Scholarly Journals on the Net:
A Reader's Assessment

ANN PETERSON BISHOP

ABSTRACT

THIS ARTICLE PRESENTS AN assessment of scholarly network journals from the reader's point of view. The author subscribed to seven journals that are published primarily on the Internet and reviewed the nature of the journals' contents, format, and policies. This review forms the basis of the author's assessment of the ease of use and usefulness of current network journals. While network journals present a number of problems, they have also begun to include features which offer readers an advantage over print journals. The article concludes with a brief discussion of requirements for future scholarly network journals. The discussion is based on current technology and industry trends and on preliminary results from focus group interviews conducted by the author and others with engineering faculty and students. Focus group participants discussed the nature of their journal use and their preferences for the networked digital library of journals that is currently being developed at the University of Illinois.

INTRODUCTION

As readers, we expect scholarly journals to meet certain standards and to possess certain predictable characteristics. We turn to them as trusted and stable sources of research reports, creative works, and current news. We expect published contributions to meet agreed-upon standards of quality. Conventions of format and structure facilitate legibility and comprehension as well as the ability to quickly locate particular segments of text. The unique appearance of a particular

journal also facilitates use by establishing a dependable familiarity. Through our reading of journals, too, we gradually develop a sense of the extent and limits of our scholarly community, and it is on the basis of this understanding of the discourse of the community that we make our particular contributions to scholarship through publication in those same journals. We create private archives of pertinent articles and assume that accurate copies of material published in the past can be obtained. An existing access apparatus is in place to help us augment our personal archives. When we think of scholarly journals we also implicitly include in our thinking the expectation that we will be able to identify journals and individual papers using standard bibliographic tools. Through our relationships with publishers, vendors, libraries, and colleagues, we know how to obtain copies of journal material on a regular basis. And yet, for all its familiarity and utility, print does not optimally serve certain aspects of scholarly communication. Dissemination is too slow. Materials—the volumes of paper and ink—are expensive and their acquisition environmentally destructive, and the expense may impose barriers for scholars outside the mainstream. Nor, where the print format is concerned, is access to previously published material necessarily easy or guaranteed. Further, interaction among readers and authors is limited in print and often constrictingly formal; the familiar ritual of the letters column, for instance, with its typical reader's rebuke and author's brief rebuttal, might better serve the advance of knowledge if conducted through a public forum where constraints on space and time were less severe.

For these reasons and many others, the number of scholarly journals that appear primarily, or only, on the Internet is rising, and analysis of the implications of this trend continues to receive attention in the literature of library and information science (e.g., Clement, 1994; Peek, 1994; Peek et al., in press; Schaffner, 1994). In what manner and how successfully do these electronic journals accommodate the needs and traditional expectations of the reader? This author set out to identify and access a number of scholarly journals available over the Internet in order to assess their usefulness and usability from the reader's point of view. The experiences are those of the relative novice—very familiar with some network services and very ill at ease with others. The author's working knowledge of the Internet has been acquired piecemeal as practical needs arose—spending several hours a day on e-mail and occasional use of electronic bulletin boards. The author is familiar with simple network navigation tools like Gopher and NCSA Mosaic and subscribes to three online newsletters which are delivered via listservs. Even so, on those rare occasions when there is a need to ftp files from remote computers, the author still tends to rely on print or human guides. The author has never before

subscribed to a scholarly electronic journal and so had few precon-
ceptions when undertaking this task.

It is difficult to identify with certainty the exact number of schol-
arly electronic journals in existence. Due to the rapidly changing elec-
tronic landscape, the difficulty of precisely categorizing publications
in the new medium, varying definitions of "scholarly," and the lack of
complete descriptive data from journal producers, it is highly unlikely
that any existing directory can lay legitimate claim to being compre-
hensive, current, and accurate.[1] For the purposes of this exploration,
an attempt was made to identify a representative sample of scholarly
network journals, in a range of disciplines, to serve as a basis for com-
parative study. A "scholarly network journal" was defined as a publica-
tion that appears periodically, includes refereed contributions repre-
senting original scholarship, and is accessible exclusively or primarily
via the Internet.

One current Internet directory, *On Internet 94*, includes entries
for thirty electronic journals that appear to fit this definition of a schol-
arly networked journal. Seven of these journals were selected for fur-
ther investigation:

1. *EJournal*
2. *Electronic Journal of Communication/La Revue Electronique de Communica-
   tion*
3. *Electronic Journal of Differential Equations*
4. *Flora Online*
5. *Journal of Extension*
6. *Journal of the International Academy of Hospitality Research*
7. *Postmodern Culture.*

Using the information provided in the *On Internet 94* entries for these
journals, an attempt was made to access and subscribe to each one
over a two-day period. If the author was unable to access a particular
journal with the information given (either because the information
was no longer current or the host site was not accessible at that par-
ticular point in time), an attempt was made to locate the journal online
by browsing the Internet, chiefly via gopher. Once each journal was
accessed, an attempt was made to obtain the table of contents of the
current issue and at least one paper from that issue, identify back
issues, retrieve an archived paper or issue, and locate published infor-
mation about the journal that would help in understanding its pur-
pose, policies, and use.

In the course of these activities, this author was struck by the varia-
tion among the journals in a number of areas that affect a potential
reader's use of them. One important influence on use is awareness

and ease of access. How easy is it for potential readers to become aware of the journal's existence in the first place and then to obtain access to current and previous issues? To gauge awareness, this author checked to see if the journals were included in standard sources that people might use to identify or locate print journals and articles (OCLC, *Ulrich's International Periodicals Directory*, Current Contents, and Wilsonline). While tools devoted exclusively to electronic journals exist, as noted earlier, it is this author's assumption that electronic journals will not enter the mainstream of bibliographic control and hence not reach the maximum number of potential readers unless these journals are also included in more readily available traditional sources. Ease of access was gauged directly by attempting to subscribe to the electronic journals. Another area that affects use is the nature of the journal's contents—i.e., the type and amount of material published. In perusing the sample of network journals, the range of material published was identified and the extent to which scholarly contributions seem to mirror the length and depth of the papers published in print journals was noted. Policies related to content—nature of journal administration, the reviewing process, and copyright treatment—were also noted.

The third major area explored was usability. Noted in particular were the extensiveness and helpfulness of instructions provided to users and the general "readability"of the entire journal, the latter construed as a combination of aesthetic appeal and the existence of such features as tend to aid typical reading activities (scanning text both forward and back; jumping to a particular article; getting a sense of an article's scope or approach by the perusal of an abstract; and so forth). Readability thus is based on the clarity of layout of the journal, its typographic conventions, and the existence of formatting features which aid in searching and browsing. The final area explored was the extent to which the journals capitalized on their electronic format to offer features (typically not possible in print journals), that might offer readers important improvements in scholarly communication. Such features might include automatic links to related materials, keyword searching in journal archives, the inclusion of multimedia material, the incorporation of reader responses and other features aimed at facilitating the reader's participation in the scholarly community represented by a journal's set of readers, and the "unbundling"of journal issues so that individual articles may be identified and retrieved.

