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Setting the Priorities: Electronic Scholarly Publishing for Instructional Technology and Teacher Education

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§ *Journal of Computers in Teacher Education* (JCTE).

§ *Journal of Information Technology for Teacher Education* (JITTE).

§ *Journal of Technology and Teacher Education* (JTATE).

These three journals, plus the proceedings of the annual meeting of the Society for Information Technology and Teacher Education, constitute the primary publication outlets for work in the area of technology and teacher education. Many other journals, of course, publish papers on the topic, but these four publications are the only ones dedicated solely to the topic of technology and teacher education.

Contemporary Issues in Technology and Teacher Education (*CITE Journal*) is an online journal that will serve as an electronic counterpart to the *Journal of Technology and Teacher Education*. The *CITE Journal* will complement rather than replace the *Journal of Technology and Teacher Education*. The rationale for an online journal is governed by three factors: demand, format, and participants.

Demand

JTATE, the print counterpart of the *CITE Journal*, was established in 1990. At that time a number of the leaders in the field expressed doubts about the need for a new refereed journal devoted specifically to the field of technology and teacher education. One individual argued strongly that there were only a few papers in the field, and after one or two issues there would be no more papers and thus no more journal.

However, JTATE was founded as the flagship publication of the Society for Information Technology and Teacher Education (SITE). Today, a decade later, the journal and its two sister journals receive substantially more submissions it can possibly publish. Papers of high academic quality are rejected each year because of lack of space in the existing journals.

There is a growing recognition that educating teachers in appropriate uses of technology is crucial. In the United States, for example, federal funding is being provided directly to schools, colleges, and departments of education to facilitate integration of technology in teacher education programs for the first time. The U.S. National Council for Accreditation of Teacher Education (NCATE) established a Task Force on Technology and Teacher Education, recommending policies and standards for integration of technology into teacher preparation programs. Similarly, the American Association of Colleges of Teacher Education (AACTE) established a best practice award recognizing exemplary teacher education programs that provide leadership in this area.

European Commission research programs have included significant teacher training and Information Technology components (known as telematics or multimedia). In England, comprehensive provisions for both information technology and its assessment are administered by the Teacher Training Agency. In the Netherlands the national funding aims to create innovative and exemplary new approaches, such as that described by Westhoek, Egberts, and Aardse (2000). Further discussion of such developments can be read in several editorials of the Journal of Information Technology for Teacher Education (Davis, 1998, 1999).

Several countries in the East, including Japan, Taiwan, and Singapore, have inaugurated significant programs for teacher education and related research in this area. Recognition of the need for incorporation of information technology in teacher education has also arisen in each of the Australian states.

In consequence of the growing recognition of this area, subscriptions to the three existing journals are healthy. There is both a demand for a publication outlet and a readership interested in papers about technology and teacher education. Having established, to our satisfaction at least, that there is sufficient academic demand for additional publication outlets, we would like to turn now to the second reason, format.

Format: An Electronic Journal

The issue of format will require a bit more discussion, grounded in the context of the evolution of academic and scholarly publishing. As scholarly societies were established in the 17th century, they began publishing proceedings and journals (Ornstein, 1928, cited in Parrot, 1995). According to Ornstein, the first was *Gesta Lynceorum,* which the Italian Academia dei Lincei published in 1609. It was the proceedings of the organization's meeting and is the first publication of a scientific society.

A half century later, the evolution toward more organized and formal communication between scholars took another step when the *Journal des Scavans* began publishing in Italy (Parrot, 1995; Guedon, 1994). A second journal, *Philosophical Transactions of the Royal Society of London,* began publishing the same year, 1665. Guedon saw the rise of the journal as more than a mere technological advance. He pointed out that it changed the function of writing. Before journals, scholarly writing served a primary role as a "prop for memory." But after journals became established, writing "evolved into a virtual discussion space." That is, instead of communicating the accepted cannon of "truth," writing became a way of discussing issues.

Scholarly publishing continued to grow and evolve during the 18th and 19th centuries. This was followed by a substantially increased acceleration in rate of growth in the 20th century. The increase in the number of new scholarly publications produced in the 20th century is remarkable by itself; that century also produced transformational changes in the very nature of scholarly publishing.

