
Authors and Readers: The Keys to Success or Failure for Electronic Publishing

CAROL TENOPIR

ABSTRACT

ALTHOUGH THERE ARE MANY POSSIBLE links and ways to join them in the publishing chain for scholarly journal articles, the first and last links are always authors and readers. Unless it satisfies the motivations and goals of both authors and readers, electronic publishing cannot completely succeed. One of the most frequently cited advantages of electronic publishing is the loss of distinction between readers and authors and the shared motivation of both to have more opportunities for collaboration. Unfortunately, many goals of authors and readers are not shared. Authors are primarily motivated by career advancement and long-term contributions to their discipline, readers by keeping up in their field and work-related tasks. Many other factors enter into the process as well—some of which coincide while others conflict.

INTRODUCTION

The process of electronic publishing on commercial online systems traditionally involves many interrelated, but mostly separate, parts. These parts may be depicted as steps leading to a completed search request or, more commonly, as links that together form an information generation and use chain. Each component is dependent on the others, and together the whole leads to something greater than the parts.

Like a value chain within a company's operations, an information generation/use chain forms a system of interdependent activities,

connected by linkages. All of these linked activities must be coordinated, because the way each linked activity is performed affects the cost or effectiveness of the other activities (Porter & Millar, 1985).

Williams (1990) describes seven links in the information-generation-database use chain that focuses on the people responsible at each link: (1) author/originator, (2) primary publisher, (3) secondary publisher/database producer, (4) tertiary publisher/online vendor, (5) gateway, (6) searcher/analyst, and (7) end-user/requestor.

Anderson (1993) identifies four crucial links in the electronic information delivery chain: (1) authors, (2) publishers, (3) libraries, and (4) readers. Distribution is assumed to be via the Internet from publishers to readers or from publishers through libraries to readers. This echoes earlier work by King, McDonald, and Roderer (1981) on the separate, but interrelated, roles of authors, publishers, libraries, and readers in scientific communication through scientific print journals.

Schauder (1994) describes these links as "dependency patterns." In print publishing, he identifies three patterns: (1) author to publisher to vendor to librarian to reader, (2) author to publisher to reader, and (3) author to publisher to vendor to reader. In every case, the author and reader are dependent on the publisher as the key link in conveying information, although other links may also be present.

In electronic publishing, Schauder expands the possible patterns to fifteen variations incorporating, in various permutations, the links of author, publisher, vendor, librarian, consortium (of publisher/vendor, publisher/vendor/librarian, publisher/librarian, or vendor/librarian), and reader. Unlike print publishing, the publisher is not involved in every pattern. The pattern may be directly from author to reader, or it may be from author to vendor to reader, or from author to library/vendor consortium to reader. Four of the fifteen dependency patterns exclude publishers. When a publisher is involved it may be only as part of a consortium.

An elaborate traditional publishing structure has developed that includes publishers, printers, indexers, database vendors, subscription agents, libraries, microfilmmers, back issue dealers, cataloging utilities, and interlibrary loan networks, in addition to authors and readers (Potter, 1986). Other possible parts of the structure include reviewers and editors.

These many "intervening agents" between authors and readers have proliferated over the years. Potter points out that, historically, journals grew out of personal correspondence among scientists, but today "with the sheer number of journals, the complexities of serials, and the sociological baggage involved in publishing, an elaborate structure has been built to provide the channel that connects the author and reader" (p. 20).

All of the descriptions of the links or structure recognize the separate, but interrelated, functionalities in the electronic transfer of information. In all cases, the functionalities begin with the intellectual creator (the author) and end with the reader or user. This is, of course, the essence of any type of oral, written, or electronic knowledge dissemination—the linking of creators, or creators' ideas, with readers. As Potter (1986) succinctly puts it, “the situation today, as volatile as it may seem to us, is still essentially a reader looking for an author and an author looking for a reader” (p. 20).

CHANGING ROLES OF PUBLISHERS

What is unique about electronic publishing of scientific journals is the wide variety of ways the links can be connected to achieve this ultimate purpose. New ways of linking authors more directly to readers have developed as networks such as the Internet and Bitnet often replace the formal role of vendors, distributors, or publishers. The networks usually play a more passive and less formal role than traditional vendors or publishers in linking authors to readers.

Much of the dissemination of scholarly journals on these networks today bypasses formal publishers, although this is beginning to change. After an extensive survey of scholarly electronic publishing efforts, Schauder (1994) concluded that, as of mid-1993, most of the publishing on networks such as the Internet are noncommercial enterprises. Most efforts are dependent on volunteer effort and institutional or personal subsidies of money, labor, or facilities.