The intent of this article is to portray, from the reader's point of view, the current landscape of scholarly network journals based on an informal investigation of seven journals from a range of disciplines. Examples of how these pioneers in electronic publishing are faring

in terms of reader awareness and access; usefulness of content; usability; and new functionality are presented and discussed. Conclusions about the ideal characteristics of network scholarly journals are drawn from this review as well as from evidence of current trends in network applications and the publishing industry. Finally, in order to place these conclusions back into a framework emphasizing the reader's point of view, selected preliminary results are presented from focus group discussions on journal use that were recently conducted with faculty and students at the University of Illinois in order to help in the design of a networked digital library of engineering journals.

READER AWARENESS AND ACCESS

Ulrich's International Periodicals Directory is a standard source for scholars who need to identify journals on a particular subject, verify a journal's existence or discover where it is indexed, or obtain bibliographic data on a journal or the information required to contact a journal editor. Of the network journals investigated, only *Journal of Extension* and *Postmodern Culture* are listed in the 1994-1995 edition of *Ulrich's*. Another traditional tool for alerting readers to the existence of journals that might interest them is OCLC, which allows people to, among other things, identify journals on a particular topic or verify bibliographic data so that a needed journal can be located in a particular library collection. All of the networked scholarly journals investigated in this study were found in OCLC with the exception of the *Electronic Journal of Differential Equations*. The records provided the traditional elements of bibliographic data such as title, publisher's name, ISSN number, frequency, price, existence in other formats, and start date. In keeping with the traditional function of the library catalog, the OCLC records allowed the user to locate the journals in the local library collection, but they did not generally provide information that would allow the reader to locate and obtain the journals outside of the library itself. Most described the mode of access (the 500 field) in only general terms—e.g., "electronic mail on BITNET and Internet." The records for the *Electronic Journal of Communication* and the *Journal of the International Academy of Hospitality Research,* however, included the network address for placing a subscription. The *Journal of Extension* record was even more helpful, providing both the address and command that would be used to subscribe to the journal.

Inclusion in standard indexing and abstracting sources would also greatly increase access to the articles published in scholarly networked journals. Scholars trying to identify or locate journal articles often initiate their searches in general sources that span disciplines, such as Current Contents, Carl Uncover, or the Wilsonline databases. None of the electronic journals under investigation was found in these

sources with the exception of the *Journal of Extension* for which cita-
tions were found in Carl Uncover. According to information pro-
vided in directories or in the journals themselves, several of the net-
work journals investigated are, however, included in indexing and ab-
stracting services devoted to particular disciplines. The *Electronic Jour-
nal of Communication,* for example, is indexed in *ComIndex,* an elec-
tronic index covering communications journals, and *Postmodern Cul-
ture* is included in the *MLA Bibliography.*

While the lack of systematic coverage of scholarly network jour-
nals is illogical from the reader's point of view, it perhaps makes sense
from the perspective of the producers of these bibliographic tools.
Electronic journal publishers may not have initiated relationships with
the producers. Readers may not have put pressure on them to in-
clude electronic journals, so there may as yet be no competitive ad-
vantage in doing so. The producers of bibliographic tools may not
consider electronic journals to be worthy of inclusion. If producers
derive a substantial portion of their revenues from the delivery of the
identified document to the scholar who is unable to obtain the needed
article locally, they may not have designed the appropriate process
for deriving income from the delivery of the full text of electronic
journal articles to readers. Perhaps it simply seems counterintuitive
to the producers of indexing and abstracting databases to provide elec-
tronic access to records and articles for journals that are already di-
rectly accessible to scholars in electronic form.

It is clear that scholars attempting to identify journals and jour-
nal papers of interest are less likely to discover electronic than print
material if they limit themselves to traditional awareness tools. Schol-
arly network journals have not yet entered the mainstream of biblio-
graphic control. They are best represented in directories explicitly
devoted to providing information about material available on com-
puter networks and, further, are likely to be brought to the attention
of potential readers via the network itself. Those scholars who al-
ready browse the network or read network journals or newsletters are
much more likely to be made aware of the existence of electronic
journals and articles since electronic journals are announced and dis-
cussed in listservs and in existing electronic journals and are stored
in network sites. Libraries, perhaps because of the pressure to serve
the information needs of a specific and local scholarly community by
collecting material regardless of format, have incorporated network
journals more systematically into their record systems than have com-
mercial indexing and abstracting services. Thus today's scholar is re-
quired, for the most part, to complete an additional search in order

to identify both print and electronic records of scholarship. Yet such
an additional search is itself unlikely to be conducted in the absence
of prior knowledge that the pertinent tools exist. Electronic journals
thus present two obvious obstacles when considered from the stand-
point of scholars with articles to place. Scholars may not be at all
aware of electronic outlets for their work and, further, they may be
reluctant to offer their work through a medium whose readership may
be perceived to be too limited.

Once identified, how do readers access scholarly journals on the
Internet? An exploration of the subscription and access process made
plain that there is no single approach to the distribution of network
journal issues and that gaining access can be frustrating. Some jour-
nals are available only through listservs. Others may be stored at ftp,
gopher, or World Wide Web sites (or some combination of these). In
some cases, the reader's subscription initiates an alerting service, in
which an e-mail message automatically notifies the reader of new con-
tributions or even sends new contributions directly to the subscriber.
Individual contributions may be made available as they appear, or they
may be bundled into issues. All of the journals examined provided
some form of network access to previous issues. Some online archives
allow readers to find and read individual papers, while others only
allow entire issues to be accessed and perused. Some archives are set
up as searchable databases, allowing, for example, the text of papers
to be searched by keywords. Some journals augment the online archive
by making journal papers or issues available in paper, microfiche, or
disk formats.

It is difficult to state categorically which access mechanism is
"easier" or most effective, as this depends in part on the scholar's
networking experience, hardware and software capabilities, and per-
sonal preferences. In some cases, a scholar may subscribe to a net-
work journal and access current and previous issues within minutes
without leaving the computer. This offers a substantial improvement
over the time and effort needed to access print journals, which could
entail a delay of months after a personal subscription is entered, or
which requires a trip to the library and the use of disparate access
tools—e.g., catalogs and indexes. Technical difficulties in accessing
network journals may lead, in other cases, to significant delays and
great frustration. Such problems may stem from the scholar's lack of
expertise or tools, from inadequate instructions, or from breakdowns
in network processes. It should be noted that cost was not a barrier to
access in the author's case since basic network access to all of the
journals reviewed is offered free of charge (the *Journal of the Interna-
tional Academy of Hospitality Research* formerly operated with a subscrip-
tion fee, but this was recently dropped).

Two examples will illustrate the typical user experiences in attempting to access network scholarly journals. *EJournal* provides a model of ease and efficiency. All activity is conducted via a listserv with simple commands that are well explained and that immediately return the expected results. Upon sending a subscription message to *EJournal,* the author received an e-mail response indicating that issues would be automatically e-mailed as they were produced. Following posted instructions, the command "get ejrnl contents" was sent. This returned an easy to read list of all back issues arranged like a table of contents, with a brief abstract describing each issue and instructions for ordering desired issues. A particular back issue was then easily and quickly obtained by sending the message "get ejournal v1n2" to the listserv.