Notable trends in the 20th century included a shift from *nonprofit* publishers (such as associations, societies, and universities) as the primary publishers of academic journals, books, and monographs, to *for-profit* publishers. Some have argued that the increasing dominance of for-profit publishers in the field of scholarly publishing is the major reason for another recent trend—the spiraling costs of journals. The Scholarly Societies Project (1995) at the University of Waterloo concluded, "In the last couple of decades, the subscription costs of many scholarly journals (especially those published by certain powerful commercial publishers) have escalated at a rate far exceeding the cost-of-living rate of inflation." This study titled, *The Crisis in Scholarly Publishing,* included a number of cost comparisons clearly indicating that, "as a rule, journals published by commercial publishers are more expensive than

those published by scholarly societies." This journal is a response to the trend toward higher and higher subscription rates. It is published by a nonprofit organization, and it is available without charge to anyone who wishes to subscribe.

The trends in scholarly publishing, however, are not all that make this an interesting time. Another is the information revolution—the shift from print-based communication to electronic channels of communication. Some (Odlyzko, 2000) believe electronic journals are likely to overwhelm print journals in the near future. He suggested that traditional scholarly journals will likely be transformed within a decade or two. (Odlyzko, 1994 in a paper titled "Tragic Loss or Good Riddance? The Impending Demise of Traditional Scholarly Journals"). Today's headlines make it clear that this transition is already well along in many sectors of publishing.

"We're doing quite a bit in the e-book and online areas," says Ted Nardin, a vice president at McGraw-Hill. "We are converting a number of our print products to digital form" . . . . He believes the early demand will be for reference books. Readers will want "a travel book when they go to Italy; a computer book when they want to learn a skill; a business book on a plane flight."

This technological shift will inevitably lead to changes in American publishing. In the way that amplification forever altered American music, so digital technology will change publishing. "Paper, printing and binding goes away," Nardin says matter-of-factly. "Physical distribution goes away."

As an example, Nardin points to Harrison's Principles of Internal Medicine, a two-volume, 2,688-page reference text ($149) that has sold well for years. McGraw-Hill has also converted Harrison's into a subscription-based Web site. "We have transformed the book entirely into a continuously updated product," Nardin explains. The site is easily searchable, and also lucrative. A subscription costs $89 a year. (Weeks, 2000a, p. C01)

In many instances, printed and electronic versions may co-exist for some time to come. In other instances, the physical printed version may no longer exist. Within the next five years many types of physical books—travel, science, sports, for example—may disappear altogether.

Erik Engstrom, president of Random House, is one levelheaded publishing executive who entertains this notion. Take his company's popular series, Fodor's travel guides. More and more the travel advice traditionally found in the books will be dispensed on the Internet, he believes. Other types of books with information that changes rapidly will follow.

"You've already seen a dramatic change in the encyclopedia division," Engstrom says. In fact, as online reference works proliferated, Encyclopaedia Britannica reduced the company's famous door-to-door sales force from 2,300 to 0 in seven years. They were booksellers. Since 1996, the electronic versions of the encyclopedia—CD-ROMs, DVD disks and the Web site—have been the company's "main source of revenue," says Tom Panelas of Britannica.com, the made-over encyclopedia company. (Weeks, 2000b, p. C01)

Today there are hundreds of *electronic journals*—scholarly publications that are available on-line via an electronic network. Many such journals have only published a few issues thus far, but they demonstrate the viability of the concept, and they bring many new possibilities to the scholarly publishing table. In addition, a number of electronic journals have been in publication for several years with considerable success.

Extrapolating from the success of journals currently published, it is clear that electronic media will capture a large share of scholarly publication in the next five years and that printed media may not be competitive in journal publication beyond a few more decades. Conversion and startup costs will delay the dominance of electronic media, but the improvement in marginal cost makes it inevitable.

(O'Donnell, 1995, p. 183-184)

O'Donnell made his prediction even though he was not uncritically enthusiastic about electronic journals. Amiran and Unsworth (1991) also said that “electronic publications are likely to proliferate sooner than most now expect." A major reason they cite for the proliferation is economics. "Economic reasons alone will force letters out of their time-honored sanctuary in wood-products and into the electronic ether." Amiran and Unsworth were concerned, however, about the possibility of commercial organizations controlling academic electronic publishing.

They may come to limit redistribution of such publication or insist on copyright restrictions that may serve their financial interests but not the interests of the research community. In effect, this is the case with print publication: much of it is determined by the financial interests and possibilities of commercial presses . . . Bailey (1994) was also concerned about control by for-profit publishers.

