1.0 Introduction

Remote users are no longer a small segment of library users. [1]
From electronic workstations in their offices and homes, scholars
and students access library OPACs and commercial indexes, connect
to distant Internet systems, and download information using file
transfer protocols that were uncommon just a few years ago. They
ask questions of reference librarians through e-mail, requesting
answers via fax machines. Remote users are no longer limited to
just dial access; they surf the Internet to locate resources that
meet their needs. Library staff have become remote users of a
variety of systems, including other libraries' systems. Staff
are challenged to use new electronic capabilities to enhance
traditional methods of bibliographic instruction and to reinvent
themselves and library services.
     Do libraries have a mission to educate remote users about
their electronic information resources? At least one librarian
has written that end-user instruction is unnecessary due to the
development of increasingly user friendly systems and the growing
computer sophistication of users. [2] But is reliance on users'
hands-on experience really best? It is a logical extension of
bibliographic instruction programs to extend libraries' teaching
activities into the remote electronic information resources
arena. The growth of high bandwidth connections that will
provide users with access to interactive digital video and audio
capabilities will increase libraries' opportunities to reach and
teach remote users. If we do not utilize these new technologies
to add value to the information we provide by demonstrating and
teaching our unique skills in the electronic arena, we will have
lost an opportunity to make ourselves and our libraries part of
the electronic future.

     As the trend toward the virtual library continues to
accelerate, the knowledge that a library physically houses must
be made electronically available to its remote users. As
libraries move toward a user-centered focus, their perspective
must change: it is not users that are remote from libraries,
rather it is libraries that are remote from users. [3] Services
needed from these remote libraries will be defined by future
users to help them deal with an increasingly complex information
environment. Consequently, the question of how best to identify,
contact, selectively disseminate information to, and teach remote
users should already be an important consideration when planning
library services.
     How can we effectively train remote users of electronic
information resources? This paper examines the categories and

characteristics of remote users, training challenges, and ways
that emerging electronic capabilities can be used to enhance
traditional bibliographic instruction methods.

2.0 A Short History of Remote Access

Remote access can be defined as access through electronic means
(e.g., dial access or network access) to library resources (e.g.,
OPACs, bibliographic databases, full-text databases, and numeric
databases) and library services (e.g., reference, interlibrary
loan, and document delivery) from a location distant from the
physical site of the library that provides these resources.
     Remote access to libraries did not start with the electronic
era: 19th century printed book catalogs allowed patrons to check
the library's holdings in their homes or offices. However, at
the turn of the century, card catalogs began to replace printed
book catalogs, and this was no longer possible. [4]
     Electronic remote access began in libraries with dial access
through modems to commercial databases in the late 1960s and
early 1970s. In 1972, for example, Dialog began commercial
operation with 3 databases. By 1975, 300 databases were
available; by 1980, that number had grown to 600 databases; and
by 1984, it had increased to 2,400 databases. [5] The latest
edition of the Gale Directory of Databases lists 8,261 unique
databases and subfiles available through various vendors today.
It points out the growth in the size of the databases over the
same time period: the "average database in 1975 contained 173,000
records, and reached approximately 500,000 records in 1985. The
average database entry in 1993 has 739,188 records." [6]

     According to the same source, the searching of word-oriented
online databases on the major U.S. systems increased from 750,000
searches per year in 1974 to 51.78 million searches per year in
1992.
     It is not surprising that remote access to online databases
began to increase rapidly in the early 1980s coinciding with the
widespread availability of personal computers in the consumer
marketplace. Libraries' introduction of OPACs in that period,
followed by locally mounted databases, further accelerated the
remote access trend. The rapid growth of the Internet in the
late 1980s and early 1990s also significantly increased remote
access of library electronic information systems, as Gophers and
World-Wide Web servers were added to OPACs.

3.0 Types of Remote Electronic Information Resources

With the burgeoning number of electronic information resources,
it is useful to have a method of grouping them in order to
discuss them. These resources be grouped in many ways. One way
is to group them by their form of data representation (i.e.,
words, numbers, images, or sounds). This system does not
adequately allow for resources such as computer bulletin boards,
e-mail, and electronic conferences. Nor does it adequately
account for software archives that include public domain
software, special help software, and shareware. Another means of
grouping is by region and country of origin. A third method
groups resources by subject categories. [7]
     For the purposes of this paper, I have adopted Cuadra's
classification of databases into "reference databases" and

"source databases." [8] The former category includes
bibliographic citation databases that refer users to printed
publications. The latter category contains databases that
contain original (i.e., source) information, such as numeric
databases containing statistical data, textual and numeric
databases, full-text databases, and software. This terminology
can be extended to non-database electronic resources on other
types of systems, such as Gophers, and the term "electronic
information resource" will be used instead of database.