Widespread commercial electronic publishing ventures over the Internet by not-for-profit and by for-profit organizations may soon be coming, however. The early involvement of OCLC in conjunction with the American Association for the Advancement of Science (AAAS) and pilot projects by commercial scholarly publishers, such as Elsevier, foreshadow future developments.

Many proponents of electronic publishing call for a downplaying of publishers' roles (or even the elimination of publishers as we now know them) as a way to bring authors and readers closer. Certainly the lines among publishers, authors, and readers are blurring in electronic publishing or, as Anderson (1993) points out, “the boundaries between the players—authors, publishers, libraries, readers—have become very fluid and permeable” (p. 88).

By eliminating traditional commercial publishers in scholarly publishing that emanates from academe, Okerson (1992b) sees the solution to a range of long-term problems. These problems are fundamental to traditional scholarly publishing through the commercial sector and include high costs and loss of ownership.

Publishing outside academia, to the extent that it happens today, is unfortunate for users. The obvious reason is well documented: journals coming from university presses or learned societies cost anywhere from two to twenty times less per page than comparable for-profit journals. That is the smaller misfortune, however. The far greater one is loss of ownership. Through the conventions of scholarly publishing, the author routinely assigns copyright to the publisher, who legally becomes the new owner of the authored material for fifty years plus. That is, the academic institution is assigning most of its scholarship outside of academia, for a lifetime (Okerson, 1992b, p. 171).

Other advantages to the elimination of middlemen are cited by proponents of a new model for electronic scholarly publishing. These include faster transmission from author to reader (Arms, 1992); a way to circumvent exorbitant prices of serials (Bailey, 1992); providing equal access for all scholars (Okerson, 1992a); and breaking out of a biased and closed review system (Judson, 1994).

Not everyone agrees that publishers should be eliminated in the electronic publishing chain. The advantages and commitment that formal publishing brings are historical and far-reaching. They touch all parts of the publishing process, including the soliciting and evaluation of quality manuscripts; supervising the refereeing function; editing and advising authors of needed changes; copyediting final drafts; disseminating issues on a regular schedule; and protecting copyright. The formality and regularity of the process brings legitimacy and constancy to scholarly journals.

Even publishers agree that the role of the publisher is very likely to change, however, including the long-stable relationships between publishers and writers and those between publishers and readers (Kaplan, 1993). Scholarly publishing is especially ripe for change, and the role of the publisher may be taken on by universities or other players outside the mainstream of traditional publishing.

More emphasis is likely to be placed on the marketing and promotion role of these publishers. With the likely continued proliferation of published materials in an electronic environment, even scholarly publishers can bring an increased effort in identifying markets, linking author's ideas to appropriate readers, and serving as clearinghouses (Kaplan, 1993; Horowitz & Curtis, 1982).

Other possible expanded roles for publishers (and librarians) are as enforcers of an author's individual copyright, as developers of better access and display software, as providers of better links among related research, and as maintainers of quality over time by including errata or updated information alongside older articles.

COMMON GOALS?

Ultimately, the key to success of any electronic publication lies with the two predominant players that appear first and last in all the variety of models. Authors must be willing to write and readers must feel compelled to read what is written. Kaplan (1993) depicts the relationship between authors and readers as a constant that "has not changed since the first writings were rendered as cave markings" (p. 158).

Downplaying or eliminating publishers' roles revolves around the widely held belief that authors and readers share all of their goals in common and that these common goals are in conflict with the goals of commercial publishers. Authors and readers are depicted as integrated units as electronic journals "shift the emphasis of scholarship...from the single author to the corporate author [which is made up of] writers and their readers" (Amiran et al., 1991, p. 36).

Certainly authors and readers share some goals, but in reality are they now, or can they ever be, a single unified entity? Is this unification necessary for success of electronic publishing? An examination of their respective motivations and goals concerning scholarly publications may help answer this question.

AUTHORS' GOALS

The motivation to publish in scholarly journals has been examined often, long before electronic journals were a reality or even a possibility. The two primary motivating factors of scholarly authors are: (1) recognition for career advancement, including tenure, promotion, and salary increases ("publish-or-perish"); and (2) the desire to contribute to the body of knowledge in a field or to the archive of the scholarly knowledge in a field and to be recognized for their contribution by their peers. Several studies in the last fifteen years have shown that these are still the primary motivating factors of authors.

ACADEMIC ADVANCEMENT

Griffiths et al. (1991), in a study for the National Science Foundation, examined all aspects of scientific communication. Regarding authors, they estimated that over 600,000 scholarly articles were published in the United States in 1990, up from 489,000 in 1985 and 382,000 in 1977 (pp. 4-7). The number of articles published per scientist in U.S. journals is actually decreasing, however, from 0.155 in 1977, 0.114 in 1985, to 0.104 in 1990.