Commercial publishers have the skills and the resources to produce high-quality electronic publications . .. However, given the ongoing severe crisis in the cost of library materials, we should be hesitant to let them dominate network-based scholarly electronic publishing to the extent that they do print-oriented scholarly publishing without substantial changes in some of their publishing practices. . . . Current trends in the commercial electronic information area do not bode well for the future.

There are, already, a surprising number of electronic journals. The sixth edition of the Directory of Electronic Scholarly Journals, Newsletters, and Discussion Lists, published by the Association of Research Libraries (1995), listed over a thousand electronic journals, and many more have appeared since that directory was published. There are many reasons for the rapid growth in electronic journals. Aside from new technology that makes electronic journals both possible and relatively easy to disseminate, many of the reasons relate to problems with traditional print journals. Treloar (1995) and Treloar (1996) identified five major problems:

1. There is a significant lag between completion of a paper and publication, sometimes years.

2. Print journals cannot be directly searched, but the size of the available literature in most fields makes the ability to search the literature for relevant "hits" critical. The result is a large and growing industry of abstracting and indexing services.

3. Print journals are limited to what can be reproduced in ink on paper. In many fields this eliminates important types of data and media such as video, sound, simulations, and animation.

4. Hyperlinking is limited in ink-on-paper materials.

5. The cost of producing, distributing, and storing print journals is high [and rising].

Treloar's first and last problems, the time lag in publication and the cost of journals, are the two most frequently cited as a reasons for seriously considering a move from print to electronic journal publishing. These same problems, and several others, were identified as critical issues by the Association for Computing Machinery (ACM) in its proposal to revise its large publishing program to include many more electronic resources (Denning & Rous, 1994). The ACM, with 78,000 members, publishes 17 periodicals and over 17,000 pages of proceedings a year.

After a thorough review of their publishing enterprise, they concluded, "The traditional scientific publishing system is now facing a variety of breakdowns that must be overcome if the system is to survive." One aspect of their plan to deal with the problems is to "move aggressively toward having the entire ACM literature in an on-line digital library." ACM is now well on its way to accomplishing that goal.

It is not yet clear whether the future, particularly the immediate future, will be characterized by the demise of all but a few printed scholarly publications as electronic publications come to dominate the field. All the possible futures are, however, more complex than a simple shift from print delivery to electronic delivery of similar scholarly materials. The future into which we actually evolve will be determined by many factors, some technical, some social, some political, and some organizational.

In this paper, we will examine some of the issues associated with this "bridging period" between a print-dominated scholarly publishing environment and one in which new electronic forms of communication play a major, if not dominant, role. We will outline choices we have made for *CITE Journal* and acknowledge other viable options.

The Current Context

Here we are concerned with only one part of the publishing industry. It is what Harnad (1995a) has called "esoteric scholarly publishing," which is publishing that involves scholarly material for which the author does not expect to be paid. Esoteric material is created to be disseminated to other specialists with similar interests. There is no expectation that the author of the material will be paid for the paper or share in proceeds from the sale of a publication through royalties. While it is usually applied to journals, the term "esoteric scholarly publishing" can probably be extended to scholarly monographs and books for which there is a limited audience, since the primary goal is communication and not profit. A scholarly book that sells 400 copies and costs $35 would generate a royalty of $1,400 if the contract called for a 10% royalty on the retail price. If you assume the author invested 900 hours in writing the book, that works out to $1.75 an hour. Teaching an overload course (or mowing yards) would yield more money for less effort.

We are, therefore, not dealing with popular publications such as *Scientific American* that are aimed at a broader audience. Esoteric scholarly publishing is essentially an effort by an author to communicate with a few others rather than many others. Franks' (1993) article on electronic journals dealt with essentially the same type of publication, but he characterized them as "a publication whose authors and editors are unpaid."

Electronic scholarly publishing presents scholars with several options. Although considerably oversimplified, Table 1 divides the scholarly publishing options into two types: media options and content options.

Table 1. An Options Matrix for Scholarly Publishing in the 90s.

Content of Publication	The Media of Dissemination	
	Traditional Print	Electronic
Traditional Content	printed journal	electronic journal
New Media	content not possible	new media journal

Decisions must involve consideration of both content and media. Content involves decisions about whether you retain traditional content – text and simple graphics, photographic images, etc., or expand the potential content of scholarly publications to include material such as video, audio, complex animations, and sound, as well as virtual worlds and other media that are exotic today but will soon be commonplace. The medium of publication has traditionally been print materials (such as books and journals), but the explosion of electronic formats makes publishing journals on CD-ROM and as World Wide Web sites, electronic lists, or Gopher sites possible.