This paper will primarily focus on the first category--
electronic information resources containing bibliographic
citations. However, it should be noted that there are many
electronic information resources marketed directly to consumers
for which libraries provide no instructional support. In the
future, libraries may choose to become active in providing access
to and instruction in these resources also.

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4.0 Who Are the Remote Users?

Elizabeth H. Dow, in her 1988 dissertation, found that nearly 80%
of remote library users were between the ages of 24 and 54. [9]
This suggests that remote users are more likely to be graduate
students, faculty, staff, or researchers, rather than typical
undergraduate students.

As more undergraduates bring their personal computers and
modems to the university, they are creating a vast new group of
remote users. As remote use grows, librarians are faced with BI
problems similar to those encountered in training end-users
within the library. A body of knowledge has been accumulated
about teaching end-users to search OPACs, online databases, and
CD-ROM databases in the library. While this knowledge base is
valuable to some extent in understanding and dealing with remote
users, much research remains to be done. Sally Wayman Kalin has
done groundbreaking work in identifying the needs and habits of
academic remote users. [10] However, further investigation of
this topic is needed.

4.1 Categories of Remote Users

It is useful to identify four general categories of academic
remote users:

    1.   Affiliated campus users (traditional academic users).

    2.   Affiliated off-campus users (research center personnel,
         distance education students, and users at other
         institutions in the same university system).

    3.   Unaffiliated local users (community users).

    4.   Unaffiliated distant users (anyone with Internet
         access).

This paper will primarily address the needs of the first two
categories, although as library policies allow, the same training
techniques would also be applicable to the last two categories.
Since access problems are a significant factor in
instructing remote users, it is necessary to consider the modes
of access typified by these different categories of users.

The users in category one (affiliated campus users) often have access to network-connected workstations in dormitories and campus computer labs that allow them to connect to campus computers and Internet computers. Those living off-campus usually rely on dial access to campus computers via modems.

Category two users (affiliated off-campus users) often have access to computers on the university system network, but some may need to utilize dial access.

Category three users (unaffiliated local users) typically rely on dial access.

Finally, category four users (unaffiliated distant users) either access Internet-connected computers either via dial access or via workstations attached to local networks.

4.2 Characteristics of Remote Users

Reva Basch has classified electronic users into broad categories with identifiable traits. [11] This paper will adapt some of her terminology, which was based on fee-paying clients, and apply it to the academic milieu.

4.2.1. The Technologically Challenged Remote User

These remote users are usually newcomers to computer terminals and electronic information resources. The faculty members in this category have expertise in the research methodology of their subject areas, but are frustrated by the technical problems of access. They are interested in results rather than in the operation of the computer or the mechanics of searching. The students in this group are not yet fully computer literate, and they frequently experience anxiety about both the means of access and the research process itself. These users need "electronic counseling" to reassure them, to help them through the technical problems of remote access, and to encourage them to seek further help when needed. [12]

4.2.2. The Techie Remote User

These remote users are aggressively computer literate and are eager to explore the possibilities of cyberspace. They are interested in the technological aspects of telecommunications and techniques of remote access, but may not be familiar with the subject area they are researching or with effective search techniques. They are more interested in the means rather than the end.

4.2.3. The Research-Naive Remote User

These remote users are technologically sophisticated enough to surmount the problems of access and gain entry into library systems. Once connected, students in this group encounter problems with particular electronic information resources. For example, they may not know the scope and coverage of a resource, or they may not be able to construct a search strategy that includes all the possible ways of expressing the concept that they are searching for. Faculty members in this group usually understand information retrieval principles, but need assistance with the terminology of an unfamiliar subject area.

Many users in this category are confused by the enormous
wealth of available electronic resources. Librarians have a real
opportunity to provide a service here and, in doing so, to
establish their role as navigators of the electronic information
universe. End-users, overwhelmed by numerous information
resources, want to know techniques for winnowing out unreliable
and less useful information. Librarians need to establish
themselves as the best equipped professionals to assist in this
task.