Although the Griffiths et al. study focused on nonacademic scientists, they compared their findings with earlier work which found that approximately 70 percent of professionals from research universities had articles published in the two-year period 1986-1987. This is far

greater than the number of nonacademics who write, as scientists and engineers in companies and government agencies wrote only an average of 0.05 articles per year in the late 1980s. Adding in the articles written by academics in these disciplines increases the number per year to between 1.5 and 3.1 articles per author (pp. 4-7).

Griffiths et al. (1991) conclude that "these data confirm that academicians publish for external purposes, far more than scientists and engineers from industry and government" (pp. 4-7). This coincides with Price's (1975) observations thirty years before that scientists (mainly in academe) "want to write but not read" and the "technologist" (mainly in industry and government) "wants to read but not write." Since far more academicians publish, the motivation of academic recognition and advancement through tenure and promotion must surely be a major goal in scholarly publishing.

This goal is not new—the term "publish-or-perish" was first used by Wilson in 1940—and academic institutions usually weigh tenure and promotion decisions most heavily on research output. A 1986 survey by the American Council of Learned Societies (cited by Lubans, 1987) found that 29 percent of academic scholars felt the pressure to publish was "extremely strong," while an additional 31 percent felt it was "strong."

In his review of the literature that describes motivations and problems with academic pressure to produce, Schauder (1994) concludes:

the need by academics to publish in recognized refereed journals is a very important factor supporting the continuation and growth of formal academic publishing. It might be even more important than the need to read such journals. An academic with a poor publishing record is deemed to be underperforming. (p. 83)

Schauder's survey of 743 senior academics in Australia, the United States, and the United Kingdom reinforced the perception that career advancement is a major motivator for academic authors. He found that 82 percent felt the publishing of professional articles was "important" to advancement in their careers, while an additional 14 percent felt such publishing was of "some importance" to their careers (p. 90).

The goal of publication as an advancement mechanism may not yet be served by electronic journals, as universities are slow to recognize their scholarly potential. One of the earliest attempts at developing a refereed scholarly electronic journal was the *Mental Workload* journal of the Electronic Information Exchange System (EIES) (Turoff & Hiltz, 1982). A main reason for failure was the unwillingness of authors to contribute to a journal that promised no recognition in tenure or promotion decisions, no royalties, and no role in advancing their reputations or careers.

A small study by Shamp (1992) reinforced the reluctance of universities to recognize electronic journals. He surveyed eighty-five academic users of Comserve, a communications electronic discussion group on Bitnet, to discover factors influencing their willingness to contribute articles to scholarly electronic journals. Of the respondents who were assistant, associate, or full professors, 77 percent "did not believe their institutions would accept electronic publication as evidence of scholarly productivity" (p. 301).

The success of electronic journals surely rests on the number and quality of the articles submitted and published. The early adopters of technology that Shamp surveyed are the most likely candidates to submit electronic articles, yet:

sixty percent of the respondent's decisions to submit were in line with their perceptions of their universities' policy on electronic publication—22.1% said their university would accept and that they would submit while 37.1% thought their university would not accept and they would not submit. No respondents indicated they would not submit when they believed their university would accept the publication. (p. 301)

PEER REVIEW/REFEREEING

The author's goal of academic advancement may be met by inculcating the accepted practice of peer review/refereeing into scholarly electronic journals and ensuring that this is understood and accepted by academic decision makers. The editors of the successful electronic (and peer reviewed) journal *Postmodern Culture* report having trouble getting contributions from junior faculty because tenure committees fail to recognize the legitimacy of electronic publications (Amiran et al., 1991, p. 38). It must be conveyed to these decision makers that:

Institutional legitimation is a matter of the peer-review process and not a question of the medium in which peer-reviewed work is distributed. An electronic journal that uses methods as careful and reviewers as qualified as those used by responsible print journals ought to be considered a valid form of professional publication. (pp. 38-39)

A study by Seiler and Raben (1981) provides an early view of the challenge of fostering such acceptance. They surveyed attitudes toward refereed electronic journals by 677 assistant, associate, and full professors in U.S. academic institutions that have graduate programs. Respondents were asked to envision publications that were available only through computer networks but were national in scope, were in their subject specialty, and were refereed. Given this scenario (futuristic in 1981), 52 percent of the respondents:

considered electronic publication equivalent to print publication. A sizable minority, however, either believed it inferior (37

percent) or would totally disregard it (6 percent). There was virtually no support (1 percent) for the idea that electronic publication is superior to print publication as a basis for promotion. (p. 81)

Not surprisingly, in schools oriented toward teaching, a higher percentage of the respondents believed the electronic medium for journals would be equal, or superior, to print for promotion to full professor than was true for schools oriented toward research (62 percent to 42) (Seiler & Raben, 1981, p. 81).

