Dr. Warren and Marge Thompson; sister-in-law, Linda Foster; nieces Laura and Jennifer; and many dear friends and co-workers.

Contributions in Denise’s memory may be given to the Corvallis-Benton County Public Library Foundation or the Heartland Humane Society.

This issue of *OLA Quarterly* is dedicated to the memory of Denise Allen Thompson.

March 25, 1952 to July 22, 1996

An Internet Skeptic

by Faye A. Chadwell

Head of Collection Development
University of Oregon

The area where the Internet has had the most immediate impact on my professional life has to be communication. Early in the Internet craze, I didn't like sending e-mail messages simply because none of the packages was particularly user-friendly, and the messages were not substantive. Now with some e-mail packages, sending messages is virtually a no-brainer. Unfortunately, we still have to endure more irrelevant and obtuse communications than we endured in the pre-Internet past.

As a collection development librarian, I have received my share of these messages and self-aggrandizing notices of new publications. I worry that publishers' and authors' self-promotion via e-mail may evolve into an insufferable future trend, especially when I remember the amount of print mail my lone staff member recycles daily. I know where the delete key is, but what about the health of my wrist? And as I push my finger toward exhaustion sending inane and unwanted messages to the cyber-compost heap, I wonder, "Don't these people have some real work they need to be doing?"

There's an old and familiar adage that states, "The more things change, the more they stay the same." It was not so long ago that I filed away paper copies of memos I received. With the advent of e-mail, I thought, "Great, this should save a few trees, and the ever-growing paper monster that I constantly battle will disappear like dinosaurs and card catalogs." However, because my colleagues and I discuss many daily issues via e-mail, I find myself filing many messages and holding on to them longer than it would take for the Energizer Bunny to run down. I ponder whether I should keep a message in case an issue rears its beauty-challenged head and I have the one message that might provide clues to resolve a conflict or misunderstanding. I know some librarians print out e-mail messages and file them, but this behavior defeats the purpose of the paperless society. Perhaps what I was really envisioning and desiring was a memo-less society. Anyway, I continue to archive, albeit electronically, in anticipation of issues yet to be resolved. I am resigned to this reality: just as my file cabinet, desk, and office, once ranneth over, so doeth my e-mail folders.

Communication via the Internet is not completely fraught with worthless or irrelevant information. As the head of collection development, I often find myself somewhat isolated from my peers because I don't have oodles, or even a handful, of in-house colleagues performing similar work—like a core group of catalogers or a ring of reference librarians. Access to listservs and electronic mail simply makes it easier to keep up with what's going on in the field

of collection development. If necessary, I can obtain and give feedback on questions and concerns from folks who do work like I do. The Internet has also become a terrific means for publicizing collection development policies and procedures via the University of Oregon's home page. It proved itself invaluable in our recent serials cancellation project. The entire University community could view our proposed list of cancellations and immediately send us hate mail.

I think we all agree that communication is a vital component of all our jobs. Outside this realm, the Internet's effects on librarianship warrant continued cynical speculation. As I write this, the electronic availability of information continues to open the proverbial can of worms regarding collection development. Because many of us face a frigid fiscal reality where we are not able to acquire and archive as we have in the past, some of us look to the Internet as the net that will catch us as we step off—or leap—into the future.

In particular, the growing commercial presence on the Internet makes those worms writhe in gruesome new ways. First, if librarians don't select and order materials for their libraries, will some middle agent, even library users, squeeze us right off the screen of our 17-inch monitors? After all, in theory (and more often than not, in reality), library users will be able to locate useful information, order articles for document delivery, read books at their PCs, or publish their treatises directly on the Web—without ever consulting a librarian or our much-touted on-line catalogs. Secondly, since we would not necessarily be doing all the selecting, conceivably the jobs of collection development librarians will evolve into merely managing some of the access and licensing for products and services. Because end-users would do most of the direct selection themselves, the remaining librarians would be serving as wait people who assist while users choose from the Internet menu. An order of *Psych Abstracts* to accompany that *Medline* meal, ma'am?

Such a scenario raises obvious issues regarding fundamentals of librarianship. What is potentially bad about library users doing their own selection? What is potentially good? How will Internet-poor patrons afford access in the information-rich future? How much of what we think is information rich is really "fool's gold"? And in those cases where we still need to purchase hard copies, couldn't collection development librarians order materials directly from the Web? I apologize for striking fear in the hearts of acquisitions librarians out there, but if patrons are doing direct selection, then it seems likely that collection development librarians could engage in more direct purchasing. And while we are at it, why not purchase or outsource structured access to the Internet rather than depending on catalogers to do it or on OCLC to provide it—if you can fathom the demise of this titan?

Even were we to ignore the commercial presence—or threat—on the Internet, the constant barrage of new materials and new technological developments makes it difficult to keep up with our selection

options and to make timely and sound choices. This week we have access to citation indexes via a telnet session and the next week via three or four Web providers all with different interfaces. In the next year, who knows? Perhaps we will be able to plug our brains up to a computer and just suck up the necessary information like nutrients through an IV.

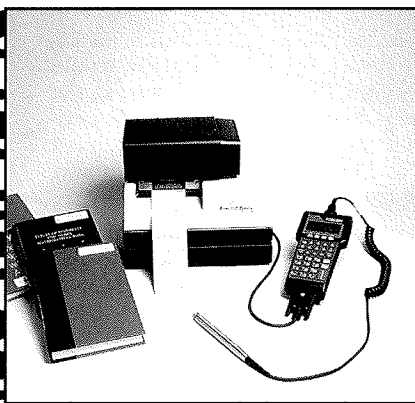
The availability of information will also prompt patrons to challenge us to consider providing access to resources that we might not have considered in paper—simply because they are so readily available via the Web. Remember this demand: “I want my MTV”? Finally, we have only begun to endure significant challenges to the access of information that some folks deem indecent or inappropriate, and I will not knowingly step into the quagmire of copyright issues. I suppose that now more than ever we should be able to change selection and acquisition policies as quickly as Superman changes in a nearby phone booth. We should also consider retaining the services of a talented lawyer who is savvy about intellectual property and can afford anti-quagmire shoes.

A lot of what I am discussing here comes down to issues of control, flexibility, authority and survival. What are we willing to let go of in terms of control? When are we willing to be flexible and to change? How can we maintain some authority? And because I am convinced that there will be some rather nasty results of this natural selection process, I have to ask: Who within the profession will survive if no one

hears you scream in cyberspace? I find that I don't have all the answers, or at least few that aren't cynical. But I sure as hell have my share of questions.

In the end, few librarians—with good reason—would be willing to admit what I am about to confess (perhaps courageously): I remain an informed skeptic regarding how well the Internet serves librarians now and will serve them in the future. Actually, we will probably end up serving it. Secretly, I also believe that not only will the Internet replace books, but also it will likely replace librarians and libraries—at least as we know them now. I wonder whether knowing this about me might change my status among other librarians and mar my image—sort of like those adults confessing to their relish of Frosted Flakes in that moronic cereal commercial. Who wants to be associated with the geeky stereotypes of librarians who loooooovvvveee books, but fear and loathe computers? If anything, I live and work to alter that image not only in myself but in others. I understand that the fear of this familiar stereotype may very well be one possible reason so many of us cannon-balled into the bandwidth: because joining afforded an opportunity to be associated with a constantly evolving, perhaps flashier, focus of information technology. Despite my skepticism and cynicism, I do not deny that the Internet has and will continue to have an enormous positive

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The Wide World of the Web:

A Liberal Arts Perspective.

by *Barbara Valentine*
and *Susan Barnes Whyte*
Linfield College

It is not easy trying to encapsulate in a short article the impact the Internet has had on our library lives. In fact, it is hard to believe that only five years ago we were still laying the initial foundations for connectivity. So much that we take for granted has so recently been put into place. The first wave included e-mail and listservs, which not only began to take up a lot of time, but also began to change the way we communicate. A whole paper could be written addressing this aspect of the Internet alone. The next important wave connected us to other libraries, databases, and resources worldwide. Until then, Linfield College was dependent on the resources of its own small library. This connectivity, along with the Orbis and Portals consortial agreements, expanded our universe almost overnight, and we began humming around the Internet in search of those elusive answers.