5.0 Challenges of Training Remote Users

Working with remote users presents some interesting instructional
challenges that call for new high-tech solutions. This section
discusses two types of major challenges: (1) providing procedural
knowledge, such as accessing and capturing the needed
information; and (2) providing conceptual knowledge, such as
teaching effective information retrieval strategies.

5.1 Procedural Knowledge

A key task for libraries is helping remote users, who are using
different hardware and software platforms, operating systems, and
telecommunications software, to effectively access electronic
information resources.
     The first thing that all types of remote users need to know
is how to access the target system and how to reach technical
support services for it. The logon procedures for either network
access or dial access are necessary first steps. Technical
details needed for dial access users include the proper terminal
emulations supported or required by the system, parity bits, baud
rate, and other technical settings for the communications
software. Network-connected users need to know how to obtain
accounts with the campus computing system, how to logon to campus
network servers, and how to use the sometimes obscure commands
and special features of their campus network. Both types of
users need clear explanations of error messages and prompts. It
is extremely important to tell users how to reach assistance by
providing phone numbers for immediate help with frustrating
problems.
     It is critical that library instruction staff work closely
and cooperatively with the campus computing center in order to
provide support services to remote users. Computing centers
typically provide technical support, such as how to get started
with the correct communication software settings appropriate to
the dial-access user's hardware platform, and libraries provide
assistance with searching and using electronic information
resources.

Should librarians develop the expertise to diagnose and
advise users on complex technical problems related to hardware
and software platforms? Debate concerning electronic user
support services focuses on the "one-stop shopping" approach
versus the "complementary role" approach. The one-stop shopping
approach proposes that librarians should develop in-house
technical support for handling the needs of remote users as well

as providing support for searching and using electronic
information resources. The complementary role approach envisions
librarians working cooperatively with the campus computing center
personnel to provide remote user support. Based on their unique
configuration of resources and needs, libraries may choose to
implement one approach rather than another, or they may view this
debate as a continuum of choices rather than as an either-or
decision.

5.2 Conceptual Knowledge

Helping remote users develop a conceptual model of how
information retrieval works is the central challenge of user
instruction for remote users, just as it is of any user
instruction program. The remote user needs to learn to
conceptualize his or her information need and to think in terms
of how an electronic information resource is organized in order
to develop an appropriate search strategy. The user must also
understand the limitations of the system in order to evaluate
search results. Were the search terms the best ones to use to
exploit the strengths of the system? Does the electronic
information resource represent all relevant research in the
subject area?
     If the user does not understand the scope and nature of the
electronic information resource, he or she runs the risk of
assuming that it holds absolutely everything they need to know
and that any search will turn up all relevant citations. More
than in the print environment, the librarian working in the
electronic environment needs to help the user recognize that the
electronic information resource is a tool that the user controls
to gather and evaluate information. In order to do that, the
librarian must explain the tool's limitations, purpose, and
proper use.

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5.3 Teaching Searching to Remote Users

Successful efforts to teach effective searching techniques have
often employed interactive, one-on-one, point-of-use instruction
by reference staff working with end-users. Until advances in
technology supply us with similar interactive electronic
capabilities, providing general instruction to a potentially vast
group of remote users with unknown levels of sophistication and
learning styles will require creative use of existing
instructional technologies. Much more research needs to be done
to identify how remote users actually search electronic
information resources and how best to address their needs.
     A study at Hofstra University has suggested what end-users
do not need to know: advanced search techniques such as nesting
concepts, using an online thesaurus of descriptors, and anything
beyond the most basic Boolean search strategy. [13]

5.4 Helping Remote Users to Capture and Manage Information

To support effective remote use of electronic information,
libraries need to address the wide variety and complexity of the
hardware that dial-access users are utilizing to download
information as well as the vagaries of the different kinds of
communications software that they employ. It is extremely
important that library instruction staff work closely and

cooperatively with the campus computing center in order to
provide this type of support service to remote users. For
example, while the computing center might typically provide
communication software and instruction in its use, librarians can
teach users how to manipulate downloaded information and how to
format it for use in word processing, spreadsheet, or
bibliography software.
     Network access presents its own challenges in capturing and
downloading information to an individual's workstation via
network software such as the NCSA Telnet drivers. In this case,
librarians providing support for remote users need to address the
technical details of capturing and downloading data from network
systems and to provide help in formatting the data.