Nowhere is the peer review issue more important and more discussed than in the medical and biomedical fields. Health-service professors publish more refereed articles in their careers than any other scientists (Griffiths et al., 1991, pp. 4-7), and the amount and prestige of these publications is essential for competitive external funding as well as academic success. Much of the discussion has centered upon the problems of a peer review system for grant proposals and journal articles that uses potential competitors as reviewers in a highly competitive scientific environment. Recently, discussions have focused on the role of peer review in electronic journals as well.

The International Committee of Medical Journal Editors recently added a statement about electronic publication to their "Uniform Requirements for Manuscripts Submitted to Biomedical Journals" (Flanagin et al., 1992). They wanted to convey to authors, editors, academicians, and institutions their belief that:

Scientific reports disseminated through an electronic journal—especially one that publishes original, peer-reviewed, and copyright-protected articles—should be considered "published" material and thus held to the same standards that apply to information published in conventional print journals. (p. 2374)

When it works as it should, peer review is an essential ingredient of ensuring that only the best quality papers get published. It provides decision makers at universities with a criterion for quality that they can accept without question. It thus serves the academic author's primary motivation.

But merely bringing the old processes of print into an electronic world may not serve the interests of all authors or of all readers. Judson (1994) surveyed the troubled history of peer review in medicine—a process that is dominated by an old boy network and conflicting interests and competition, where the best work doesn't always get into print. Merely moving this old system into a new delivery medium would not solve fundamental problems, but there is the possibility of a better peer review system in the future with the more open environment that electronic publishing will bring. He sees hope in the future as:

A new generation of journal editors will arise who have grown up with electronic editing and publishing. In 10 years' time, although procedures will be followed that some journals will still label "refereeing" or "journal peer review," these procedures will be startlingly different from those put into place in the years after the second world war; which, despite their brief history, seem so monolithic and unchangeable today...[T]he transformation will open up the processes by which scientists judge each other's work, making them less anonymous, capricious, rigid, and subject to abuse, and more thorough, responsible, and accountable. (Judson, 1994, p. 94)

In many less competitive disciplines, it may be a long time before this new vision serves the advancement goals of authors. It does, however, clearly serve the next major goal of authors—that of contributing to the knowledge base of their field.

CONTRIBUTING TO KNOWLEDGE

While motivation for advancement may be a pragmatic view of authoring, a more idealistic view is that an author's prime goal is to contribute to the knowledge of his or her discipline. Ideally this is not a one-way or a one-step process, but an iterative communication process with peers and beyond. These peers form at least some of the body of readers of scholarly work (but not all).

Anderson (1993) quotes Harnad's (1992) expression of the loftier communication/contribution goal:

Surely the motive of the true scholar/scientist is to advance human inquiry. And, just as surely, such an enterprise is and always has been a collective, cumulative and collaborative one: Scholars publish in order to inform their peers of their findings and, equally important, to be informed by them in turn, to interact with them, in the cycles of reciprocal influence that constitute an evolving body of scholarly research. In a word, the purpose of scholarly publication is communication—with peers, and for posterity. (pp. 91-93)

Feedback can be instantaneous and from a wide group of readers. Implied in this communication function is the frequently mentioned advantage of becoming closer to readers and of fostering more collaboration, which is already beginning to change the fundamental nature of research.

Authors will be able to enter into a dialogue or "dialectic" with readers as research and writing evolve through continuous interaction (Lederberg, 1993). A "collaboratory" electronic community, as expounded by Wulf (1993), is composed of scientists who both cooperate and compete and who do their own reviewing in an open manner "that concatenates publication and responses" (Judson, 1994).

In the ideal view, electronic publications will include all evolving versions of an article, from preliminary to revised (replacing the old preprint function). In a more revolutionary mode, it could also include all comments from referees; all criticism and suggestions from readers; rebuttals, corrections, and retractions; and perhaps even raw data (Judson, 1994).

With this cooperation among peers, electronic publishing facilitates the long-term functions of the scholarly invisible college. Writing evolves from an idea, to a research or conference report, to a preprint, to a formally published article, all with peer involvement and cooperation. Invisible colleges, by definition, are exclusive groups, as graphically described by Price (1975) in *Science Since Babylon*:

[Scientists] get by in what are now called "invisible colleges" of little groups of peers. They are small societies of everybody who is anybody in each little particular specialty. These groups are very efficient for their purpose and, somewhere along the line, people eventually write up their work so that graduate students can read it and get to the research front. By the time it gets published, however, it is so old that all the good research juice has been squeezed out of it, so it is not worth reading if you are really in the business at the research front. (pp. 126-27)

Electronic communication facilitates more timely access to the small peer group of invisible college members, which is clearly an advantage to authors within the college. Expanding it to include other peers who were previously left out of the college, particularly those in other countries who may not be able to attend professional conferences, should assist researchers as well. Electronic communication has the potential of opening up the invisible college to a much wider world of readers going beyond research peers. This includes students, researchers in other disciplines, readers outside of academia, and any interested layperson. Surely this is an advantage to readers or new authors who are now included in a process that once excluded them, but is it an advantage to authors who are already members of the more exclusive peer group?