Flora Online provided more options for access but presented a host of roadblocks as well. First an attempt was made to access the journal at its advertised Gopher site, which, unfortunately, was "down" and therefore not responding to connection requests that day. Next was tried connecting to the listed ftp site, doing so with some trepidation since this author is relatively unfamiliar with ftp commands. After successfully accessing and navigating the ftp site, the author was dismayed to find that *Flora Online* was no longer stored there (the new ftp address was posted, but, because of the lack of expertise in browsing ftp sites at the time, the author did not find this vital piece of information). A search of gopher space for the keyword "flora" eventually landed at a Gopher site providing information about the journal, including a list of back issues, the superseded ftp address, and a phone number to dial in to the TAXACOM BBS that houses the journal archives as well as an assortment of related data communications services for systematic biology. Unfortunately, attempts to dial in via the posted number also failed. Several days later, while browsing gopher space for another journal, the author happened upon a new ftp site address—at Cornell—for the TAXACOM service. After connecting to the new ftp site and downloading the readme file, it was learned that Cornell also maintained a Gopher site which provided access to issues of *Flora Online.* It was then possible to connect to the Cornell gopher and, finally, get access to complete and current information about the journal and the related TAXACOM services, and to read published issues of *Flora Online.*

Access to published contents in fixed media (microforms, diskettes, paper) is also treated in a variety of ways by existing scholarly network journals. The treatment of physical storage in non-network formats deserves attention because of its impact on scholars in their dual role as readers and contributors in the information cycle. The availability of print-on-paper versions of scholarly articles provides intellectual access for potential readers who lack network tools and skills.

And ubiquitous access is necessary to ensure that published work is communicated and subjected to the scrutiny of the entire scholarly community. Paper copies of journals also allow scholars to construct a personal collection of easily accessible items that are stored, arranged and rearranged, retrieved, and shared without dependence on intervening computer technology. Finally, paper journals have historically served as the mechanism by which authenticity is guaranteed and work is preserved for the future.

How do network journals approach the provision of access to their contents in fixed media? The guiding assumption of most of the journals examined seemed to be that scholars would read material online using their own discretion and equipment to produce paper copies for personal use on demand. Most of the journals appear to be accessible only over the network; physically fixed copies are not widely provided by producers. *EJournal,* for example, only provides "authenticated paper copy from our read-only archive for use by academic deans or others."[2] An anthology of essays from *Postmodern Culture* has been published as a traditional print monograph by Oxford University Press. Disk subscriptions to *Postmodern Culture* and *Flora Online* are available for a fee, allowing access for non-networked scholars and some further guarantee that material will be preserved into the future. In the online information provided, *Flora Online* goes so far as to warn librarians to refresh their disks every five to seven years. Readers are also warned:

> Computerized files are easily changed. "Authorized" versions of original TAXACOM text or computer files are only available from TAXACOM itself (or from TAXACOM distribution diskettes of "Flora Online"); second-hand files may well have been modified for better or worse, and researchers should be skeptical of the integrity of any electronic publication obtained through an intermediary.

The *Journal of Extension* is unusual among network journals in that it takes over as the primary distribution mechanism (supplemented by UMI microform and reprints) for a previously print-only journal. Its sponsoring body, the Cooperative Extension System, notes that it is experimenting to discover whether there is an absolute need to provide print issues in the traditional manner.

The *Electronic Journal of Differential Equations* offers a special challenge to access. Due, presumably, to its need to facilitate the viewing of equations, it is stored only in PostScript and other richly formatted versions, meaning that online reading is impossible without special viewers. Scholars are encouraged to download and print papers in order to read them. So while the journal is accessed almost exclusively over the net, individual printing of papers is probably the norm.

Sensitive to the need to supply broader access and archival storage, however, the editors note that in order to preserve the scholarly record for posterity and provide copies for interlibrary loan, a hard copy of the journal exists in the libraries at two institutions which sponsor the journal as well as at the Library of Congress.

The copyright statements attached to all of the network journals examined also fostered archiving and access (see Table 1). A number of them explicitly noted that either electronic or print copies could be reproduced and disseminated by individual readers or libraries. Restrictions included the demand that copies be used for noncommercial purposes, that material not be altered in any manner, and that appropriate acknowledgment of the material's source be provided.

NATURE OF CONTENTS

A scholar's use of network journals is, naturally, affected by the nature of the journals' contents. Readers of print journals expect, ideally, to obtain access to a large volume of high quality substantive contributions. All the journals this author examined claimed to exert more rigorous quality control over contributions than is generally found in, say, the typical print newsletter or newsgroup posting. Nonetheless, the journals varied considerably in the type and amount of material they published. Some network journals published issues that consisted solely of scholarly papers or other substantive creative works. Others were more like print journals in that they included a diverse range of material, including editorials, reviews, announcements, and letters. And a few exhibited not only diversity but innovation, offering material not typically found in scholarly print journals. All of the journals surveyed noted that manuscripts submitted for publication were refereed. Although some did not describe the review process, quality control appears to be accomplished in the same basic manner as in print journals: by the editor(s), by editorial boards, or by individuals specifically serving as peer reviewers. Quality in print journals is also partly attributable to the reputation and practices of their institutional sponsors. The network journals examined all derived from "reputable" sources. The majority emanated from academic institutions, while several had a basis in professional organizations. Only one was affiliated with a commercial publisher. The quantity of material published varied significantly, with the number of scholarly papers published ranging from about one to a dozen per year. The papers themselves varied considerably in length and formality. The most obvious limitation in network journal contents was the inability to provide readers with the type of illustrations standard in print-on-paper journals. The nature of the contents and editorial practices of each journal reviewed is briefly described later.

TABLE 1. NETWORK JOURNAL COPYRIGHT STATEMENTS

EJournal
* This electronic publication and its contents are (c) copyright 1994 by   *
* _EJournal_. Permission is hereby granted to give away the journal and its *
* contents, but no one may "own" it. Any and all financial interest is hereby*
* assigned to the acknowledged authors of individual texts. This notification*
* must accompany all distribution of EJournal.

Electronic Journal of Communication/La Revue Électronique de Communication
Articles are protected by copyright (c) by the Communication Institute for
Online Scholarship (ISSN # 1183-5656). Articles may be reproduced, with
acknowledgment, for non-profit personal and scholarly purposes. Permission
must be obtained for commercial uses.

Electronic Journal of Differential Equations
Copyrights are transferred to and are property of the publisher, who allows
making copies of articles provided that articles are not modified and that
copies are not sold.

Flora Online
Whether directly indicated as such or not, TAXACOM text files are made
available to the systematic community with the assumption that they will
not be sold for profit and that secondary distribution will be without
modification.

Journal of the International Academy of Hospitality Research
This journal is registered with the Copyright Clearance Center, Inc., 27 Con-
gress Street, Salem, MA 01970, USA. Duplication is permitted for academic
or research purposes but not for commercial purposes. Libraries are permit-
ted to distribute the journal electronically to institutional faculty, students
and employees via local area networks or institutional mainframe computers.