6.0 Methods of Training Remote Users

Specific strategies and teaching techniques should be developed
with the needs of different types of remote users in mind.
Current methods of training include providing self-study
materials; individualized instruction; and various forms of group
instruction, including remote online workshops, local hands-on
workshops, demonstrations, and classroom lectures.

6.1 Self-Study Materials

Traditionally, many libraries have maintained packets of
instructional guides, help sheets, pathfinders, brochures, and
other printed handouts that are available to mail out to remote
users upon request. These packets typically include an
instruction sheet on how to access the OPAC and other local
databases, a sheet explaining Boolean searching concepts and
techniques, and a sheet giving system-specific search commands
and tips on using a particular resource.
     With the advent of campus-wide electronic networks, one of
the easiest methods of distributing these instructional guides is
to add them to a campus or library Gopher, where a user could
easily access them and either read them online or download the
information. One problem frequently encountered with this
process is the length of the instructional guide. Users seem to
prefer brevity, and a useful rule of thumb is to limit electronic
versions of help sheets intended to be read online to no more
than three screens.
     The Gopher itself can be a useful self-instructional tool.
Academic libraries have been working with campus computing
centers to construct gophers that will enhance the user's ability
to locate and explore electronic reference books, e-journals,
bibliographic citation databases, Usenet newsreaders, and other
wonders of Gopherspace. A list of well-constructed Gophers was
posted to the PACS-L list, and an examination of any one of these
gophers will illustrate the potential for using a Gopher as an
information tool for remote users. [14]
     Network hypermedia software, such as World-Wide Web servers
and Mosaic clients, feature user-friendly interfaces, links to
diverse types of network resources, access to digital multimedia
information, and full-featured interactive help. These tools
make it possible for users to discover electronic information
resources on their own. So much information is already available
electronically that users need to be allowed to learn on their
own through guided exploration and to create their own paths

through cyberspace.

Reference librarians should also be prepared to send user help tips as text files directly to remote users' workstations via e-mail or file transfers; however, an easier alternative is to establish an anonymous FTP or Gopher site on a campus network server that is accessible to all remote users. For example, a joint project of the University Library and the School of Information and Library Studies at the University of Michigan has established a Clearinghouse for Subject-Oriented Internet Resource Guides, and made these guides available via anonymous FTP, Gopher, and the World-Wide Web. [15]

As more fee-based systems become available to remote users, instruction becomes even more essential to enable users to employ these electronic resources in a cost-effective manner. For this purpose, modular self-paced workbooks can be developed and made available for a fee on a cost-recovery basis. Printed workbooks can be made available for pick-up or mailed out, and electronic versions can be provided in the various ways discussed previously.

Libraries are making online tutorials from publishers available on their networks so that users can employ them prior to utilizing an electronic information resource. These computer-aided instructional programs have become more useful as they have become more interactive. For example, SilverPlatter has excellent tutorials for the ERIC and PsycLit CD-ROM databases that go into far more detail than ordinary printed library handouts.

Another training option is computer-assisted instructional programs developed by the library. These programs can be made available on diskette so that they can be picked-up at the library or mailed out, or the programs can be sent electronically to users' workstations. With this approach, library staff can tailor instruction to the unique set of resources available from their site. Unfortunately, the development of these programs is time consuming, and, in many cases, the need is obviated as the quality of commercial tutorials available from publishers improves.

Emerging technologies for delivering instruction, such as on-demand video, offer interesting possibilities for the future. Once commercial ventures provide this service to users' homes, libraries may be able to use this delivery mechanism for instructional purposes. One can imagine a scenario in which users will be able to call up on-demand tutorials for learning how to utilize remote electronic information resources of all kinds.

6.2. Individualized Instruction

For users who can come to the library, library staff could offer individualized instruction sessions that would be tailored to meet a particular user's needs. By appointment, the user could consult with library staff members, and the user could quickly get hands-on experience with remote access techniques and develop a mental picture of how electronic information resources are designed and function. This basic understanding would help combat the common misconceptions of remote users and enable users

to become more effective researchers.