But recently it is the World Wide Web that is having the greatest impact on reference and instruction at this library, and it is about this method of accessing the Internet that we will concentrate our impressions in this article. With its graphics, full text documents, and the facility to click into worlds unknown (and come back!), the World Wide Web has captured our imaginations in a way the first waves of the Internet did not. The democratic base and distribution of information on the Web is both energizing and enervating. Questions of content become almost secondary at first as we are dazzled by the possibilities. But over time, intoxication has changed to hangover (Metcalfe, 1996) as we struggle not only to find substance and real answers, but also to absorb this huge amoeba into our repertoire of information tools.

The expectation of a one-stop-shopping information delivery system has been growing steadily in the last decade. The popularity of the Web has probably increased that expectation sharply in the last year. But the Web is not quite ready for prime time. Sites often load slowly or are inaccessible from one moment to the next. They may be unreliable, making a splashy debut but lying unmaintained after that. Many disappear without a trace. It can also take enormous amounts of time to find little of substance. In addition, printing capabilities vary with the local situation. In our library, we provide Web access, but our dot matrix printers cannot support the images. Until we acquire a laser printer, students must download results to disk, e-mail them, or take their URL to a lab where they can print it. Such barriers fly in the face of the notion of push-button information.

At the same time, the Web has provided a unique opportunity for us to teach students about the overall nature of information and how to integrate traditional library resources into their Internet fantasies. After all, most students respond enthusiastically to the Web, which is a rare occurrence in library-land instruction. So it makes for a nice starting point for some of them when they start their research projects.

In general, freshmen and sophomores seem more experienced and at ease with this technology than juniors and seniors, which creates some interesting role reversals on campus. Nevertheless, even many of those who are convinced the Web has all the stuff of libraries and much more come to a point when, after hours of surfing, they bog down while the assignment still stands looming. This turns to our teaching advantage because students are then more amenable to exploring other library resources. In fact, it is possible that exploring the Web has whetted their appetites to pursue information in any format with more determination than they may have ever had before.

Both reference and library instruction have changed incrementally to absorb this new amoeba. We try to integrate Web sites into most of the classes we teach because, after all, it is another important information tool. But it also has become an important teaching tool for several reasons: It's fun for all of us, it gets the students' attention, and since many of them are self-proclaimed Internet jocks, it sets the stage for collaborative learning. If the Web is really relevant to an assignment, we all learn something. When the Web content is only incidental, we can demonstrate its limitations. In addition, the Web is a perfect place to dramatize the need to evaluate content critically, whether electronic or print. It actually seemed harder before the Web became so popular to convince students that not everything they read is gospel. On the democratic Web, however, where literally anything may be published, the need to be selective is more obvious. It is also an opportunity to question the authority of Web sites and point out how difficult it sometimes is to find out who is responsible for content.

Internet resources serve some courses, assignments and disciplines much better than others. In some cases, it provides a variety of information never before attainable in one place. For instance, questions about recent news events, anything in popular culture, medicine, nutrition, health, and alternative points of view may often be more readily answered on the Web. There is also a wealth of government information on the federal, state, and even the local level available full text. Finding information from the federal government alone on such things as recent Supreme Court decisions, economic indicators, census data, house and senate discussions, executive orders, contact information for representatives, and much more is in many ways easier to get at than it was before.

Business students really benefit from using the Web these days. Marketing students can scout out marketing strategies provided by businesses or industries they are studying by consulting the growing

number of company home pages available. We also introduce accounting and finance students to company pages because they often contain the financial data and annual reports the students use in class projects.

The Web is becoming a wonderful place for art history students to find artist and gallery home pages, which often include illustrations unattainable locally. In addition, it might be the quickest place to find biographical information about newer artists.

Researching cultures and countries is often very productive on the Web. Although there is a lot of good information in print reference collections regarding countries, it is often trickier to find sociocultural information. Journals, newspapers, travel information, and much more on regions of the world abound on the Web. In addition, there are opportunities for students to communicate through e-mail with people in different countries.

But finding information on the Web is not as productive in all areas of the liberal arts curriculum. In many areas, Web content is hit or miss, containing patchy bits of what the library, at least at the moment, handles in a better, more uniform way. There are lots of articles and bibliographies, but often not an overall search mechanism to find them. Electronic journals abound and are growing in the social sciences and humanities, and many of them are free. As supplementary material, they are wonderful, and on occasion there will be one devoted to the kinds of material one is searching for.

However, the Internet is not yet a productive first choice in many subject areas. There are plenty of links for sites in history, psychology, sociology, political science, and literature. But it usually takes more time to plow through the department sites, on-line courses, student home pages, and other paraphernalia to find something of substance than it does to use the library's own resources. Nevertheless, it is worth a certain amount of time to try the Web, because it is constantly changing and it is impossible to predict what might be there on any given subject. So the best strategy is to try both traditional and Internet resources.

The Web is the new kid on the block. It expands our notions of what information is, it presents great teaching opportunities, it frustrates, and it excites. But how does it affect faculty research in the humanities? We conclude with some of Susan's musings about humanities research.

It is generally acknowledged that research and publication for humanities faculty (hereafter referred to as humanists) tends to be a more solitary pursuit than for scientists and social scientists (Wiberley). While the Internet presents the beginning of a new, informal way of communicating ideas or brainstorming certain notions, be it research based or pedagogically based¹, the picture of a humanist performing research tends to be of one person in a room, probably using a word processor, but not likely to be cruising the Web checking out the latest literary criticism. Perhaps as the content in these areas of the humanities grows, this will change.

However, Wiberley (1991) makes an interesting observation that partially explains some of the reluctance on the part of humanists to search on line, either via Web or other electronic means. He points out that, in general, humanists research by pursuing acknowledged experts among their peers. For example, a humanist reads a paper and then looks up a cited reference. Searching a general bibliography by subject is not the norm for humanities research, rather "a reference favorably cited in a monograph or journal article is one that somebody [an expert] sent. If the citing author is a well respected peer, then the humanist will have special reason to read the cited source (Wiberley, 1991, 20)."

Monahan (1994) points out that the scholarship done in this traditional way is top-down in authority structure. Searching the Web, on the other hand, presents to the humanist the spectacle of sorting through undifferentiated information, that no one with authority can be guaranteed to have filtered, evaluated, or critiqued. The innate democratic nature of the Web creates a multitude of textual possibilities such that acceptable quality, in humanist terms, may take more time to find.

On the other hand, for musicians and artists, whose professional lives consist of tinkering with a work of art or lots of practice, searching the Web is not such an alien concept. Playing a phrase over and over again until it is "right" can extrapolate nicely to working one's way through the maze on the Web. This idea of "serious play," which can be applied to practicing an instrument or trying a new brush technique, is more difficult to fit in with the ways of knowing involved in, for example, literary criticism. It is interesting to speculate on how writing with computers is now accepted practice, but the idea of incorporating the rhetoric of computers, of delving into the textuality of hypertext, where worlds can be both words as well as links to other sites, presents new ideas for textual criticism. Imaginative research is a term that has not reached full acceptance. The Web urges this notion of serious play upon us.

At this moment in time, the Internet presents some enticing notions about retrieving, packaging and evaluating information. It also presents a moment for librarians to really facilitate the design, with faculty and media experts, of Web-based courses. Rather than emphasizing the lines between professions, the Internet erases these lines and can motivate new ways of exploring and thinking through the screen to the creation of knowledge. **Q**

¹ See Weedman for an interesting discussion of a humanities-oriented listserv

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See Web page 17

Trapped in the Web

by J.Q. Johnson

Academic Education Coordinator
University of Oregon Library

It is common in the computer trade press to joke about "Web years," each year being a few months or weeks of normal time. The idea behind the phrase is that product development for the World Wide Web occurs so rapidly that software that traditionally would take a year to develop now must be out the door in a month and will be obsolete by next month. If software developers, accustomed as they are to rapid change, feel pressure from the accelerating pace of technology, where does that leave us in the library profession? Libraries of today may not be identical in design with the Library of Alexandria, but we focus on the similarities and continuity, not on the differences. We revel in the permanence of paper as an archival medium, and in stability in our approaches to organizing information.