Journal of Extension
Copyright (c) 1994 by Extension Journal, Inc. ISSN 1077-5315. Articles ap-
pearing in the Journal become the property of the Journal. Single copies of
articles may be reproduced in electronic or print form for use in educational
or training activities. Inclusion of articles in other publications, electronic
sources, or systematic large-scale distribution may be done only with prior
electronic or written permission of the Journal Editorial Office, <joe-
ed@joe.ext.vt.edu>, 233 Smyth Hall, Virginia Tech, Blacksburg, Virginia 24061-
0452.

Postmodern Culture
COPYRIGHT: Unless otherwise noted, copyrights for the texts which com-
prise this issue of Postmodern Culture are held by their authors. The compi-
lation as a whole is Copyright (c) 1994 by Postmodern Culture and Oxford
University Press, all rights reserved. Items published by Postmodern Culture
may be freely shared among individuals, but they may not be republished in
any medium without express written consent from the author(s) and advance
notification of the editors. Issues of Postmodern Culture may be archived
for public use in electronic or other media, as long as each issue is archived
in its entirety and no fee is charged to the user; any exception to this restric-
tion requires the written consent of the editors and of the publisher.

Postmodern Culture, supported by North Carolina State University and published by Oxford University Press, is one of the few existing network journals associated with a commercial publisher. Its contents represent the high end of both quantity and quality. It is published three times a year; the May 1994 issue contained six essays, three poems by a MacArthur award winner, a column on pop culture, six reviews, and about fifty announcements related to new books and journals, calls for papers, available research grants, and so on. The lead essay included all the scholarly trappings of the typical paper in a print journal: it contained over 13,000 words and was followed by sixty-eight footnotes. With two co-editors, a managing editor, and an editorial board of thirty-four members, the editorial staff of *Postmodern Culture* also appears to be on a par with that of traditional print journals, though it seems to be able to accomplish its work more efficiently: author instructions note that the review process takes only about six to eight weeks.

The *Electronic Journal of Communication/La Revue Électronique de Communication* is published quarterly and seems, similarly, to disseminate a relatively high volume of substantive contributions. Contributions, however, are apparently limited to scholarly papers. The issue published as volume 4, number 1 (1994) contained four papers and an editor's introduction. One paper was 4,500 words in length and included seventeen references; another was over 20,000 words long and was followed by 175 references. Although it has a permanent editorial staff from the two primary academic institutions which sponsor the journal, each issue has a guest editor, and it is this editor who puts together a group of reviewers to assess submitted manuscripts.

The *Electronic Journal of Differential Equations* (EJDE) also limits its contents to scholarly papers. The paper the author downloaded was published in September 1994 and represented the seventh paper appearing in the journal for that year. Printed as a PostScript file, the paper ran fourteen single-spaced pages in length and included fifteen references. In its statement of scope, EJDE notes that it "will accept only first-rate original work, subject to as rigid a peer review process as is applied by the finest of today's journals." The peer review process is not further explained, beyond the note that papers were "refereed," but the editorial staff of the journal is substantial. EJDE has three managing editors and an editorial board of twenty-six members from a wide variety of reputable academic institutions.

Other journals examined published shorter papers, as is perhaps typical in their respective disciplines. Two of these emanated from professional organizations. *The Journal of the International Academy of Hospitality Research* (JIAHR) publishes issues consisting of single papers which appear after having been "judged of sufficient quality."

The journal is published for the academy by the Scholarly Communications Project of Virginia Polytechnic Institute and State University. The editor is supported by an editorial board comprised of fourteen members and a slate of independent reviewers. Only eight issues have appeared since November 1990. Issue eight, released in June 1993, contained a research report consisting of 3,000 words and thirteen references.

The *Journal of Extension* is the official refereed publication of the Cooperative Extension System. It is overseen by an editor and an assistant editor, a twenty member board of directors, and an editorial committee of twenty members. The editorial committee members are responsible for reviewing submitted manuscripts. The journal offers readers a variety of contents. The October 1994 issue (vol. 32, no. 3) included four papers labeled as "feature articles" and one as "research in brief." These ranged from 1,000 to 4,000 words, and most of them included several references. The other eight contributions in that issue were labeled "commentary," "ideas at work" (e.g., descriptions of projects), or "tools of the trade" (e.g., descriptions of relevant reference books, software, and research instruments) and averaged about 1,000 words each.

Two of the journals reviewed were notable for their inclusion of unusual contents. Their founders sought specifically to improve scholarly communication by incorporating material not common in print journals due to the fetters of the paper format or traditional scholarly conventions. *Flora Online,* published by the Clinton Herbarium of the Buffalo Museum of Science, is one network journal that provides an outlet for contents not typically found in print journals. Each issue encompasses a single contribution; the twenty-six issues that have appeared since 1987 include, along with more standard research reports, a range of data-intensive and compiled works—such as species lists and taxonomic works—as well as computer programs for herbarium management and data analysis. Recognizing the advantages of computer-based communication, the journal also publishes textual works that have appeared previously in print formats and which might benefit from having the keyword search capability that computers offer. The review process is also not typical; contributions are reviewed exclusively by the journal's editor (who also serves as the sysop for TAXACOM), unless he decides that they need to be sent out for any additional review.

Another publication offering a change from the standard scholarly fare is *EJournal,* a network journal for humanists whose editor and managing editor are associated with the English department at the State University of New York at Albany. *EJournal* has published about fourteen principal essays since 1991. The editors proclaim their

intentions with an unusual degree of verve, noting "we try to be a little more direct and lively than many paper publications, and considerably less hasty and ephemeral than most postings to unreviewed electronic spaces." *EJournal* has a board of advisors whose six members are well known in the field of electronic communications. The editors seem to encourage experimentation in both tone and format, accepting contributions in the form of essays (a term deliberately chosen to get away from the standard stuffiness of the academic paper), reviews, editorial comments, news items (e.g., project announcements), and reader-response letters. True to form, published essays average about 4,000 words and typically include few cited references. *EJournal's* review process is also somewhat less formal than in some print journals. The editor makes a first cut on submissions and then sends the most promising manuscripts (estimated by the editor to be fewer than half of those received) to the journal's panel of about twenty consulting editors for further review. Upon a favorable response, the editor then summarizes their comments and communicates with the author regarding needed revisions.

The diversity of contents of the scholarly network journals reviewed suggests that potential readers will discover substantive material that has been subjected to some form of quality control by editors associated with reputable, primarily academic, organizations. On the other hand, no general expectations as to the type or quantity of material published should be formed by potential readers. Though the nature of the material published varies along disciplinary boundaries, as might be expected, journal contents seem also to depend on the inclinations of individual editors to a somewhat greater degree than is typical in print academic journals.