     Currently, technological tools (e.g., e-mail, telephone, and
fax) are usually used in individualized instruction to help
remote users to solve specific problems, typically technical
problems that must be resolved immediately (e.g., an
indecipherable system prompt or error message).

     Emerging technologies provide exciting opportunities for
individualized instruction. Online consultation via interactive
digital video would provide an electronic means to teach remote
users that would truly extend the library's reach beyond its
walls, while giving users their most preferred means of learning:
real-time, one-on-one interaction with a librarian who is an
expert in using electronic information resources and managing
data from them.

6.3. Group Instruction

If remote users can come to the campus, workshops are an
effective instructional technique. Workshops may be held at the
library or elsewhere on campus. They are most effective when
hands-on training can be offered so that the two basics of user
training can be covered: how to access electronic information
resources and how to use them. When equipment is not available
for hands-on training, demonstrations are useful to show groups
of remote users the techniques of online access and searching.
Classroom lectures, although better than no instruction at all,
are woefully inadequate to teach online skills. Slides or
overhead transparencies can be used to simulate the screens that
the user will encounter, but a hands-on approach or a live demo
is much better.

     An e-mail message posted to PACS-L summarized twenty-three
responses made concerning workshop teaching methods for an
Internet course: thirteen respondents recommended a hands-on
approach, six recommended both hands-on training and a
demonstration, and only four recommended the
lecture/demonstration approach. [16]

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     "Master" electronic classrooms are superior to traditional
classrooms because they are equipped with the latest computer and
video technologies. The master classroom at Steen Library at
Stephen F. Austin State University is an example of an ideal
electronic classroom. It includes twenty network-connected
workstations along with five printers encased in soundproof
printer stations. There is a network-connected instructor
workstation equipped with an overhead projector and a color LCD
projection panel for projecting the instructor's computer screen
on a large screen for group viewing. The lights in the room can
be easily dimmed to an appropriate level for the task at hand.
To provide maximum flexibility for teaching a variety of skills
and electronic information resources, workstations can access the
library's OPAC, all in-house electronic information resources,
and Internet resources. The workstations can also access
applications software (e.g., word processing, spreadsheet, and
bibliography software) so that students can learn to cut and
paste the results of their searches directly into their
documents. In this way, students and faculty are able to see for
themselves the ideal of the "scholar's workstation" in action.
In the near future, the number of workstations will be increased
to thirty, and these workstations will have access to image and

other multimedia resources, including digital color video and
audio sound clips.

   Group instruction outside such a classroom setting is best
exemplified in the emerging electronic era by the interactive
online courses offered over the Internet. Such classes or
workshops are announced on PACS-L, NETTRAIN, and LIBREF-L with
increasing frequency. For example, a workshop entitled
"Navigating the Internet: Let's Go Gopherin'" attracted 17,769
participants from 54 different countries. [17]

7.0 Preparing Librarians to Work With Remote Users

The library should define its role in respect to training remote
users. That role should not be developed in isolation from the
campus computing center, which often offers a variety of computer
courses. For example, the Butler Library at Columbia University
defines their role as complementing that of the University's
Center for Computing Activities and does not duplicate existing
instruction in computer hardware, telecommunications, or basic
applications like word processing. Instead, their "focus is on
advanced research tools and processes . . . and on specific
applications of technology to information retrieval and
organization, publishing and communication, and textual
analysis." [18]

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Librarians working with instructional programs in electronic
information resources need to have a broad perspective not only
of the resources themselves, but also of information management
techniques, electronic scholarship, and electronic publishing.

   Staff training programs should focus on providing an
understanding of these subjects. Other areas that should be
covered include the system-specific commands of relevant
electronic information resources, expertise in managing personal
databases, and the bibliographic generation of downloaded
information.

   It is also very important for those working with remote
users to understand the user's perspective. They should
experience the kinds of problems and system messages that remote
users encounter using various means of access, and they should
develop appropriate training materials to assist users with any
challenges that cannot be resolved.