The on-line revolution has been an ongoing challenge to libraries. We had to learn many new ways of doing things, throwing away first our card catalogs in favor of OPACs, then some of our reference collections in favor of surfing the Internet, and now perhaps our scholarly journal collections in favor of on-line journals. The scary thing is that even the "new" skills of last year are becoming outdated: If you learned how to use Archie or set up a Jughead index two years ago, those skills are not very useful to you today; if you spent time learning the HTML document formatting language last year, that may not be very useful to you next year when WYSIWYG HTML editors obviate the need for understanding those obscure tags and pointy brackets.

Driving change over the last year or two has been the explosive growth of the Internet as a key element of popular culture, both as a physical network and as reified in World Wide Web pages. Tony Rutkowski, formerly executive director of the Internet Society, estimates that the Internet has been growing exponentially, from under 500,000 hosts in January 1991 to nearly 10 million in January 1996 (www.genmagic.com/Internet/Trends/slide-3.html). The Comerenet/Nielsen Internet Demographics Survey (www.commerce.net/work/pilot/nielsen_96/excc.html) estimated that 24 million people used the Internet during summer 1995. Although that estimate is likely much too high for 1995, it is probably an underestimate for spring 1996. As of May 1996, the Lycos Web index claims to index 40 million (a number that does not include most large Web-based databases, e.g. the million or so records in each Web-accessible OPAC). More important than the current numbers is perhaps the degree to which the Internet—and the World Wide Web in particular—has entered our collective consciousness. My last doubts about its penetration vanished a few weeks

ago as I listened to a National Public Radio story on cigars and heard the pundit cite—in passing!—Lycos data on the number of Web pages that mention "cigar" as evidence for the importance of cigars in American culture.

Apart from the inevitability of rapid change and the concomitant need for ongoing professional development, can we make any predictions about which changes will be most significant over the next year or two? Probably not, but here are a few trends to watch:

The Web will continue to be big news. Although current growth of the Web seems mostly in the area of advertising and marketing on the one hand, and intranets on the other, both trends are important for librarians. The Web is creating new opportunities for librarians as a cataloging, academic publishing, and communications medium.

The resurgence of Madison Avenue makes it harder for librarians to contribute to the Web; gone are the days when a list of a dozen links to specialized Internet resources plus a bit of description and evaluation qualified as an exciting Web page; at a minimum, we are all under pressure to become graphic artists, or at least to work with the graphic artists in our organizations and to make our pages visually appealing. The HTML language, originally designed as a way to describe the logical content of documents, has grown with additions designed to provide Web authors with greater control over appearance, while alternative commercial document formats for Web publication—Adobe PDF, Macromedia Director, Sun Java, Microsoft ActiveX, Apple Quicktime—have

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proliferated. Animation, visual tricks, multimedia ornaments—what some would consider the triumph of form over content—have become the norm for Web pages.

On the other hand, the commercialization of the Web also means that it has become the preferred place to look for many kinds of mainstream reference information. Why try to find a telephone book for a city in another state when you can search an on-line yellow pages such as www.niyp.com? It seems a no-brainer to predict that the Web will soon replace paper and CDROM as the preferred distribution tool for essentially all mass-market textual information that changes frequently. And it takes only a bit more daring to predict that librarians will have a greater role in helping the average user evaluate and choose the most useful of these on-line reference resources. We can also predict that economics and pricing will be hot topics, with some databases continuing to be free to the consumer (more and more frequently paid for by advertising spots on the Web pages), others site licensed (where the convenience of site licensing based on IP address will conflict with growing complexity as your user community increasingly gets Internet connectivity from a variety of providers with different IP addresses), and others charged on a per-hit basis. With digital money evolving so rapidly, it's not unreasonable to believe that within a year the dominant form of access to networked information will be pay per view, with librarians, quaintly committed to freedom of information, struggling to cope. (For reviews and further references, see www.ex.ac.uk/~RDavies/arian/emoney.html.)

The rise of intranets—Web servers for internal use—means that libraries, like every other organization, must look to the Web for techniques for reengineering their own internal processes. We can expect to see Web clients as the universal front end to other resources, both public and private. If your OPAC doesn't yet use the Web as its primary interface, it probably will by the end of the year. If you have a database that your department uses internally, say written in dBase or Microsoft Access or 4D or Filemaker Pro, you'll be under pressure to make it available on the Web. If you have a calendar or room schedule that you currently maintain on paper, you should be seriously thinking of publishing it on the Web too. (For examples of calendars published on the Web with one commercial tool, see www.nowsoft.com/tmn/tmnDirectory.html.) Since intranets are the rage in business, libraries that build an intranet of their own will be able to take advantage of a growing array of (expensive) special-purpose software. On the other hand, most libraries are fairly open organizations and don't have the network firewalls that provide security and privacy to corporate intranets. As a result, libraries, like academia, will be at a disadvantage in seizing the benefits of intranets.

Search engines, a major component of the Web since its beginnings, continue to be big business. (See www.pcweek.com/opinion/0520/20berst.html and www.bubl.bath.ac.uk/BUBL/IWinship.html.) The rise of intranets means that there is a huge market for search engines to organize not just

the Web as a whole but private Webs. Some librarians see search engines, with their typically brute force string-search approaches, as an insult to the traditions of cataloging, but a better view is that we have for the first time major commercial investment in cataloging and indexing technologies. The rise of the Web has prompted substantial new research, much of it occurring in the library community. (See www.dlib.org.) We can predict continued prominence for vendors of search engines and for research into better ways to index and organize a growing and dynamic Web. We can predict greater use of controlled vocabularies and thesauri in the next generation of search engines, but non-automated cataloging systems that require a person to actually evaluate a Web page as part of the indexing process seem doomed given the rate of growth of the Web and the ephemerality of many Web pages. We can predict that some Internet-wide search engines such as Alta Vista will continue to be free to end users, paid for by advertising or by sales of the search engine for use in intranets; others will increasingly offer searches for a fee. Just keeping up with the current search engines and their strengths is becoming an important job for a reference librarian.

One trend of particular importance to academic libraries is the escalating price of scholarly journals, driven in part by the escalating total production of scholarly works. Many see the Web as an antidote, and see the rapid growth of electronic journals as inevitable (See highwire.stanford.edu.) One huge area of growth is the organization and distribution of unrefereed preprints. Another is traditional scholarly publishers taking their wares on line, e.g., sciencemag.org. A third is university-sponsored specialized journals, such as those being published by Johns Hopkins Press as part of Project Muse. (See muse.jhu.edu.) We're in for a few years of experimentation here before the dust settles, but it's absolutely clear that scholarly communication in 2000 will be very different from—and very much more dependent on on-line media than—scholarly communication a decade earlier.

The Web is all about communications, but in its early years could be conceptualized as a vehicle for publishing—a repository for broadcast communications only. One can no longer ignore its evolution into the umbrella covering essentially all forms of electronic communications. (See John December's www.december.com/net/tools/cmc.html for a survey of current software and tools.) Web browsers are becoming Swiss army knives, integrated with e-mail packages for asynchronous communications and tools for synchronous communications ranging from Internet Relay Chat clients to shared whiteboards and Internet-based telephone and videoconferencing. This evolution offers a few obvious opportunities for libraries. We can, for instance, use the technology to offer electronic reference services and help desks or use it to deliver customized bibliographic instruction. But in the larger picture there may be a tension between communications and

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Science Librarianship and the Internet

by *Tim Klassen*

*Electronic Services Librarian
University of Oregon Science Library*

When I joined the University of Oregon Science Library staff, in September 1992, knowledge of the Internet, though a plus, was not a necessity. Over the past four years, however, the influence of the Internet has become so pervasive in science librarianship that the thought of hiring a reference librarian with no Internet experience borders on the absurd.