Tens of thousands of highly respected printed journals play a critical role in the dissemination of scholarship for a particular discipline. Hundreds of electronic journals also include traditional content but deliver it to readers electronically.

Many electronic journals play an influential role in their field, but some members of the scholarly community continue to view electronic journals as being less substantial than print journals. The issue of status is something that must be addressed before electronic journals become a viable means of knowledge dissemination in many fields.

(There has been an interesting recent development in this area, however. In the United Kingdom universities receive funds for research on the basis of their performance on a government-sponsored Research Assessment Exercise that makes comparative evaluations of the quality and quantity of the research and publications at UK universities. A few years ago the United Kingdom government agency that determines research standings decreed that "refereed journal articles published through electronic means will be treated on the same basis as those appearing in printed journals." Because central government policies influence higher education in the UK more than in the US, the full acceptance of electronic journals may develop in the UK before it does in the US.)

A new type of electronic journal, the *new media journal*, is more a concept than a realization today. Most of the work in electronic scholarly publishing involves the creation of electronic versions of traditional content – text, graphics, and photographs. Once the concept of electronic journals becomes established and accepted, we believe new media journals will rapidly emerge as viable publication outlets that may well have significant advantages over other types. New media journals could, for example, accept the following:

§ Video illustrating a new surgical procedure.

§ Three-dimensional graphics of chemical compounds.

§ Audio of research interviews that would normally be printed.

§ Edited video clips that highlight critical points in a process.

§ An animated simulation of systems such as a computer network.

While these are only illustrations of what might be included in a new media journal, they do illustrate the point that many important topics in the scholarly literature can be discussed more effectively through the use of new media. There are a number of electronic journals published today that go well beyond the typical text and black and white illustrations found in most print journals. The *Journal of* Postmodern Culture, for example, accepts papers that include all of the following: still images, sound, animations, and full motion video. The editors require that in-line images must be in .GIF format with appropriate HTML markup to indicate placement of the image. Sound files should be in the .au format (or WAVE files), again with proper html markup. Video can be accepted in Quicktime or MPEG. The author guidelines also ask authors to:

bear in mind that your document still needs to be intelligible without the multi-media elements, since many of our readers will not be able to see these elements. Also, do remember that you must have appropriate permissions in order to use photographs, drawings, sound, or video that was originally produced by someone other than you: the same intellectual property rules apply to the Web as apply in print.

Garelick's (1995) article on diet infomercials, for example, contains a 3.2 megabyte Quicktime movie clip from a Richard Simmons exercise infomercial.

The range of media accepted by the *Journal of Postmodern Culture* and the comments to potential

authors about both technical and broader issues are an indication of the work that must be done before the electronic scholarly journal becomes an essential aspect of work in many disciplines. Many issues must be addressed. Some of them are outlined in the following section, which is followed by a more detailed discussion of some of the critical issues that must be addressed in the "bridging" period between print and electronic scholarly communication.

In spite of the many issues associated with the inclusion of new media materials (such as sound, animation, and video), we have decided to make the *CITE Journal* a new media journal. It will accept a range of media including sound files, video, and color still images.

Issues Related to Electronic Scholarly Publishing

We believe the *CITE Journal* is one of a new type of journal that will gradually replace most print journals over the next 20 years. We are in a "bridging" period. Before the 21st century, paper-based journals were the dominant means of disseminating scholarly material for almost 400 years. We are now in a bridging period between paper-based dissemination and electronic dissemination. During that period, we must deal with a wide range of issues. Those issues fall generally into three broad categories: technical, social and cultural, and economic.

Technical Issues

For some designers of electronic journals, the critical questions are technical. Do we have the electronic tools to do it? Which ones should be used? Can we come to agreement on a standard such as HTML, SGML, or Acrobat PDF? What browsers are most useful? These issues will probably be with us for some time, because the relative merits of different electronic formats change drastically from month to month. HTML, for example, was originally quite limited, while the Acrobat PDF format lets you disseminate documents that look much like a traditional print journal article. Today, with the availability of many types of support or "helper" software, as well as advanced versions of the HTML standard, the choice between HTML and PDF may actually favor HTML. And, of course, the emergence of JAVA as a format and programming option clouds the picture further. We will not deal with the technical issues of publishing an electronic journal in this paper, except to note that virtually any paper on this topic that is more than six months old is out of date. For the present, we have elected to publish the *CITE Journal* in HTML with external support for a range of multimedia content. This is, however, an open decision that is always subject to change and adjustment, because the software and hardware of electronic publishing change rapidly.