EASE OF USE

In subscribing to and accessing back issues of network scholarly journals, this author experienced difficulties related to a lack of computing and networking expertise, the constraints of hardware and software, and the lack of current access information. But other barriers to easy use also exist. Basic access modes (e.g., Gopher, listserv, ftp, Mosaic) vary across journals, and there is little standardization in the specific organizing principles and access commands associated with different journals using a particular mode. Ease of use is hampered, then, because scholars cannot predict in advance how to get hold of a particular journal and must learn how to use multiple access modes and mechanisms (granted, in some cases the availability of multiple access modes facilitates ease of use in that scholars may choose the mode that they generally find easiest to use and are given alternatives for working around access barriers that may arise in a particular

situation).   Some journals employ organizing principles and access
mechanisms that are simple to understand and use, while others re-
quire more cognitive effort from the reader's point of view. The head-
ings in a gopher menu for a particular journal, for example, may be
more or less informative, and they may be arranged more or less logi-
cally. The number of steps required before a reader can actually view
a particular back issue of a network journal varies, too, as does the
simplicity of the commands required for completing the process.

One striking difference encountered in network journals is the
amount and helpfulness of instructions offered to readers. This is
perhaps the most important factor determining ease of use. Some
journals offer scant instructions which assume substantial knowledge
of computer and network use and, therefore, either leave out basic
information or employ terms likely to confuse networking novices.
Others offer full documentation and instructions easily comprehended
by network novices. Some journals require readers to hunt for, and
through, a separate set of instructions when they need help, while
others seem to provide instructions at exactly those points where the
reader is likely to get stuck. Some journals go beyond the provision
of information about the existence of various access modes and mecha-
nisms to offer instruction in their use, such as how to access and re-
trieve journal issues using ftp protocols. Some journals provide the
e-mail addresses or even telephone numbers of support staff for users
who need individual help.

The first critical juncture for communicating with the new reader
comes with the response generated by a subscription request. The
Journal of the International Academy of Hospitality Research returns the
generic listserv subscription announcement, several screens in length,
replete with typos. The announcement states that the subscription to
the list has been accepted and provides the address for sending mes-
sages to all people subscribing to the list, as well as the address for
sending commands to the listserv. Instructions are provided for sign-
ing off the list and for retrieving the index of the list's archived con-
tributions. A note warns: "This list is confidential. You should not
publicly mention its existence, or forward copies of information you
have obtained from it to third parties." Subscribers are also warned
that other people may determine that they are signed on to the list by
issuing a command that returns the names and e-mail addresses of all
subscribers. Finally, instructions are given for obtaining a file with
more information on listserv commands. Such generic announcements
do little to orient and inform the new journal subscriber. This au-
thor wondered, for example, whether the list was the same as the jour-
nal, whether accessing the archive meant accessing other people's mes-
sages or journal issues, and why the existence of a journal should be

kept confidential. No information was provided about how new jour-
nal issues would be announced or distributed and no information
about what the journal was about or what it was like was divulged.

Other welcome messages were friendlier and more informative.
In response to a subscription request to the *Electronic Journal of Differ-
ential Equations,* for example, the following response was received:

> Welcome to the Electronic Journal of Differential Equations. Your
> name has been added to our Subscriber List. We will send ab-
> stracts as soon as new articles are accepted for publication.
>
> Subscription related messages should be sent to:
> subs@ejde.math.swt.edu
>
> Thanks for your interest in the EJDE.
>
> Julio G. Dix
> Co-Managing Editor

While this message didn't tell me everything needed, at least it was
not confusing. The welcome message provided by *EJournal* was a cus-
tomized version of the generic listserv announcement that was made
much more informative with a few simple modifications and additions.
After stating that the listserv subscription had been accepted, the fol-
lowing appeared: "Welcome. You are indeed a subscriber to
EJournal. You will get issues when they are ready for sending." Also
helpful were clearly stated instructions for identifying back issues and
finding out more about the journal:

> You can learn about previous issues of the journal by sending the
> command GET EJRNL CONTENTS to Albany's ListServ,
> LISTSERV@ALBNYVM1.
>
> The April 1992, statement of _Ejournal_'s purpose and policies
> is available in Volume 2, Number 1 of the journal. You can get
> that issue by sending the command GET EJRNL V2N1 to
> LISTSERV@ALBNYVM1.

Not only are these instructions stated clearly, they are easy to follow
and they work.

At the other end of the spectrum, *Postmodern Culture* eschews the
generic message altogether and provides the new subscriber with a
wealth of relevant and helpful information for getting acquainted with
the journal and its practices. After confirming acceptance of the sub-
scription, the message continues:

> Dear Subscriber,
> Welcome to _Postmodern Culture_, an electronic journal of lit-
> erary and cultural studies published by Oxford University Press
> and supported by North Carolina State University. _Postmodern

Culture_ is distributed free of charge to more than 3,400 elec-
tronic-mail subscribers in more than 40 countries, and it is dis-
tributed on disk and microfiche for a fee. If you are a student or
faculty member at a college or university, we hope you will en-
courage your institution's library to subscribe to _Postmodern
Culture_ either by electronic mail (if the means exist to make
the journal available to patrons in that format) or on disk or
fiche.

Enclosed are some introductory instructions and information con-
cerning the journal. Please read and then save this message, as
you may want to refer to it in the future.

Following this introduction is about six pages of information describ-
ing the goals and format of *Postmodern Culture*, the mechanisms for
obtaining back issues, and detailed instructions for retrieving journal
files though various access modes (such as Gopher and ftp). Because
of its clarity and obvious relevance to the needs of the new subscriber,
the amount of information provided was not annoying or overwhelm-
ing. Editorial staff members' names, job titles, and e-mail addresses
are provided, along with the postal address for the journal. A note
from the staff invites the "terminally frustrated" to send e-mail de-
scribing their problems, and they promise to try to help.

The *Journal of Extension* is also notable for the extent and quality
of its instructions. The welcome message acknowledges the subscrip-
tion, describes the journal, and presents simple instructions for
unsubscribing, for joining a listserv set up for readers to comment on
the journal, and for obtaining information about accessing journal
issues or submitting articles. The file containing access information
was easily retrieved. It provided simple instructions for obtaining an-
nouncements of new issues; accessing an online catalog of the journal's
archives; retrieving journal articles, sections, or issues; obtaining the
journal's user guide; and searching the journal archive by keyword.
Though the reader of the *Journal of Extension* must step through a
series of commands to access journal contents, the commands are
simple to use, allow great flexibility in retrieval, and consistently pro-
duce the expected results.   The instructions themselves are excep-
tionally comprehensive, lucid, and well placed. The very existence of
a user guide signals the journal producers' commitment to providing
assistance to the novice networker.

Another basic component of ease of use is what might loosely be
called readability. Print-on-paper journals offer the benefits of a read-
ing technology well honed over centuries of use. They offer usability
advantages over today's network publications based on both their physi-
cal format and their display features. Useful features abound. The

print journal's page layout, print quality, text structuring and format-
ting features, graphical capabilities, and locational devices like tables
of contents, footers, and page numbers all work together to improve
navigation and comprehension. In addition, readers' familiarity with
the conventions and capabilities of print journals facilitates usability.
As has often been noted, print journals seem to provide, compared to
electronic journals, a format better suited to many scholars' typical
work habits, allowing them to read more comfortably, skim and browse
in a nonlinear fashion, locate a particular piece of information quickly,
and make marginal notes (see Dillon, 1994, for a good overview of
the ergonomic aspects of information use and implications for elec-
tronic systems). These processes may eventually be accomplished
equally well in the digital realm, but print-on-paper technology is the
preferred option for many scholars today given entrenched habits and
the current limitations of computer hardware and networking appli-
cations.