In this article I intend to describe some of the changes that the Internet has wrought on my own professional life, as well as to speculate on some of the challenges that may lie ahead. These can be roughly divided into four areas. The Internet as a reference tool, end-user instruction, technical support, and collection development.

Reference Tool

The biggest area of change, and the one that most librarians probably think of when they discuss the Internet, is the arrival of the Internet as a reference tool. In 1992, with the exception of e-mail, only the most adventurous librarians were surfing the contents of the Internet looking for the answers to reference questions. The most advanced search engine of that time, ARCHIE, just wasn't up to the job of finding much besides known file names. All this quickly changed as Gophers became more widespread, followed by the explosive growth of the World Wide Web.

In my experience the Internet has become what is often a quick way to answer simple reference questions. Following are a few examples of activities more easily accomplished using the Internet than through using the print resources of a science library:

- Searching on-line catalogs around the world
- Answering the question "What is a strawberry moon?"
- Acquiring recent weather data
- Finding conversion factors between deciliters and teaspoons or tablespoons
- Locating pictures of all types (much easier to search for than in print library)
- Finding Material Safety Data Sheets (research.nwfsc.noaa.gov/msds.html)
- Finding postal addresses and e-mail addresses of faculty and students at other schools, both nationally and internationally.
- Finding Astronomical data (e.g. very large NASA data sets)
- Locating product reviews (especially software)

The utility of the Internet as a reference tool has been vastly increased with the explosive growth in the World Wide Web and the recent introduction and rapid innovation in Web searching tools. Tools like Lycos and AltaVista, while far from being perfect, allow the creation of both complicated boolean searches as well as simple natural language queries that enable the retrieval of vast amounts of relevant (and irrelevant) data. A well formulated search can often provide an answer immediately. The drawback of these search engines is that they often return huge numbers of hits. Moreover, if one doesn't know a reasonable amount about the particular search engine and how to read the results, one is likely to be overwhelmed, disappointed, or both.

Another reference strength of the Internet is the access it provides to subject-oriented groups and the experiences of their members. I've used this expertise a number of times when posting obscure reference questions to Usenet discussion groups. Such simple questions as "how much does a mosquito weigh?", were quickly answered. Just as quickly answered were more complicated questions such as "I remember in the late 1960s NASA announced that the earth was a day late in its orbit. What was that all about?"

Depending on how one looks at it, the Internet also brings a whole new conundrum to reference work: When do you give up? With the resources, both factual and experiential, of the Internet backing up the library's collection, one can never truly say one has exhausted all possibilities! In fact, the patron's patience is likely to run out long before the librarian's options.

End-User Instruction

End-user Internet instruction is both one of the most important and most challenging roles for the librarian. The most effective form of end-user training, in my experience, is one-on-one instruction. Unfortunately, it is time consuming and impractical. Group training is more difficult in terms of preparation and resources required (infrastructure and personnel), and it is emotionally stressful because of the cantankerous nature of the technology. But it is more efficient than one-on-one, or point-of-use instruction. In my experience the amount of end user training (i.e., BI) we have done since we introduced the Internet to the science library has vastly increased. And unlike previous end user training, the course content tends to change—as the technology changes—every couple of months. This leads directly into another major challenge of the Internet.

Technical Support

If librarians find maintaining photocopiers vexing, wait until they have to start dealing with Internet computers in public service areas! I spend a fair amount of my time troubleshooting the many computers in the Science Library. As I'm sure many other librarians feel, I didn't sign on to become a computer mechanic! But in these times of fiscal restraint and

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Technological change continues to confront librarians in many ways. This change is affecting how they feel about their jobs and how they complete their work. (Mellendorf, 1995)

The latest of these changes is the Internet, but as recently as 1994, Gillian McCombs wrote "the Internet remains largely unexplored from a technical services perspective." I recently talked with technical services librarians around Oregon about how the Internet has changed their professional lives. Some

libraries are still working at establishing a direct Internet connection, while others have only gained access recently. For an increasing number such as Carol Drost, associate university librarian for technical services at Willamette University, the "Internet has become an immediate, everyday problem solving tool."

Certainly the major effect of the Internet on technical services librarians has been the increased communication with colleagues via listservs, e-mail, and newsgroups. In her summary of the responses to an autocat listserv survey, *Internet's Value to Catalogers*, Chris Long wrote, "Respondents were most fervent in expressing how essential communicating with other catalogers has become in the performance of their jobs." These new sources of professional dialogue "provide the benefit of rapid communication with large numbers of cataloging colleagues", notes Lisa Haley at Southern Oregon State College. She says that she benefits from work others have done in researching a particular problem and from dialogues about problems or issues that allow "catalogers to collaborate in working out solutions." At OSU, Richard Brumley, head of acquisitions, conducts all his correspondence via e-mail. "It doesn't matter where you send a message; it could be across the library or to Boston," he notes. He too subscribes to several listservs, including ACQNET and PRICES, the newsletter on serials prices. In addition, OSU does most of its serials claiming through e-mail and places most of its new book orders over the Internet. Lori Robare, cataloger at the University of Oregon, concurs when she writes of how e-mail communication has changed the scope of her network of colleagues: "I now feel that I know catalogers all around the country," she says.

Technical services librarians also employ other libraries' on-line catalogs in a variety of ways. In acquisitions, they can help in the location of bibliographic information for foreign or out-of-print publications. Catalogers judiciously search on-line catalogs to aid in cataloging especially difficult pieces. Often copy is enriched for local catalogs with notes and additional subject headings that aren't retained in the OCLC database. Drost occasionally searches other catalogs for copy when she doesn't find any on OCLC as she did recently for a book published in Canada. She will often search for infor-

mation like subject headings on pieces being added to their Children's Literature collection since she is less familiar with cataloging for that material. Robare says, "I frequently search large databases like Melvyl to find ideas for subject headings or classification possibilities for works similar to those I'm cataloging," or for help in deciding how to handle a "sticky series" problem. Although it may take some time to search, the additional information it provides her often saves time in decision making. And for the new cataloger, Haley finds it "useful to be able to access the OPACs of other libraries to see how they handled specific cataloging situations."

Probably the third greatest impact on technical services is the availability of documentation and other electronic Web resources such as publishers' catalogs. Vianne Tang Sha's Library and Information Science Toolbox, distributed at OLA's Technical Services Roundtable Preconference this year, lists numerous sites. I recently used one of the sites listed to locate a distributor of Southeast Asian materials. On another occasion, we used the United States Book Exchange to identify available titles. Drost finds that she pursues problems further because Library of Congress documents are available on the Web. Robare uses the Web sometimes for authority work for personal and corporate names by checking a Web site for an author's academic affiliation. Most of her communication with OCLC is now done on the Web, reporting duplicates, filling out change requests, registering for workshops, and reading their publications. Other Web documents are not as easy to use or locate. Judy Chien, Acquisition Manager at Willamette University, feels that the Internet's potential is great but that "finding things on the Web can still be time consuming and you can get distracted along the way." Robare hopes that better search engines will improve access to documentation such as OCLC's Bibliographic Formats and Standards, for which you currently have to click through screen after screen after screen to locate the sought-for information.

In small-to-medium public libraries, the Internet may have an even greater impact on Technical Services librarians than in the academics. At the Douglas County Library, the head of technical services has the primary responsibility for the library's Internet connection. Carol McGeehon, Douglas County Library's senior librarian for technical services, is in the midst of testing a new direct Internet line that replaces dial-in access. Up to now, the technical services librarians and staff have made limited use of the Internet with dial-up access. McGeehon foresees a gradual growth in their utilization of its many resources beginning with participation in specific listservs.

At the University of Oregon, technical services librarians have been encouraged to participate in teaching the library's Internet curriculum. Robare teaches several workshops each term. While she says she enjoys this immensely, it's also stressful because she has to keep well-informed about Web developments and

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Technical Services and the Internet:

an Oregon Perspective

by Teresa Montgomery

Southern Oregon State College Library

OSU Creates Web Site for Government Statistics

by Carolyn Ottow
Oregon State University

In the early 1990s, as the federal government began publishing more and more information on CD-ROM, depository libraries faced many technical challenges. Figuring out how to mount the dozens of disks was the first hurdle: The 1990 Census alone was issued on more than 100 CDs. Clunky software, inconsistent user interfaces and the inability to network some CDs also presented problems. Despite difficulties, librarians at Oregon State University, who had already had success developing a network for commercial CDs, saw this as an opportunity for outreach. With data in electronic format, surely there was a way to provide remote access to libraries around the state that did not otherwise have easy access to these government databases. With this in mind, Charlene Grass, OSU's associate university librarian for technical services, wrote a grant proposal to network government CDs, and the Government Information Sharing Project was born.