This is perhaps an unanswerable question, as cogent arguments can be made on both sides. From the purely selfish perspective of an individual author, too much feedback, especially from those with little depth of knowledge in a subject specialty, may not serve the goals of authors as much as the ideal view proposes. Widespread distribution of referee's comments or disagreements from anyone who wishes to post them, may discourage some authors from publishing.

Even Harnad, an early creator and proponent of electronic journals, is described by *Scientific American* as:

no populist. Unlike Internet evangelists who view the network as the ultimate equalizer for dismantling hierarchy, Harnad is an unabashed academic snob. The best thinkers in a field, he believes, should have access to one another, undisturbed by the noise of crowds milling outside the ivory tower. (Stix, 1994, p. 109)

Perhaps it is wise to keep communication and publishing separate at some level. King (1991) advises viewing the process and products separately because "just because researchers use e-mail frequently for informal communications does not mean that e-mail will become the publishing medium of preference for formal publication" (p. 6). Invisible colleges are one type of informal communication means, wider-open lists and bulletin boards are others.

PUBLISHING FOR POSTERITY

Communicating with contemporary readers is not the only motive in formal scholarly publishing. An author's goal may be to ensure a place for himself or herself for posterity—to make a journal contribution that becomes part of a discipline's future knowledge base or to ensure personal fame and recognition in his or her field. This process may be independent of contemporary readers, as an author looks ahead to his or her place in history. For this purpose, the process of writing and publishing are essential to the work of a scientific scholar, but a wide readership of contemporaries is not (Schauder, 1994).

Taken to an extreme, authors and readers might be completely separated. According to Garcia (1994):

The view that texts are meant for audiences and thus that an audience, either actual or imagined, is a necessary condition of texts is one of those assumptions that, even if seldom explicitly stated, is generally implicitly accepted in the pertinent literature. Recently this view has come under fire, however, from some authors who claim that their business is not with an audience at all. Practitioners of the *nouveau roman*, such as Alain Robbe-Grillet, believe that for a writer the aim is to write, and whether what the writer writes is read or not is actually unimportant....From this point of view, an audience is neither necessary nor important for the author, and if that is so, then its consideration could neither be necessary nor important for the existence or understanding of a text. (pp. 731-32)

He goes on to argue that there is always at least one audience for every publication—the author is the audience for his or her own work. We have to assume that this extreme view is limited to fiction or philosophy and is not true in scientific publishing, but authors may not have an audience clearly in mind when they write. The needs of readers may be inconsequential when compared to the author's need to publish or the urge to record for posterity.

OTHER FACTORS

The two primary motivating factors of career advancement and contribution to the discipline are independent of the publication medium. In addition, some authors see advantages in electronic publishing that are not present in traditional print publishing. Many are more closely aligned with the needs of readers. Advantages include:

- timeliness (articles are published more quickly) (Judson, 1994)
- less pressure to condense the length of articles in order to conform to arbitrary page restrictions (DeLoughry, 1989; Judson, 1994)
- lower cost: no need to pay for publication or reprints
- increased opportunities for nontraditional writers or topics (Amiran et al., 1991)
- errata can be connected to the original text and authors who change their names can update previous publications (Seiler & Raben, 1981)

Financial reward does not seem to be an important motivating factor for authors of scholarly articles (this is probably based on the pragmatic realization that financial reward for scholarly publishing is unlikely). Only 4 percent of Schauder's (1994) respondents felt personal financial return was "important," while an additional 17 percent felt it to have "some importance" (p. 91). Seventy-six percent had never been paid for an article in a journal, while 19 percent had been charged a fee to publish in a journal at least once (p. 92).

PROTECTION OF INTELLECTUAL EFFORT

Although it is not an explicit motivating factor for publishing, protection of ideas from theft or misuse is implied if the primary goals of authors are to be achieved. It is a goal that is shared by publishers, although publishers and authors may be in conflict over who owns the published intellectual property. Protection against unauthorized copying, plagiarism, being quoted out of context, or theft of ideas concerns authors in all disciplines. Justified or not, the fear may be greater with electronic publications.