8.0 Conclusion

One day, new electronic information systems may provide remote
users with easier, more intuitive means of searching. For
example, search techniques based on statistical weighting (also
known as relevance ranking) can produce a list of citations
sorted in descending order with the most relevant items at the
top of the list. This type of search system is exemplified by
Westlaw's WIN. A similar system called TARGET is being developed
by Dialog, which "strikes a middle ground between pure natural
language relevance ranking systems and Boolean searching." [19]

   But even with significant system improvements, the librarian
in the brave new electronic world of the future will still play
an important role in aiding users "to navigate . . . between
information needs and information resource systems." [20]

   To return to the three categories of users discussed earlier
in this paper, the problems of the "technologically challenged"

may be overcome through improved design of search engines, user interfaces, and information protocols. The "techie" and "research-naive" users can benefit from increased human and computer-based library instruction, and they should be encouraged to explore and effectively utilize the electronic information possibilities of cyberspace. Hopefully, librarians will be able to focus more energy on fostering electronic information literacy by assisting users to develop lifelong skills in retrieving and managing all of the electronic information resources available to them from libraries and other remote sites.

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     It is important that we continue to explore the use of new technologies to reach out to and interact with today's remote users. But we should also welcome the opportunity to rethink our attitudes and our perspectives in order to reinvent our services in this new electronic environment. As John R. Sack has suggested, we need to move away from the "Ptolemaic" view of the library as central towards the "Copernican" view of the user as central. [21] Armed with this perspective, librarians will be better equipped to utilize emerging technological capabilities to effectively serve their users.

Notes

1. An earlier version of this paper was presented at the Ninth Texas Conference on Library Automation, 3 April 1993.

2. Mary Jean Pavelsek, "A Case Against Instructing Users of Computerized Retrieval Systems," College and Research Libraries News 52 (May 1991): 297-299, 301; and Tom Eadie, "Immodest Proposals," Library Journal 115 (15 October 1990): 42.

3. The author would like to thank Tom Wilson of the University of Houston University Libraries for this important observation at the Ninth Texas Conference on Library Automation.

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5. M. Lynne Neufeld and Martha Cornog, "Database History: From Dinosaurs to Compact Discs," Journal of the American Society for Information Science 37 (July 1986): 189.

6. Kathleen Young Marcaccio, ed., Gale Directory of Databases (Detroit: Gale Research Inc., 1994), xxi-xxii.

7. Ibid., xxiii-xxvii.

8. Online Database Selection: A User's Guide to the Directory of Online Databases (New York: Cuadra/Elsevier, 1989), 7.

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9. Elizabeth H. Dow, "The Impact of Home and Office Workstation Use on an Academic Library" (Ph.D. diss., University of Pittsburgh, 1988), 63.

10. See Sally Wayman Kalin, "The Invisible Users of Online

Catalogs: A Public Services Perspective," Library Trends 35 (Spring 1987): 587-595; and Sally Wayman Kalin, "Support Services for Remote Users of Online Public Access Catalogs," RQ 31 (Winter 1991): 197-213.

11. Reva Basch, "The Electronic Client: User Expectations and Searcher Responsibilities," in Proceedings of the Seventh National Online Meeting (Medford, NJ: Learned Information, 1986), 22-24.

12. Also described as "reference psychotherapist" in: Sally Wayman Kalin, "The Invisible Users of Online Catalogs: A Public Services Perspective," 590.

13. Domenica M. Barbuto and Elena E. Cevallos, "End-User Searching: Program Review and Future Prospects," RQ 31 (Winter 1991): 225.

14. Steven J. Herro, "Summary of Well Constructed Gophers," e-mail message posted to pacs-l@uhupvm1.uh.edu, 17 November 1993.

15. Louis Rosenfeld, "New Topical Internet Guides Available," e-mail message posted to pacs-l@uhupvm1.uh.edu, 20 December 1993.

16. Jim Olivetti, "Summary: Workshop Design Assistance," e-mail message posted to pacs-l@uhupvm1.uh.edu, 21 December 1993.

17. Richard Smith, "Navigating Report," e-mail message posted to pacs-l@uhupvm1.uh.edu, 30 November 1993.

18. Anita Kay Lowry, "Beyond BI: Information Literacy in the Electronic Age," Research Strategies 8 (Winter 1990): 26.

19. Promotional information from DIALOG Information Services, Inc.

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20. Francis Miksa, "The Future of Reference II: A Paradigm of Academic Library Organization," College & Research Libraries News 50 (October 1989): 789.

21. John R. Sack, "Open Systems for Open Minds: Building the Library Without Walls," College & Research Libraries 47 (November 1986): 538.

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