The Project began in 1993 with funding from the U.S. Department of Education. The intention was to create a CD network that would be accessible via telnet and to work with software developers to create a more intuitive, consistent user interface to the many and varied CDs. As the World Wide Web emerged as the new standard for Internet access, it became clear that using a Web site would provide the best access to the CDs. The Web allowed us to develop a consistent interface that is easily accessible through popular browsers such as Netscape and Mosaic. Using standard features of the hypertext markup language (HTML) used to write Web pages, staff on the project created interactive forms and clickable maps that allow users to extract data tables from several different databases. The URL for the home page is govinfo.kerr.orst.edu.

The resources on the site include some of the most useful and popular government statistics in the areas of demographics, economics and education. The first database introduced on line was the 1990 Census data for Oregon and other Northwest states. This has recently been expanded to cover all 50 states. Other demographic databases are Population Estimates for counties from 1990-1992 and USA Counties, a handy reference source with social, economic and governmental statistics spanning several years.

The economic databases include the 1992 Census of Agriculture, 1992 Economic Census, U.S. Imports and Exports, and the Regional Economic Information System (REIS) from the Bureau of Economic Analysis, which has income and employment data as well as short narrative summaries of regional

economies. The recently added Consolidated Federal Funds Report details federal expenditures in all states, counties and municipalities.

Finally, the School District Data Book provides a wealth of demographic, financial and administrative data for all U.S. school districts. Users can find such things as the student-to-teacher ratio in their school districts and the level of funding by federal, state, and local governments.

Although these data bases are easy to use, providing access to them is labor intensive. All of the CDs contain files in dBase III format. By adapting DButil software developed at Lawrence Berkeley Laboratories, programmers on the project wrote software to read and format the data files. CGI scripts were written for the Web pages' interactive forms. When a user queries the site, the programs extract the data directly from the CDs, which reside in drives attached to the Web server. One exception is the 1990 Census data. Because of the large number of CDs, these data files were extracted, subsetted, and stored on the server's hard drive. We have found that getting the data directly from the CD-ROMS is almost as fast as accessing the dBase files directly from the hard disk.

Project staff members have taken care to make the Web site easy to use. Keyword searching is available within each database, allowing users to pinpoint statistics on specific topics. Besides the numerical data, the complete documentation from each CD was coded in HTML and is available on the site by clicking on the "info" buttons. Users can find out how the data was compiled, look up definitions of terms, and read about sources and authority of the data. There are also help buttons to provide context sensitive help in navigating and querying the data sets.

In a related project, the Government Information Sharing Project joined with the State Library and PORTALS to fund Jumpstart, a program that provides hardware, software, and training to small, rural school libraries and public libraries in Oregon that have limited access to the Internet. Twenty-four libraries were each given a 486 computer equipped with a printer and a 28,800 baud modem, and accounts were set up with local Internet service providers. Two representatives from each library came to Corvallis for a two-day training session on setting up their computers, navigating the World Wide Web using Netscape, and using the Internet for reference service. This program complemented the work completed on the Government Information Web site because it helped to ensure that libraries around the state would have access to the government information.

Although the initial goal of the project was to share OSU's government information resources with other Oregon libraries, the Web has allowed us to reach people from far and near. Usage tracking software set up on the Web server even indicates usage by people around the world. Comments have been received from a variety of people, including a journalist in Ohio; government officials in Washington,

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The Salem Public Library Internet Project

by Jennifer Frankel
Salem Public Library

In early 1995 the Salem Public Library applied for two grants that would give the library seed money to start a community network. The network would run through the library and Marion/Salem Data Center and would provide patrons with access to local information as well as the World Wide Web and other Internet services. The concept was to have both in-house Internet workstations and dial-up accounts for patrons who had computers at home. These services were developed in response to strong patron demand. SPL's success

with bringing cutting-edge information technologies to the community had inspired patrons to ask for Internet access. As the Internet's acceptance and value increased, patrons began asking for SPL to "hook them up."

The Library was notified in the Summer of 1995 that it had received both grants: a \$53,500 Libraries

Services and Construction Act (LSCA) grant and a \$231,565 Telecommunications and Information Infrastructure Assistance Program (TIIAP) grant. The first grant would provide Salem patrons with both in-house Internet workstations and low cost dial-up service. The TIIAP grant would expand the network into the tri-county area, providing local dial-up service for individuals and businesses in rural areas of Polk, Marion, and Yamhill counties as well as placing 22 Internet-ready computers in community gathering places, such as libraries. The City of Salem and Marion County rounded out the funding by contributing \$60,000 each to the project. The City of Salem/Marion County Data Center was involved from the beginning by providing technical assistance to the library staff, as well as setting up and maintaining the server and taking care of hardware and software problems. The library set up our four workstations at the beginning of November 1995, and the Oregon Public Electronic Network (OPEN) dial-up service began the following month.

Staff Training

Prior to the Internet workstations going into our reference area, the library held a series of Wednesday morning training sessions for the reference staff. The staff learned the basics of moving around on the World Wide Web using Netscape, as well as how to perform searches, make bookmarks, telnet into a remote computer, and provide basic troubleshooting for the workstations. The library also held a series of introductory sessions for the support staff. They were encouraged to sign up for training sessions taught by reference librarians. All staff, both librarians and paraprofessionals, were given the opportunity to attend outside training sessions and workshops. Although the staff was aware that the Internet constantly changes and provides new challenges as a reference tool, the staff felt comfortable with incorporating the Internet into the reference division.

In-House Workstations

The staff knew there was patron support for Internet workstations in the library but were not prepared for their popularity. Prior to setting up the workstations, the reference librarians established guidelines for their use. Of the four workstations, three are available for patrons for one hour blocks of time. The fourth terminal is available for half-hour sessions only. The staff feels that this shortened time period will give more patrons access to the Internet as a reference tool. Sign up is available at the Reference desk. An individual may only use the Internet for one session a day even if a terminal is free. The staff wants some of the workstations to be available in order to entice patrons to try them. Patrons can sign up one day in advance.

The workstations were positioned in the middle of the reference area, near the reference desk. Three main issues influenced this placement: 1) The new service would need much assistance from reference librarians, 2) The new workstations might be a target for vandalism, and 3) The central placement of the workstations might dissuade people from looking at potentially offensive graphics. The library decided not to create new guidelines for usage but rather use the existing library code of behavior, which states that a patron cannot "be disruptive, disorderly, or harass patrons and/or staff." Based on this code, staff would not allow a patron to walk around the library holding a Playboy centerfold picture for all to see. Staff believed that a patron drawing attention to similar images on a computer screen in the middle of the library would likewise be disruptive and that a patron could be warned that his or her behavior was not acceptable under the library guidelines. So far, in the five months of operation of the Internet workstations, librarians have asked seven patrons to stop displaying potentially offensive graphics. Although the problems have been few, staff is experimenting with filters on two of the four workstations. So far the filters have proven to be too restrictive. As new filtering technology emerges, the possibility of finding the right product increases.

The workstations' popularity has been overwhelming. All of them are almost always in use, and there is an average of more than 1,100 users a month. The service has been well received: Of 120 Internet users who filled out surveys, only two said that they did not expect to use the service again. One-third of those surveyed had never used the Internet before. A volunteer comes in eight hours a week to assist people in using the Internet. The goal is to have Internet helpers all hours the library is open.