What features are offered by today's scholarly network journals,
then, in their efforts to foster on-screen readability? They largely fol-
low the conventions of print journals in their basic organization and
design, employing such features as a masthead, table of contents, ab-
stracts preceding the body of papers, headers and subheaders to di-
vide papers into sections, and bibliographic references—formatted ac-
cording to standard style guides—at the end of papers. These con-
ventions are, however, instantiated and combined in a variety of ways.
In the case of *Electronic Journal of Communication/La Revue Électronique
de Communication,* for example, the table of contents for an issue ap-
pears as a separate document and includes abstracts and retrieval in-
structions for each contribution as well as the editor's introduction to
that issue. The reader obtains desired papers individually; the com-
plete issue is not formally constituted and displayed on the producer's
end; instead, readers put it together as they will, at their own discre-
tion. The *Journal of the International Association of Hospitality Research*
offers issues comprised of single papers. Nonetheless, the contents
and format of each issue mimic those of the typical print journal. For
a particular issue, the journal masthead is followed by some simple
descriptive information about the journal and its staff. Next to appear
is a table of contents that lists the associated page numbers for each
section of the paper published in that issue; subsequently listed in the
contents are standard sections which apparently appear in each issue,
such as instructions to authors and information on retrieving back
issues. The contents page is followed by the paper abstract, the text
of the paper, and the standard supplementary sections. *EJournal* is-
sues follow print journal conventions even more closely. A complete
issue is delivered to the reader, and it begins with a masthead, journal

information, and a table of contents for the issue. Next comes the
lead essay, followed by shorter articles, editorial notes, and further
information about the journal and its staff. As this set of examples
illustrates, network journal readers will encounter many familiar de-
vices but cannot expect to encounter the various pieces of a journal
packaged in a completely standardized or familiar manner. Variety
exists across network journals, and the basic conventions of print jour-
nals are not uniformly adopted in the network realm.

Network journals distributed in ASCII format are severely limited
in their ability to offer the kind of visual variety that assists reader
comprehension and navigation and lessens fatigue. Nonetheless, they
do make efforts to introduce visual cues and graphic features, and
conventions in this realm are arising. For example, *Postmodern Cul-
ture* uses the following conventions to simulate print-on-paper text for-
matting:

underlining (for titles)
boldfacing (for emphasis)
%italics% (for foreign words)
^superscript^ (for note numbers)

Flora Online suggests using all capital letters to replace underlining so as
not to interfere with keyword searching. Simple tables for the presenta-
tion of data can be accommodated in network journals; attractive easy-
to-read tables appeared in *Journal of Extension* and the *Journal of the Inter-
national Association of Hospitality Research.* Issue sections are divided in
some network journals by strings of asterisks or other special characters
to help the reader who is skimming through the issue in search of a
particular portion; one journal refers to this simple navigation tool as
"bookmarks." Boxes constructed with special characters are used in some
journals to draw the reader's attention to important announcements.
A number of the network journals provided extensive guidelines for
manuscript preparation in order to achieve consistency in the layout
and formatting of their publications.

Network journals vary in their choice of devices for labeling docu-
ment segments. When combined with a table of contents, labeling
document segments facilitates the process of jumping or scrolling to
a particular part of a paper or issue. It also provides a mechanism for
scholars who wish to cite network journal papers. *EJournal,* for ex-
ample, intermittently displays line numbers in square brackets on
the right-hand margin of the text and its table of contents lists the
line numbers for each article. *Postmodern Culture* displays paragraph
numbers in square brackets at the left-hand margin. Each of the sub-
stantial number of announcements that appear in each issue is simi-
larly numbered, and the announcements section is preceded by its

own table of contents. One journal employed page numbers, labeling both the beginning and end of each page; another lacked any kind of numerical labeling of document segments, a fact which, of course, would render citing its contributions problematic.

One is forced to conclude that the reader of ASCII-based network journals is subject to severe aesthetic deprivation and ergonomic difficulties. Reading these ASCII journals is tiring and tiresome. Nonetheless, some ASCII-based journals are more attractively formatted than others and ease the online reading process by displaying documents with plenty of white space, making effective use of simple techniques for highlighting and organizing text such as centering lines, capitalization, ASCII cues for underlining and emphasis, and "sidebars" outlined with boxes drawn with special characters. Navigation and browsing are assisted by numbering and other visual markers, though admittedly these features do not compensate for the frustration of having to scroll linearly through entire documents. The more extensively that abstracts and tables of contents are used at each stage of the retrieval process and are associated with different sections of a network journal, the easier it is for the reader to acquire the kind of overview of the contents, and the sense of getting oriented, that are easily accomplished with paper journals simply by holding them in your hands and skimming or flipping through them. Contents listings are also critical to the reader who is trying to identify and locate items quickly, especially in those journals that publish lengthy issues.

Screen reading, of course, is made easier when journals are available in richer formats. PostScript viewers allow the display of electronic journal papers with all of the visual variety (e.g., numerous fonts and font sizes, equations, graphics) found in print-on-paper journals. The HTML version of *Postmodern Culture* that is viewed with Mosaic accommodates the display of all manner of images and allows the kind of jumping around in a document that more closely approximates the navigational ease that print journal readers enjoy. Moreover, direct links between, for example, an endnote number in the body of the paper and the text of that specific endnote actually improve the efficiency of the digital reader's jumps.

ENHANCED FUNCTIONALITY

This exploration of scholarly network journals uncovered several ways in which current online publications have capitalized on their electronic format to offer readers significant benefits. Network journal contents have been enhanced by the incorporation of material which was impossible to include in print publications, such as the herbarium management software provided by *Flora Online*. Some journals included features that could conceivably be viewed as transforming

the nature of scholarly communication, such as *EJournal*'s aggressive solicitation and presentation of its readers' responses. Journals have also experimented with altering the traditional scholarly publishing cycle by allowing authors to revise their contributions and then making the new versions easily accessible to readers. *Flora Online* labels and stores subsequent versions of material it publishes, while *EJournal* distributes "substantial counterstatements" to its published essays as supplements to the original work and is even willing to experiment with retracting published texts. Such alterations in the speed and ease with which journal contributors and readers can communicate among themselves augment one's sense of active participation in the scholarly community represented by a journal's set of readers.

Several journals represent only one part of a suite of related services offered to subscribers. The other services offered are specifically aimed at facilitating alternative forms of communication; a common example is the provision of a companion discussion list to allow informal discussion of topics and issues presented in the journal. One example of a network journal that belongs to a family of scholarly communication services is the *Electronic Journal of Communication/La Revue Électronique de Communication*. The journal is part of Comserve, which is operated by the Communication Institute for Online Scholarship at Rensselaer Polytechnic Institute. Other services available through Comserve are listservs devoted to announcements of new job opportunities and books in the field, as well as previews of research in progress. Comserve also maintains an online library of textual resources, such as bibliographies and syllabi, and invites subscribers to include their name, e-mail address, and interests in the system's subscriber white pages. *Postmodern Culture* offers a mechanism for online interaction among scholars that is especially innovative in its approach to enlarging and enlivening the scholarly communication process. Its PMC-MOO provides a text-based virtual reality environment in which subscribers can interact in real time in a manner similar to that experienced in popular multi-user games like Dungeons and Dragons.