Staking a claim to a research idea before it can be formally published or claimed by someone else is more easily done electronically. In competitive fields, the desire to get credit for an idea, or process, or discovery has a long tradition. It is tied to the motivation of recognition by peers and by posterity. Although only the expression of ideas and not the ideas themselves can be copyrighted, there is a long tradition in scholarly research of granting credit to the one who first goes public with an idea. Electronic communication has changed the traditional channels of "going public" and may allow some ideas to

go public before they should (the cold fusion issue is a good example). More cautious researchers may be penalized.

On the other hand, casual mention in an electronic forum may not be considered staking a claim by some readers. To protect a researcher's interest, all readers must be made aware that "using someone's ideas that have been articulated in a casual manner on a listserv without ascription, or taking credit for another's work is intellectual theft" (Hauptman & Motin, 1994, p. 9).

If authors' prime motivators of academic advancement and securing a place for themselves in their discipline are to be met in an electronic environment, the work of an author must be clearly differentiated from the interactive comments or extensions by readers. Even in coauthored publications, the work by the authors of the institute or organization must be easily identifiable.

Copyright laws were made to protect authors' and publishers' investment of time, creativity, and capital. According to Rawlins (1993), in book publishing, that protection is eroding rapidly because "there is no long-term copy protection scheme suitable for marketable electronic books; the user can always scan the book and copy it perfectly. It will merely take longer to make the first copy" (p. 475). With electronic distribution of journals, the process is even easier as entire articles can be quickly downloaded and imported into a reader's word processor. The potential for misuse is vast.

Some of the copyright abuse in scholarly electronic communication is surely unintentional. In an interactive environment of give and take with informal looking "communications," the author of an original idea may be obscured. As lines blur among readers, authors, and publishers, a reader may make an idea his or her own or, mistakenly, an entire interactive document. In this situation, the author's motivation of self protection is not best served by informal or highly interactive electronic publications.

Outright plagiarism is a topic that is gaining renewed concern, although some say the fear is unfounded (Amiran et al., 1992). Still, downloading full articles is easy to do and "from there, it is easy to change a sentence here and there and incorporate the downloaded information into one's own research paper and claim it as one's own work. How to catch such plagiarism is a major problem" (Reichel, 1989, p. 478). Reichel calls for librarians to teach ethics of information use to students along with techniques for accessing electronic information. Plagiarism may be less of a problem with formal electronic journals that appear at regular intervals and have copyright notices clearly displayed than with e-mail communications (Bailey, 1991, as cited in Amiran et al., 1992).

The fear of having their intellectual output read out of context or quoted out of context is one that is not often articulated by authors but nonetheless may be present. Some authors fear, in particular, the capabilities offered in electronic versions of texts that make viewing small segments of texts so easy. The ability to read only chunks or paragraphs from multiple articles on a topic is seen as an advantage by readers of electronic texts but as a disadvantage by authors (Tenopir, 1988).

Involvement of a formal editorial and formal publishing function may help authors to protect themselves from copyright infringement, theft of ideas, or plagiarism. Commercial publishers and authors share a common goal in this situation. Amiran, Orr, and Unsworth (1991) quote Bailey (1991) who points out that "perhaps the situation is worst [sic] for electronic communications that bear the least resemblance to traditional printed forms...Some print publishers are already moving into electronic text, and if they become a major force in this medium (or if software companies do), then some of these questions might eventually become moot or meaningless" (p. 44).

READERS' GOALS

Clearly, not all of the goals or concerns described for authors are shared by readers. Some are in direct conflict; others may be shared in an electronic environment when they were not in a traditional print world; still others are important to both groups. Readers have their own goals as well.

Three recent extensive studies explore the needs and habits of readers of scholarly journals: Griffiths et al. (1991) and Griffiths and King (1993) provide in-depth pictures of researchers as readers of scientific and technical literature, while Olsen (1994) examines journal reading habits of professors of chemistry, sociology, and the humanities and their requirements for electronic journals.

Scientists rely on refereed journals more than any other type of literature, although the amount of reading seems to be declining since the 1970s. Scientists averaged 116 readings per year as of the late 1980s, with academic readers reading much more than others. Non-academic scientists read approximately 75 articles per year, down from 95 readings per year in 1984 and 105 readings per year in 1977 (Griffiths et al., 1991, p. 43).

Much of the reading is for current awareness purposes, with three-quarters of the reading occurring within six months of publication of the article. In contrast, readings "that have a significant effect on work" often come from older publications and "about 40% of readings were second-time readings with a one month lapse between readings" (Griffiths et al., 1991, p. 44). Reading occurs for many reasons,

including (in order of frequency): specific work activities, current awareness and professional development, and communication (Griffiths & King, 1993).

Olsen (1994) found that academic readers unanimously find journal literature to be "indispensable" to their work. They read journals for many reasons, including gathering background knowledge on a topic, current awareness, and looking for specific facts or items. Chemists use literature the most frequently—62 percent read journals every day (pp. 14-15).