Social and Cultural Issues

For others interested in electronic journals, the important questions are really social, and cultural. Are electronic journals within the comfort zone of scholars? Will published papers in an electronic journal be perceived to be of the same value as those in traditional print journals? Will promotion and tenure committees treat electronic journal publications differently than traditional journals? Are current intellectual property rights laws, including copyright, adequate and appropriate for this bridging period? The editors (Hagler, Rutledge, March, & Batchman, 1998) of the *IEEE Transactions on Education*, which is distributed on CD-ROM and on-line, encountered a number of these questions as they launched the electronic version of the journal.

There is still some resistance to electronic publication. One author indicated that e-mail notification of the results of the review process was not acceptable for his tenure and promotion files. The tenure committee at that institution required notification on official letterhead with an original signature. Others have noted that their peers view electronic publication as lesser than traditional formats. One author explained that the rapid review and increased volume of papers published was a sign to his

colleagues that the CD-ROM papers had not received the same careful scrutiny as the others. It may take time for the community to gain enough experience with electronic publication to alleviate those concerns. Participation in the process as authors, reviewers, and/or readers may be the best (and only) way to achieve this.

You may find the article by Haggler et al., as well as Valauskas (1997), useful if you are interested in the influence of social and cultural context on the patterns of scholarly publishing in different disciplines. In consideration of the social and cultural context, we have made several decisions concerning the *CITE Journal*. First, it is supported by a coalition of respected scholarly and professional organizations. That should give it some status from the beginning. In addition, it is a refereed journal with a strong group of editors and reviewers. Again, that should give it some status.

We have also elected to provide authors and readers the option of printing a copy of an article in a format that will look the same as a traditional print journal, including page numbers. This is something many electronic journals may do in this bridging period before electronic publication becomes the dominant form of dissemination.

Concerning intellectual property rights, we have some simple rules. Copyrighted material cannot be included in your papers without the permission of the copyright owner unless the use falls under the "fair use" or "educational use" exclusions. Authors, on the other hand, give the journal the right to publish their paper in the journal and in any paper versions of the journal, as well as in publications that are derived from the journal (e.g., "best papers of 2003"). Authors, however, are free to make copies of their papers and use them as they see fit.

Political and Economic Issues

Still others consider the political and economic questions associated with electronic journals the most critical. This group generally observes that for much of this century the percentage of journals published by scholarly societies has decreased, while the percentage produced by commercial publishers has increased. This concentration may have encouraged the unprecedented increases in journal prices that are at the heart of the financial problems many research libraries face today. One possible solution to this problem is to reduce the percentage of journals published by commercial publishers, while increasing the percentage published by societies and universities (Guernsey, 1998).

However, colleges and universities are also dealing with budget problems themselves, and the likelihood of sizable grants for innovative projects is probably less today than in the past. One way to do this economically is to publish journals electronically over the Internet. Franks (1993) noted that, even when the decision to publish electronically is made, political and economic issues may influence decisions about what form the publication will take. He observed that several of the models for electronic publishing "differ primarily in the extent and method of their efforts to *prevent* the contents of an electronic journal from being read by those who have not paid for it."

He concluded that efforts to keep people who have not paid for a subscription from reading articles in an electronic journal can account for a substantial portion of the cost of publishing the journal. "All this is especially ironic since the authors and editors derive no benefit from the attempts to restrict access. On the contrary, the best interests of the authors and editor are served by the widest possible distribution (even to non-subscribers)." Franks recommended alternative forms of support, including subsidization by a scholarly organization, university, or department, that would make the journal available to everyone with access to the Internet.

The *CITE Journal* will be freely available to anyone who has access to the Internet. For the first two years of operation, the journal will be supported by a grant from the U. S. Department of Education and matching contributions from its publisher (AACE) and the professional societies (SITE, AETS,

AMTE, CEE, and CUFA) that jointly conceived it.

The Complexities of Today's Scholarly Publishing Environment

All three aspects of electronic scholarly publishing—the technical questions, the social and cultural issues, and the political and economic context—are important and relevant. They also interact with each other. Guedon (1994) argued that any technological innovation will interact with complex social constructs and, as a result, the smallest eddy or draft, however minuscule, can deeply perturb the flow of history—the phenomenon is called the butterfly effect in the fashionable circles of chaos theory. In any case, knowing what the ultimate logical goal is rarely says much about the best path to reach it.