Some scholarly network journals enhance the usability of their contents by taking advantage of computer-based mechanisms for search and navigation. Journals accessed through World Wide Web pages allow the reader to make instant links from one point in a document to another. *Postmodern Culture* (http://jefferson.village.virginia.edu/pmc), as noted earlier, allows readers to jump directly from endnote numbers in the text to the endnotes themselves. Those journals available at gopher sites may facilitate the kind of serendipitous identification of other relevant material that scholars sometimes enjoy in browsing library shelves, publishers' catalogs, or online bibliographic databases and catalogs. This can occur because gopher sites may house a

collection of network journals or other information resources that are relevant to a particular topic or discipline; readers accessing the target network journal at such a gopher site may notice other items that look interesting to them. Several of the journals examined extend the usability of their contents by supporting keyword searching in their journal archives. In the *Journal of Extension,* for example, readers may enter uncontrolled terms in their search query. Citations, abstracts, and retrieval instructions for articles which contain keywords matching the reader's query are returned in descending order of relevance, and the relevancy rating of each article is displayed. This capability offers readers a substantial improvement in their ability to quickly locate particular papers.

   This author also encountered evidence of enhancements in dissemination offered by scholarly network journals. Simple reduction in the time required to publish material is one advantage that electronic journals have over their print counterparts. *EJournal* and *Postmodern Culture* both explicitly noted their relatively quick turn-around time in the review, production, and distribution of published material. Time savings may accrue due to the speed of network transmission of documents, the lack of need for physical production, and the conscious decision to publish articles as they appear rather than waiting for a number of papers to be collected as an issue.

   Another improvement in the dissemination of scholarly journals that is implemented in many network publications is the use of an alerting function that automatically sends an e-mail announcement of new journal issues to all subscribers. In those cases where the issues themselves are not e-mailed directly to subscribers, the situation is analogous to that of a scholar who regularly reads a journal to which she does not carry a personal subscription. The improvement comes, then, because the scholar does not have to visit the library to discover whether the journal has arrived and whether it holds anything of interest. While some libraries offer a similar alerting service, the practice is not universal and, in any case, may lack the reliability and comprehensiveness which computer-based services are able to provide. The "unbundling" of journal issues, so that individual journal sections or articles may be identified and retrieved, also offers enhanced functionality for readers, providing them with more control over, and flexibility in, the dissemination process. Scholars may easily browse journal archives and retrieve only those items of interest, assembling them into the package that best meets their needs at a particular point in time.

   While some of the current enhancements offered by network journals may be viewed as efficiency gains as opposed to powerful transformations of the scholarly process, it is sometimes difficult to draw

the line between these two types of impacts. At what point is a gain in efficiency so great that it actually permits scholars to accomplish something that they could not or would not have accomplished in the past? The accumulation and integration of individual enhancements may also engender a transformation that could not be attributable to any individual gain. Speedier dissemination of the results of scholarship, more immediate and informal interaction among scholars, increased integration of scholarly products that formally appeared through separate channels of communication, and the potential to greatly increase the number and diversity of "subscribers" (if access barriers—in terms of awareness, cost, and technology—are kept low) all work together to alter the nature of scholarly communication and reshape the activities of a scholarly community.

CONCLUSION: A VIEW TO THE FUTURE

In reviewing a sample of scholarly journals available primarily on the Internet from the reader's point of view, a number of key problems have been identified. The greatest barriers to use for many scholars will arise in the areas of awareness and access. Network journals have not yet entered the mainstream of bibliographic control; many scholars, therefore, remain ignorant of their very existence. And even after journals are identified, access to them is often hindered by several factors. Current and accurate instructions for subscribing to or retrieving network journals are neither consistently nor widely available. The vagaries and volatility of network-based communication contribute to the inability to successfully access a desired publication in a reliable manner. Scholars who lack the computing and networking expertise and tools required by the variety of systems used to store, distribute, and display network journals will be frustrated in their attempts to locate and obtain desired material.

Critical problems also exist in the basic usability of current network journals. While the lack of consistent conformance to the conventions of assembling and displaying print-on-paper journals is not necessarily a flaw, greater attention to establishing appropriate conventions for network journals, and informing readers about them, are certainly needed. Network journals can only do so much to support comprehension and navigation for on-screen readers of ASCII-based publications; unfortunately, some journals make inadequate use of available options and offer readers documents that are poorly designed. Ease of use is also greatly hampered in many publications by the lack of clear, complete, and well-placed instructions.

Compared to their print counterparts, the network journals reviewed here all seemed to provide readers with material of acceptable, and in some cases impressive, quality. Yet content is limited in

several important ways. The disciplinary scope of network journals is currently biased toward the humanities and social sciences, where, perhaps, commercial and priority concerns are less pressing and the inability to display illustrations and special characters is a less serious drawback. The quantity of scholarly contributions currently produced by some network journals is also limited, with some publications offering a significantly smaller number of contributions than the reader of print journals has come to expect. While a number of instances in which network journals offered their readers significant improvements over the speed and functionality that accompany the production and distribution of print journals were identified, the degree to which network journals have taken advantage of the capabilities of computers and networks varies considerably, and it is safe to say that many of the possibilities remain virtually untapped.

It appears that we are at a critical juncture in the history of the networked dissemination of scholarly work. The journals reviewed here represent pioneers on this frontier. Several trends in policy and technology have converged in a manner that suggests that a more radical transformation of scholarly communication is imminent. Convinced that a viable market for network journals exist, and that business transactions on the Internet can be made both allowable and secure, a greater number of commercial publishers are beginning to enter the network journal marketplace. MIT Press, for example, has announced its intent to offer personal and institutional subscriptions to a peer-reviewed electronic journal called *Chicago Journal of Theoretical Computer Science* (Fisher, 1994). OCLC has also announced a new slate of fee-based electronic journal offerings. Based on the experience that has been gained to this point with both commercial and noncommercial electronic publishing ventures, it appears that more commercial publishers feel that issues of awareness, quality, archiving, and subscription procedures can now be adequately dealt with and, further, that a competitive advantage exists for publishers who offer readers the enhanced capabilities inherent in network publishing.

Other recent efforts have concentrated on pushing the boundaries of current technology and the new capabilities it offers. Project Muse at Johns Hopkins University Press begins to test the possibilities of networked hypermedia journal publication (Pathak, 1994). A prototype system accessed through the World Wide Web (http:// muse.mse.jhu.edu) consists of current issues of three scholarly journals published by the press. Features of the system include author, title, and subject indexes, Boolean searching, hypertext links within the documents, and the incorporation of both illustrations and voice annotations. The World Wide Web and Mosaic have spawned another departure from previous patterns of scholarly communication in that

more scholars, researchers, and artists seem to be "publishing" their
own material by mounting personal or workgroup homepages, thus
making their work publicly available to a broader audience more
quickly than in the past. Because such homepages often include links
to other material that are somehow meaningful to their creators, they
embed the scholar's or artist's own work within the broader, yet per-
sonalized, context of the field and suggest that new forms of invisible
colleges or online scholarly communities may arise in the future.