When preparing to do research in a new area, preparing a grant proposal, or writing a manuscript, readers use retrospective literature as well as current articles. They scan or browse through vast amounts of material, using articles to trigger new ideas.

Olsen (1994) found that the parts of an article that are used to determine pertinence or that are ultimately read vary with the subject discipline of the reader. Chemists most often look first at the abstracts and the figures (including captions); sociologists at the abstract, introduction, conclusion, and figures; humanists scan the entire article or look at the first few paragraphs and footnotes.

When an article is deemed useful, chemists typically do not read the entire article and often read interesting parts out of sequential order. Humanists are the most likely to read the entire article in sequence, probably because articles in their fields do not have the regular structure that articles in chemistry or social sciences usually do.

Olsen's findings suggest that the concerns of authors that electronic publishing will lead to sections of their works being read out of context is something that is happening already in a print environment. Chemists and many social scientists do not read all of a print article but extract the information they need from the sections they deem useful.

However, these same scholars indicated to Olsen that skimming print does not result in context being lost. Instead, they skim to get a feeling of the whole and place the parts they are interested in into the context of the whole. They expressed concern that scrolling on a computer screen does not retain the same level of context, neither does it facilitate the browsing that is so important to them. In this instance, the concerns of academic readers mesh with those of the authors.

Olsen (1993) also suggests that scholars will embrace electronic versions but only if they serve their real fundamental needs. She concludes:

while scholars may express their purposes as "finding the comprehensive background knowledge on a topic," or "browsing to keep up to date" or "finding articles in my research areas," their

actual purposes in interacting with the literature are learning, creative thinking, and analytical thinking. This is a crucial distinction because functions such as selecting articles or browsing the latest literature appear to be tasks which a computer can be programmed to perform well, but in practice the computer performs them quickly, but not well. (p. 71)

Assuming technological barriers (hardware and access to networks) are overcome, electronic publishing serves many interests of readers. Clearly good software design that facilitates searching, scanning, and browsing are crucial elements in electronic publications from the reader's point of view.

Low costs and pricing mechanisms that facilitate this natural behavior are also important factors. Griffiths and King (1993) found that the number of personal journal subscriptions held by scientists has declined as prices have gone up, and the price of the journal is the most important reason for not holding a personal subscription. Surely this applies to electronic journals as well.

CLOSER RELATIONSHIPS TO AUTHORS

As discussed earlier under authors, the advantage of closer relationships between authors and readers is seen as a major advantage for readers. At the simplest level, a reader's natural impulse to interact with an author can be easily met. Comments to and from the author could be stored and viewed by others if they desired (Seiler & Raben, 1981).

At its fullest extension, a new form of cooperative collaborative writing would "entwine ideas and response to them (more ideas) in a totally new vision of the cumulative scholar's journal" (Okerson, 1992, p. 94). Harnad (1990) calls this "scholarly skywriting"; Lederberg (1993) calls it "a dialectic"; Judson (1994) sees it as a revolution that moves scholarly work from a hierarchical model to an egalitarian one.

But readers' goals of learning and keeping up in their field are not always best met by collaboration and interaction. As articulated by Price (1975) and demonstrated in the Griffiths et al. study (1991), not all readers want to write or even to be known to the authors they read. Anonymous reading of the experts' polished work is still a valuable goal of many readers. They often want to annotate, underline, and make notes about an article but not for public consumption (Olsen, 1994). Traditional publishing models place a buffer between readers and authors.

PEER REVIEW/REFEREEING

Peer review serves the needs of readers by assisting as a quality filter. If it works correctly, peer review keeps the number of papers

published down to those with merit (although there are many complaints that too much is published and that the filtering function should be tighter).

Readers, especially those who are not also experienced researchers and authors, need to have confidence that what they read is accurate and authoritative. Amiran, Unsworth, and Chaski (1992) quote a proposal to establish *The Chicago Journal of Theoretical Computer Science* by Mike J. O'Donnell and Abraham Bookstein on the needs of readers of scholarly publications. Readers need to have:

a high confidence that they are all reading precisely the same article created by the author and accepted by the editor, and that this acceptance is an accurate certificate of the value of the article. The basic protocol of publication in a scholarly journal—the author freely chooses to submit an article, the editor takes the advice of several independent and anonymous referees, insists on revisions if appropriate, then accepts or rejects the article—is independent of the medium. There is no reason to change that highly successful protocol in converting from print to electronic network publication. (p. 54)

As discussed earlier, rigorous peer review is facilitated by electronic communication. More reviewers can evaluate a manuscript in less time. Reviewers' comments can be attached to electronic preprints of a manuscript before a more final version is completed. There is no reason why peer review has to be less rigorous, and, indeed it could be more rigorous. Harnad, editor of *Behavioral and Brain Sciences* and the electronic *Psycoloquy*, is an articulate proponent of rigorous peer reviewing in print and electronic journals.