The staff has incorporated the Internet into the reference area with relative ease. It has vastly expanded our reference collection. Among other things, with the Internet, SPL has become a partial depository library. Previously, patrons had to go to the Oregon State Library when they needed federal documents. Now, more often than not, the information they seek is on the Internet. With the Internet there is little publication time lag. For example, one librarian had a patron who wanted the schedule for

the NCAA Basketball Tournament a month before it started. She checked all of the sports magazines and contacted the local newspaper to no avail. She searched for it on the WWW and found it immediately.

Staff knew that having the Internet in the reference area would be a challenge, but hoped it would be such a valuable tool for reference work that the positive aspects would outweigh the negative. Surprisingly, most of the problems encountered at the public Internet workstations were familiar to reference librarians. There were patrons who had never used windows or a mouse and had difficulties moving the cursor. Some patrons had unrealistic expectations about what they would find on the Internet. Staff encountered one problem that was completely new: They no longer knew the reference collection completely. Reference librarians were used to quickly bringing patrons the answer or information they sought. The Internet is not set up for finding information in a quick and efficient manner. The workstations have a list of bookmarks and the SPL Web site has a Web page with reference resources, but normally, staff shows a patron how to use the search engines and lets them explore on their own. At times it has been hard for staff to admit that they do not know exactly what is out there. SPL patrons had come to expect that staff would be able to tell them exactly where they can find a particular piece of information, but the Internet's scope and organization makes that difficult.

While the Internet brings in a great deal of information, staff have lost their power of selection. The librarians are very careful about the resources they purchase for the library. Staff members read reviews and talk to colleagues to make sure that the information in a publication is accurate and correct. The Internet offers us no such selection or review process. Although the staff can confidently provide answers found on pages authored by the National Institute of Health or Microsoft or the Library of Congress, they cannot be so sure of pages that either have no discernable author or do not cite their sources. Although the answer is often found on the Internet, staff is less confident of the quality of information they are providing.

Dial-Up Service

The decision to become an Internet Service Provider (ISP) was made when there was only one other provider marketing its service in Salem. The library believed that there was a need in the community for affordable Internet service and that such a service would fit nicely into SPL's already existing services. Ken Phillips and his staff at the Marion/Salem Data Center were instrumental in bringing this project to fruition. The staff knew that the library had the ability to take care of the public side of the project: making accounts, giving out information, and holding training classes, but the technical aspects of setting up and administering an Internet service were better left to computer professionals.

The Oregon Public Electronic Network (OPEN) was launched in December of 1995. The expectation was to have 500 subscribers by the end of the first year,

and have the service begin paying for itself. As of the end of April 1996, OPEN had 1,800 accounts. In addition to having access to the Internet, OPEN provides a community network through which residents can look for city and county information as well as other community resources. To encourage this, non-profit agencies are provided with free accounts if they agree to put a Web page with community information on our server. The response has been encouraging. So far there are 20 non-profit accounts and seventeen city/county government departments.

The second phase of the project will extend local dial-up capabilities to rural Marion, Polk, and Yamhill county patrons. It will go into effect in the summer of 1996. There will be 22 computers, identical to the workstations at the Salem Public Library, placed in community sites within the tri-county area. Extensive on-site staff training for these remote sites will be provided by staff from the Salem Public Library. There are already technology advocates in these communities who are looking forward to having user group meetings and training sessions.

Conclusion

Six months into the OPEN Internet project, we are pleased and amazed with the public response. The Internet workstations are always busy and the comments are overwhelmingly positive. Although the workstations sometimes add to the noise and chaos of an already busy reference area, the reference staff has come to look at them as an integral part of library services. The staff is pleased that the community looks to the Salem Public Library for leadership in an increasingly wired and digital age. We expect to continue leading in this area for a long time. ☐

If you have any questions about SPL's Internet project, please contact Jennifer Frankel at 503-588-6038 or jfrankel@open.org



Patrons use Internet workstations at the Salem Public Library

Despite advances in high speed telecommunications, lightning fast processors, incredibly compact storage devices, inter-network linkages, array processing systems, and the ever declining cost of computer processing, librarians and information seekers face the same problems they did 50 years ago when the electronic computer made its debut.

The problem: determining how to find the data that someone thought worthy of offering up for public access.

Stories abound in such publications as *USA Today* and *Wall Street Journal*—as well as on local television news—that portray the Internet as easy enough for a child to use. Although anyone can type on a keyboard or click a mouse, effectively using any type of tools to locate useable information is something that has been elusive to mankind even before Alexander built his first library.

The more things change, the more they stay the same...

by Gary Klein

Management & Business Economics Librarian
Willamette University, Hatfield Library

When our neighbors are told, "You can find that information on the Internet," they are being tossed a few crumbs without knowing whether it will lead to anything productive. If you want to watch a movie, and your neighbor tells you "I heard that they are going to air that show tonight," would you know where to find that film? Do you have a television? Do you know what time it is scheduled to start? Maybe it is only being shown on a cable channel: Do you subscribe to cable television? Do you know which cable channel will carry it? If it is a premium channel, have you paid the extra fee to get that channel unscrambled? If on the other hand you have a satellite dish, do you know where to aim your dish's antenna? Do you know what satellite channel to tune to? And you still have to find out when the movie is scheduled for broadcast!

A similar series of questions must be asked before anyone can locate information on the Internet. Without knowing what is stored, where it is located, what encoding format was used to store it, and having the software on hand to process that data—without all of those things in place—you are not going to find anything relevant to your information needs. And just as cable systems restrict certain programs to premium channels or pay-per-view, there are growing numbers of resources available on the Internet that are only available to people who are pre-registered or are students of participating colleges. Some have price tags attached to each data file.

Although television viewers can turn to program schedules in local newspapers or a TV Guide, there is no consistent place that Internet browsers can readily, quickly, or cheaply turn to in order to locate similarly concise and accurate descriptions of electronic resources.

Unlike the typical American television set that is equipped to handle 82 channels of programming,

there is no limit to the number of potential sources that a computer can connect to using the Internet. Digital Equipment Corporation claims that its AltaVista search engine can provide free access to over thirty million pages on the World Wide Web, but many experienced Internet users have difficulty in locating useable data files even when using the various Boolean search features of AltaVista or its dozens of competitors.

If an experienced Internet searcher like me (having degrees in both computer science and library science) has difficulty in locating census data, government agency expenditures, and notable quotations over the Internet, then how can we expect our neighbors to do so with less training and fewer tools at hand than we have inside our libraries?

Surveys indicate that the majority of Americans who own videotape recorders cannot use their features without referring to an owner's manual. Because VCRs are more common in homes than desktop computers, how can anyone be expected to navigate his or her way through the World Wide Web, which has never had an owner's manual or handbook! And once people physically navigate to a computer site that possesses the information they seek, do they have the site-specific or data-specific instructions to download, view, print, or store that data locally? Do they have the necessary software on their home computers to perform those duties without garbling the data?

Librarians often face these same problems when trying to locate resources on the Internet. Some encryption routines require a password to access the "secret decoder ring." At times, the data is stored in a relatively common format, but you did not have the funding to purchase each and every brand of data manipulation software available in the marketplace. In mid-May, the business librarians' discussion list (BUSLIB-L) carried several calls for assistance by librarians who had difficulty working text files that were available only in Portable Document Format (PDF) format. How does someone who does not have a laser printer manage to print these PDF files?

As we increase the utilization of computers in our libraries and in our daily work stream, we also increase our reliance on a wide variety of operational standards that allow our machines to communicate with others from around the world. When you seek information on population shifts in your home county, most people would be more concerned about the accuracy of the statistics than the data coming from a nearby computer. Whether the information comes over the Internet from the Census Bureau in Washington, D.C., or from the state capitol in Salem should be irrelevant. But how do we locate that population data file, if each regional census office puts the file into a separately created file folder? Take a look at the files that you maintain in your own office: Does your colleague from down the hallway know where to find something that might be sitting in one of your file drawers? If you were out sick, and someone had to pick up the pieces for that important meeting tomorrow morn-

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Traveling the I-Way

by Sheryl Steinke
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The emergence of the I-Way, the "information superhighway," has brought many changes and challenges to school librarians. Librarians who entered the I-Way as it was being built had no map to guide them, no apparent system for naming and numbering locations, and the information at each address might or might not be relevant to the curriculum. Librarians have had to learn a whole new range of skills, which includes learning to FTP and telnet, to communicate using listservs and newsgroups, when to GIF, TIFF, or PICT, and how to speak HTML.