   We can also envision the future of network journals by re-examin-
ing scholars' needs and preferences within the framework of new tech-
nological developments. Olsen (1994) interviewed about fifty schol-
ars in chemistry, sociology, and English language and literature about
their reasons and strategies for locating journal literature, their meth-
ods of reading, and perceived strengths and weaknesses of print and
electronic journal publication. Their responses allowed her to for-
mulate requirements for an electronic journal system. Based on her
findings, Olsen advocates the development of mechanisms to support:
display of graphics, reduction of strain and discomfort from screen
reading, effective skimming and scanning, serendipitous discovery,
improvements over current computer search capabilities, the manipu-
lation of documents, access to the literature from one's home or of-
fice, reduced lag time in publication, and the ability to create per-
sonal document collections. In terms of the current state of scholarly
publishing on the net, virtually all of these requirements remain unmet
or too dependent on technology and financial resources that are un-
available to many scholars.

   Focus group interviews conducted by a group of researchers, in-
cluding the author, also reveal a user-based vision of the ideal system
of network journals that is far from the realities of current systems.[3]
The interviews were conducted at the University of Illinois with about
eighteen faculty members, graduate students, and undergraduates in
various engineering disciplines. The focus groups were conducted in
order to inform the development of a digital library testbed that will
consist primarily of engineering journals. While the behaviors and
needs surrounding the identification and reading of journal articles
varied considerably among the three user groups, their responses
clearly suggested the network journal features that would be most ben-
eficial, overall, to members of the engineering community. Partici-
pants in our discussions were most anxious for network journals to
provide them with the ability to:

• see "real" page images, exactly as they appear in print versions of a
  particular journal (as scholars often locate material by remembering
  its relative position and general appearance, make initial judgments

about a paper based on its structure and appearance, and experience discomfort and reduced comprehension when reading ASCII documents onscreen);

- search for and display specific elements (e.g., equations, citations) and components (e.g., method, conclusions) of papers;
- automatically and directly follow links from material cited in papers to the material itself and from journal papers to subsequently published material citing those papers (because following citations is one of the most important, as well as one of the most time-consuming, means of locating relevant material);
- customize interface features, retrieval mechanisms, and document presentation to meet personal needs in any particular situation (because no single approach is ever best);
- retrieve and skim figures and tables (as these elements often provide the most accurate and useful summary of a paper or contain the most important information);
- use the system quickly and easily without the kind of anxiety and frustration that typically accompanies computer use, network use, and information searching;
- create personal collections by downloading and manipulating retrieved material (so that documents can be organized and accessed in the manner best suited to the scholar's own needs, annotated, and shared);
- explore a "natural topography" of the journal landscape that would support multiple views of the material (e.g., by type, topic, currency, discipline, author, "things I've seen before");
- allow the serendipitous discovery of "other books nearby on the shelf" and "other articles in the journal";
- move easily and flexibly from "a little information" (e.g., author names and titles) to "more information" (e.g., figures and introduction) about papers of potential interest, and define on the fly which of these elements to view; and
- view and revise a "lexicon of subject keywords" that would integrate established thesauri and user-built lists and provide direct links to documents represented by lexicon terms (interviewees were harsh and virtually unanimous in their condemnation of current mechanisms for performing any kind of subject search).

These findings corroborate those of Olsen and offer further guidance on the optimal design of scholarly network journals—optimal, that is, from the reader's point of view.

NOTES

[1]   Sources for identifying electronic journals that I came across in the course of my investigation take the form of directories, Internet sites where electronic periodicals are collected, and listservs where new electronic journals are announced. These include:

- The *Directory of Electronic Journals and Newsletters*, edition 2.1, July 1992, compiled by Michael Strangelove (available by sending e-mail to listserv@acadvm1.uottawa.ca with the messages get ejournl1 directry and get ejournl2 directry).
  Directory of Electronic Journals, Newsletters and Academic Discussion Lists. 4th ed. Washington, DC: Association of Research Libraries, 1994. (Available at CNI's gopher site. Path: gopher.cni.org/Association of Research Libraries Services/ARL Secretariat (Gopher Link)/Scholarly Communication).

- *On Internet 94: An International Guide to Electronic Journals, Newsletters, Texts, Discussion Lists, and Other Resources on the Internet.* Tony Abbott, ed. Westport, CT: Mecklermedia, 1994.

- A CICNet gopher site established as a central site for collecting electronic periodicals. It allows users to see a listing of titles and access the actual issues (gopher.cic.net).

- VPIEJ-L, a listserv devoted to the discussion of issues related to electronic journal publishing; new network journals are described in some postings. To subscribe, send e-mail with subscribe message to: listserv@vtm1.cc.vt.edu

  The lack of complete and current data on scholarly network journals is the impetus behind NewJour, a listserv on which people are invited to announce their planned or newly issued electronic networked journals and newsletters. Further, the NewJour-L support group intends to develop a worksheet to collect bibliographic, content, and access data from the editors of the new publications. This effort is coordinated through the Association of Research Libraries. It was described in note #47 of the "Announcements and Advertisements" section of *Postmodern Culture*, vol. 4, no. 3 (May 1994). To subscribe, send e-mail to: majordomo@ccat.sas.upenn.edu with the message: subscribe newjour-l Firstname Lastname.

2 Unattributed quotations used throughout this paper were taken from the basic information that accompanied each network journal issue.
3 Other members of the research team are S. Leigh Star, Laura Neumann, Emily Ignacio, and Pauline Cochrane. The team is part of the NSF/NASA/ARPA sponsored Digital Library Initiative project currently underway at the University of Illinois at Urbana-Champaign under the direction of PI Bruce Schatz. Preliminary results from the focus group interviews are available as working papers on the homepage set up for our digital library project, whose title is "Building the Interspace: Digital Library Infrastructure for a University Engineering Community" (http://www.grainger.uiuc.edu/dli).

REFERENCES

Clement, G. (1994). Evolution of a species: Science journals published on the Internet. *Database, 17*(5), 44-54.
Dillon, A. (1994). *Designing usable electronic text: Ergonomic aspects of human information use.* London, England: Taylor & Francis.
Fisher, J. H. (1994). Electronic publication at MIT. *EJournal, 4*(2), line 607-708.
Pathak, S. (1994). Electronic publication at Johns Hopkins: Project Muse. *EJournal, 4*(2), lines 542-602.
Peek, R. P. (Ed.). (1994). *Perspectives on electronic publishing* [Special issue on electronic publishing]. *Journal of the American Society for Information Science, 45*(10).
Peek, R. P., & Newby, G. (Eds.). (in press). *Scholarly publishing: The electronic frontier.* Cambridge, MA: MIT Press.
Olsen, J. (1994). *Electronic journal literature: Implications for scholars.* Westport, CT: Mecklermedia.
Schaffner, A. C. (1994). The future of scientific journals: Lessons from the past. *Information Technology and Libraries, 13*(4), 239-247.