In 1978, Roistacher proposed a unique way for electronic journals to serve both goals of readers—the goal to see more published and the goal to have a quality filter. He proposed imposing no limits on the amount of material published, but attaching numerical scores assigned by referees to each article. Readers could set a threshold score when they wanted to read only the best articles. Subsequent readers could attach their own scores to articles, extending the refereeing process forward in time and to a larger audience.

Rogers and Hurt (1990) provide detailed suggestions on how an electronic "Scholarly Communication System" could meet a variety of authors' and readers' goals for quantity and quality of publications. Scholars would submit papers electronically where they would be filed by subject category and would be available for readers' comments. After six months on the system, each article would be flagged for review, and authors would be notified. Authors could use the comments from readers to prepare a final draft of their article.

If an author submits a final revised copy, it would be sent for formal review, otherwise the article would be purged from the system. Review boards would place each article in one of seven categories, including:

1. original contribution to literature in a field;
2. logical extension of research in a field;
3. application of a theoretical perspective or method developed in one content area to another content area;
4. restatement or interpretation of existing research;
5. review of the status of research on a particular topic;
6. seriously flawed in research design, experimental technique, or conclusion; and
7. no scholarly contribution (p. 6).

OTHER FACTORS

Readers will need to be convinced that electronic publishing is superior to traditional print publishing if they are to happily make the switch (Jul, 1992). There are many indications that this is already happening in many subject disciplines and is picking up speed.

The almost complete replacement of print journals in the research areas of physics and mathematics has been well reported (Stix, 1994). Many examples of successful refereed electronic journals now exist including *Postmodern Culture*, *Psycoloquy*, and the *Electronic Journal of Combinatorics*. Others are described in other articles in this issue. The 1994 edition of the *Directory of Electronic Journals, Newsletters and Academic Discussion Lists* includes 440 electronic journals and newsletters, nearly 100 of which are peer reviewed.

As technology improves, convincing readers to make the switch becomes easier to do. In addition to the speed and convenience of delivery now present, multimedia electronic journals are beginning to provide types of information not available in print. Stix (1994) describes for the extensive audience of *Scientific American* the future look of electronic journals.

Additional factors that are important advantages to readers of electronic publishing include:

- opportunity to experiment with electronic media (Amiran et al., 1991);
- timeliness of publication (Anderson, 1993; Stix, 1994);
- location independence (Anderson, 1993);
- instant updates and revisions (Rawlins, 1993);
- better searchability (Olsen, 1994);
- ability to create own personal electronic file of articles (Olsen, 1994);
- space savings (Olsen, 1994); and

- not reliant on library collection (Stix, 1994).

CONCLUSION

Clearly some of the goals of authors and readers are in harmony. Most authors and readers, for example, want a process that allows articles to be disseminated in a timely manner. It is in both of their interests to keep the costs of creating and distributing journal articles low and to provide a system of publishing that allows widespread dissemination.

Although the primary motivation may vary, the ultimate goals of both groups are served by some sort of peer review/refereeing process that serves as a quality filter and is acknowledged as such by academic institutions and decision makers.

Many authors and readers benefit from increased feedback and connection, although this benefit is less clear for some groups. Non-academic researchers are often readers but rarely become authors. They may have neither the job incentives nor the desire to do so. Electronic communication may allow them to connect with authors or other readers on a less formal basis, however.

Other goals may never coincide. Authors value their historical place in a discipline over time, the academic and professional stature that comes with formal publishing, and the protection of their individual ideas.

Readers value the ability to access relevant information in a timely manner and use it in the ways they need to. They may want to comment on electronic texts or author's ideas even in areas where they are on the periphery. They may want to download, alter, or keep personal files of electronic journal articles and do so at a low cost.

Still, uniting all of the goals of authors and readers may not be necessary for electronic publishing to ultimately replace print *if* a variety of electronic communication and publication models coexist. The goals of communication can be met with informal e-mail, more formal listservs and bulletin boards, and still more restrictive invisible colleges. The goals of collaboration and interactive publication can be met with all of the above, plus an electronic preprint function that distributes drafts for peer review and comment. Finally, the goals of recognizing quality work and ensuring importance over time can be met with rigorous formal refereed journals.

The traditional links of editors, reviewers, referees, and publishers enable this last model and allow disparate goals to coexist. Publishing has worked in a print mode without complete commonality of goals between readers and writers and it can in the electronic world as long as all important needs are met.

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