Traveling the I-Way without a map brings many problems to the school librarian. Many librarians chose the field because libraries offer an organizational scheme for the world's body of knowledge. My first experience trying to find information on the Internet was like walking into a library with all of the books randomly stacked on tables, chairs, shelves, and even the floor. Until gophers—and finally search engines and directories—came along, trying to help others locate information on the internet required a great deal of persistence and luck.

Even now, with well-developed, seemingly easy-to-use directories and search engines available, the school librarian must work with both staff and students to help them learn how to evaluate the information that they locate with their searches. Librarians must continue to emphasize the importance of evaluating information, emphasizing such concepts as authorship, date, bias, and accuracy of facts. Resources are becoming available on the Internet that librarians and teachers can use to help students learn to address these issues. Two excellent sites are *Searching the Net*, arlo.wilsonhs.pps.k12.or.us/search.html, and Kathy Schrock's *Guide for Educators*, www.capecod.net/Wixon/wixon.htm. The development of the I-Way as a Web of interconnected sites is both a blessing and curse for school librarians helping students obtain information on the Internet. The advantages are readily apparent. Students can easily progress from one site to another, gathering huge amounts of information along the way. The disadvantage is that students can easily lose the focus and purpose of their investigation and spend huge amounts of time clicking from one fascinating site to another.

Obtaining adequate amounts of information resources has always been difficult for school librarians. The I-Way provides vast amounts of information, but students have access to I-Way information without its being evaluated for suitability to the informational and recreational needs of the school environment. Materials have traditionally entered school libraries based on reviews, professional rec-

ommendations, and the library staff's personal knowledge. Once the Internet is available in a school, prior evaluation of materials is no longer possible.

The reputation of the Internet has caused great concern to the school community. Providing students with access to a vast amount of unfiltered information and the ability to communicate with people throughout the world raises concerns that students will be exposed to ideas or material that may be unhealthy or not advance their education. Each school should develop an acceptable use policy (AUP) to ensure that the internet is being used for its intended purpose, which is to extend teaching and learning. Developing and writing these policies has required librarians to research issues such as district disciplinary processes, due process, search and seizure, plagiarism and copyright, and the first amendment issues of speech, access to information, and academic freedom.

Adherence to copyright laws and their legal interpretations has always been important to school librarians, who seem to have become the school conscience on this topic. Copyright issues require more of the librarian's time because it is so easy to copy and paste portions of files or download entire files from the internet. Librarians must stay current with Internet copyright issues while continuing to emphasize to staff and students that the basic principle of protecting the creativity of the author applies to information on the Internet just as it does to print and audiovisual materials.

Listservs have brought so much mail to librarians' e-mail accounts that it seems like a year's worth of mail arrives daily. LM_NET, a listserv of more than 4,000 school library media specialists, provides a forum to discuss issues and ask questions. Perhaps its greatest asset is ending the feeling of isolation and loneliness of media specialists who rarely have daily contact with their peers. The biggest problem is finding time to read one's mail.

School librarians must be ever vigilant to attacks from people who mistakenly believe that the school library and librarian can be retired to the scrap heap once the Internet is available in schools. These misinformed individuals fail to understand that there is more than 1,000 years of written information that is not now, and probably never will be, available on the internet. But even more importantly, the one person in the school who is uniquely qualified to help students and staff learn to be successful on the I-Way is the school librarian. The most important library resource walks out the door every night.

Learning how to drive the I-Way is frightening, challenging, exhilarating, and tiring, but ultimately rewarding when students and staff become traveling companions on the information journey. ☐

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The Impact of the Internet on Library Education

by Kelly Skogseth
Southern Oregon State College

Clearly, the Internet has brought about changes in libraries comparable to those brought about by invention of the printing press. As Kirk Doran (1996) stated, "A product of immense creativity, the Internet that we created is in turn changing us." As in any time of great change, many opportunities and challenges are present.

Obviously, this has had ramifications for the education of library professionals. In 1994, Wittig and Wolfram conducted a survey of networking education in

North American library schools. One element they explored was the impact of electronic networks on library education. They found that "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." Two years later, some general trends seem to be emerging. The

Internet has been the impetus for many changes in curriculum as schools have attempted to integrate this technology into their programs. In addition, innovative approaches that use the Internet for conducting class are being tried. Perhaps most importantly, we are beginning to see the way library students have changed in response to a networked world. As a student currently pursuing a Master's in Library and Information Science through the Oregon program of Emporia State University, I hope to give some personal insights into this issue.

That librarians must take the lead in development and utilization of the Internet is well documented. However, integrating the Internet into the library school curriculum has not been without difficulties. Wittig and Wolfram (1994) found that "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." A review of current degree programs in various schools of library and information science show that this issue has still not been resolved. Whether Internet skills should be included in each course or taught separately is a difficult dilemma for several reasons.

The levels of experience students bring into a program obviously has a bearing on how the Internet is integrated into a curriculum. This raises the difficult question of "what level of computer literacy or information literacy should be required, if any, of students when they enter a program?" (Froehlich, 1994). I experienced this first hand in my cohort. Some of us had never even used the Internet, while others were already writing HTML. We generally had to acquire the necessary skills on our own, and this led to a certain amount of anxiety. This may change

as the Internet becomes more ubiquitous. However, this is an issue that must be dealt with.

Related to this is the skill level of the faculty. Some are obviously more adept at using and teaching the Internet. As Froehlich (1994) aptly noted, "technological courses have to be structured around each faculty person's strengths and weaknesses." Obviously, the question of integrating the Internet into the curriculum is a complex issue. As the Internet continues to change and evolve, so too must library education.

The area where I have personally experienced the greatest impact of the Internet is on how courses are being conducted. Many library schools are now offering some form of distance education. This is necessary because "today's graduate students rarely have the luxury of spending one to two years in residence at a traditional campus-based program" (Godden and Moothart, 1995).

One of the complaints about distance education in the past was that students did not have regular interaction with peers and professors. The Internet, however, has revolutionized distance education by allowing this interaction. As Steve Harries (1995) noted, "The flexibility of the networked environment, which is emerging as a principal aspect of third generation distance learning, does provide an infrastructure within which collaborative learning can take place via shared group experience and peer group insights—the form of person-to-person networking which forms the basis of much professional development." I can attest to the effectiveness of the e-mail and listservs in this respect. The Emporia program utilizes a weekend intensive format where we earn one credit by spending 15 hours in the classroom. Between classes, we stay in contact through a very active listserv. Assignments are discussed, and arrangements are made for sharing resources. E-mail has also allowed for small group projects. I have even had classmates critique my papers by sending files back and forth using FTP. In addition, faculty members are accessible through e-mail. All of this has added a very important dimension to the program. Not only has this enhanced the quality of the educational experience we have received, but it has also enabled us to use the technology on a daily basis.

Emporia State is also experimenting with courses that take place entirely over the Internet. A course on information design was recently offered that used a Web site, a listserv and e-mail. This was a unique opportunity to explore both the strengths and weaknesses of this medium.

Opportunities are also being explored to use the Internet in conjunction with other technologies. For example, the University of Michigan offered two innovative courses in 1995 that employed "two-way interactive audio and video conferencing in the classroom and at the desktop along with Internet Web pages and conferencing for students at the University of Illinois and at UC-Berkeley"(CRISTALED, 1996). This will hopefully be the start of many more cooperative ventures between library schools.

All of this of course implies that students have access to the Internet. In our enthusiasm for this new medium, it is often easy to forget that this is not always the case. Eloise Greene, a participant in a distance program through Syracuse University, commented on a recent CRISTAL-ED listserv discussion: "One of the biggest challenges for my cohort was interconnective service. Most seem unable to connect to the Web, but all have electronic mail and some way of uploading/downloading files. For some it has been an unanticipated financial burden of \$200 to \$300 a month for the home connectivity charges" (Greene, 1995). Even in Oregon, where most areas have Internet service, access can be a problem. Several people in our program simply do not have the resources to purchase a home computer. They are therefore restricted to using Internet connections at libraries, which is not always convenient.

The Internet has not only changed the tangibles of course content and delivery, it also has helped lead to some fundamental changes in the way students approach their educational experience. We are no longer site-bound in our interactions. Students from different institutions can now connect with each other through listservs such as LIS-L (listserv@vmd.cso.uiuc.edu), a global discussion list of issues relating to library and information science students. Peer reviewed e-journals, such as the *Katharine Sharp Review*, edfu.lis.uiuc.edu/review, publish articles by library students. In addition, many schools post their syllabi on their Web pages. This allows students to gain a perspective on what is being taught in other schools. At times, it is even possible to read class lectures. All of these contribute to making library students better consumers of information.

Web

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Skeptic

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impact on the lives of library users. I am just not sure I like what the cards foretell about its eventual impact on my professional life, and I don't think the crystal ball is clear about the negative consequences for all librarians concerned. **Q**

Clearly, the Internet has made a profound impact on library education. Being a student while these rapid developments take place will no doubt help prepare us as we enter into the changing profession of library and information science. The students who are in library school now can be instrumental in the shaping of this new technology. I and many others like me find that to be a very exciting prospect. **Q**

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Trapped

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information access. Do we, for instance, want our OPAC terminals used by our customers to send and read their e-mail? The good news is that the problem won't be with us for long. By next Web year, we'll have a different challenge. **Q**

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Science Librarianship

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increasing computerization, learning at least the basics of PC or Macintosh technical support seems inevitable.

Another area of technical support is all the new software one must learn to use and create for the Internet. Though HTML (hypertext markup language) is a fairly easy language to learn, using it well and working with graphics involves a lot of practice.

Collection Development

I think this is probably the area where we are likely to see the most changes in science librarianship. One of the most important areas I envision is the growth of materials in on-line form. We are starting to see the proliferation of electronic journals in two forms, both original journals that exist only in electronic form, as well as paper journals that are duplicated in electronic form. We are also starting to see the availability through the World Wide Web of many of the major on-line databases (eg *Medline*, *Psychinfo*, etc.). Before, such databases tended only to be available from sources such as Dialog. In the future, I expect most of these databases will be available to any user on the Web—for a price, of course! How the library provides access to these databases and journals is going to be interesting. Especially as the development of ways to pay for information provided over the Internet matures. Will the library or university have to provide each user with a credit card number for Internet browsing, or will we continue to provide our information only through the library by purchasing site licenses to all the sites we deem important enough for students and faculty to need? Will the Library run one account that pays for all student and faculty usage? And how will we monitor which sites are of an academic nature suitable for the library to subsidize? If we think journal infla-

tion makes our budgets unpredictable, wait until we have to deal with a scenario like this! And, of course, many other scenarios could emerge.

The duties of the subject specialist also have a potential to expand with the Internet. Is a subject specialist responsible for collecting or providing access to Internet sites in his or her collection discipline? For instance, should the biology subject specialist attempt to create a page linking all sites of importance to biology? My own experience has shown that doing this well is incredibly time consuming, and quickly becomes unmanageable. The number of sites is increasing too quickly, and the task of evaluating them for quality is too time consuming. At present my strategy is to provide links only to certain categories of sites. Presently this includes subject-oriented guides (let others do the cataloging), e-journals, local sites, and professional associations. I suspect that e-journals will be the next category to become too unwieldy to include on my subject oriented pages. Creating a new home page can be a lot of fun, maintaining it and keeping it current is the hard part!

I have only scratched the surface regarding how the Internet has affected my job as a science reference librarian and how I envision my job changing. We are still in the early years of the information revolution that the personal computer and the Internet have created. Yet the changes of the last few years and their implications for the future are immense, and so will be the challenges! Lets face it, these are the kinds of challenges that make our jobs fun! ☐

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Technical Services

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spends a lot of time preparing for classes, which is time away from her primary responsibilities. But like other technical services librarians I spoke with, she feels obligated to continue to further her understanding of the Internet.

Finally, a less tangible effect of the Internet is the approach brought to the job. Drost thinks that because of the changing technology and the increased presence of the Internet in our professional lives, technical services librarians need to be "adaptable, flexible people willing to learn new things every year" and "people who enjoy working with computers." ☐

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Change

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ing, how would they know where you stored the important documents? If your colleague were hospitalized, would you know which file folders to turn to for his or her part of tomorrow's big meeting?

Just as each employee has his or her own filing system at home and at work, each person who creates a computerized file has an individualized system for labeling and filing those on-line documents. In libraries, we have come to rely upon such document classification systems as the Dewey Decimal numbering system and the Library of Congress call letter system. But these systems clearly are not universal. Some public libraries use LC and others use Dewey. Many medical libraries use a modification of LC that was devised by the National Library of Medicine. Law libraries typically use yet another system. The Universal Decimal Code was devised to be the Esperanto of call numbering systems for libraries, but it clearly is not as universally recognized as its designers had hoped.

When we look at the array of files that are freely available and accessible over the Internet, there is nothing that could be comparable to a call numbering system at the file-by-file level within any computer. Most computers offer some sort of browsing capabilities for the names of each file, but there is no consistent system for browsing the contents of each and every file that is accessible via the Internet.

But what about subject access to Internet files using search engines such as Yahoo, which collates information sources together from the World Wide Web?

I'm sorry to be the bearer of bad news, but despite the decades of familiarity that librarians have with systematic ways of describing the contents of books, the lack of uniformity within our own libraries (Sears, LCSH, MeSH, NAL, NLC and UKM) does not establish a strong likelihood of classifying and categorizing the contents of the World Wide Web.

Although many librarians are personally aware of internationally established standards such as ISO's Z39.50 for interconnecting on-line library catalogs, my research indicates that the actual number of those standardized catalogs is very low. My experi-

ence of having searched over 400 separate libraries using either NOTIS or INNOPAC brand software indicates a lack of consistency even between catalogs running on the same brand of software. The ability to customize features by turning on or off certain processing options has forced many library catalogs to operate in a stripped down fashion when connecting via a Z39.50 interface. Some library catalogs are designed to work with function keys, which simply lose something in the translation when they are connected to the Internet.

If we information specialists cannot get our own computers synchronized with on-line catalogs in our same cities, how can we expect individual's at home to overcome obstacles when they try to connect to computers around the globe? The difficulties do not stem from the computers themselves, but from the lack of communication by the people who build them, sell them, install them, and use them.

Alexander the Great built his library at a time when communicating with people was much different than today. But some things never change. The information explosion that librarians are coping with predates both Marshall McLuhan's writings, and the Alexandria Library. Electronically, you can be linked to people all around the globe in a flash. But it still is a common language that separates England from America. Just try using the Internet to find the official colors of the Labor Party's flag, and you will find out what I mean. ☐

Gary Klein has been using Internet resources at work and at home since 1989. He has given conference presentations at ALA, LOEX, NOTIS Users Group and the Ohio chapter of ACRL, as well having journal articles published on the lack of standards among library OPAC systems and overcoming historical difficulties of problematic subject headings. Gary now works for Willamette University's Hatfield Library as their Management & Business Economics Librarian. You can reach Gary through the Web or by e-mail:

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OSU Web Site

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D.C.; a city planner in Virginia; and students, faculty and librarians from around the country.

Although it began as a demonstration project, with an ending date of October 1996, the Government Information Sharing Project will continue to maintain the site. With new funding from PORTALS, OSU will add several more databases and will experiment with different types of CDs, including full-text. We plan to work on improving the presentation and features as well as adding to the content of the site, developing a quality reference source on the Internet for libraries to share. ☐

Correction

In the last issue of OLA Quarterly, we reported erroneously that Multnomah County Central Library was originally funded by a Carnegie grant. Although seven branches of the Multnomah County Library were Carnegie libraries, Central was not. The Library Association of Portland purchased the land for the Central Library, and Multnomah County levied a tax for its construction. Thanks to June Mikkelsen of Multnomah County Library for pointing out this error.

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