The literature on all three topics is rich with papers, books, and monographs, and we will not attempt to summarize the debates and positions in that literature. There are many possible futures for electronic scholarly publishing—from interesting oddity to dominant model, and the near-term future is probably the most difficult to predict. It seems clear, however, that the far-future of scholarly publishing (the "far-future" being about 15 years in this case) will probably be dominated by electronic dissemination systems. If that is true, then the next 15 years or so are the bridging years between the old and the new, and they are likely to be tumultuous years for all the stakeholders.

One way to look at this bridging, or transition, period is to consider who will be responsible for each aspect of the process of scholarly publishing. The old or standard model generally follows the pattern illustrated in Table 2. The process is roughly divided into seven steps—from conducting the research and generating the paper to archiving the printed journal or monograph. The term "archiving" is used here to mean safely storing the scholarly material and providing for convenient access, as well as creating ways for scholars to find relevant material.

Table 2. The Traditional Model of Scholarly Publishing

Function	*Conducted By*	*Paid For By*	*Value Added*
Conduct Research	Faculty	University or Grant	New Knowledge
Generate Report	Faculty	Faculty	Dissemination
Gate Keeping	Faculty	Faculty	Quality
Publishing	Publisher	Subscriber	Structure
Marketing	Publisher	Subscriber	Awareness
Distribution	Publisher	Subscriber	Convenience
Archive	Libraries	Institution	Accessibility

Note: Research is generally supported by grants from a variety of sources, by faculty, and by the university, organization, or institution where the researcher works.

In the standard model, the work is relatively evenly divided—three functions are generally performed by faculty and three by the publisher. One, archiving, is usually the province of the library. Faculty not only create the new knowledge contained in scholarly publications, they also perform the critical role of gatekeepers. Scholars and libraries subscribe to journals, in part, because they know the articles published in them have been evaluated by others and judged to be worth reading. In an era when it is easy to disseminate information, the gatekeeping role becomes more and more critical.

Some of the problems of the current system arise, however, because the major stakeholders—faculty and universities (including the library) on one side and commercial publishers on the other—participate in the process for different reasons and have unequal power. The research is created

and written up by faculty with the support of universities. They are generally concerned with the free dissemination of knowledge and would prefer the most open, lowest-cost (to them and the reader) approach possible. Commercial publishers, on the other hand, are in the business to make a profit. They want to be paid for disseminating scholarly material. The two major groups of stakeholders thus come to scholarly publishing with somewhat different purposes and motivations. Today the wishes of the commercial publisher often prevail because of the unequal balance of power. The "paid for by" column of Table 2 illustrates one of the problems—faculty and universities directly and indirectly support the first three steps in scholarly publishing and then they pay again via subscription fees for access to the information they paid to create in the first place.

When faculty members submit a paper to a journal, they generally sign over virtually all publication rights to a publisher, who makes the decisions about the subscription rates. In return for that, the publisher handles virtually all the tasks involved in publishing, marketing, and distributing the material. Several writers have argued that this approach has outlived its usefulness and must be changed.

The seven steps in Table 2 are similar to the five roles described by O'Donnell (1995). There are, however, alternative models of scholarly publishing. One of many possible "new models" is illustrated in Table 3. This model would be based on the World Wide Web (and whatever advanced technology replaces it).

Table 3. An Alternative Model of Publishing Via the World Wide Web

Function	*Conducted By*	*Paid For By*	*Value Added*
Conduct Research	Faculty	University or Grant	New Knowledge
Generate Report	Faculty	Faculty	Dissemination
Gate Keeping	Faculty	Faculty	Quality
Publishing	Non-profit	Indeterminate	Structure
Marketing	Non-profit	Indeterminate	Awareness
Distribution	Web	Internet	Accessibility
Archive	Digital Library	Institution	Accessibility

Note: Research is generally supported by grants from a variety of sources, by faculty, and by the university, organization, or institution where the researcher works.

In this new model, the first three aspects of scholarly publishing remain the same. All three would be completed by faculty just as they are in the traditional model. Another aspect—distribution—would be accomplished over the Internet via a World Wide Web site. While the cost of distributing traditional print journals can be substantial, the equipment costs for creating a Web site on a computer connected to an existing university network is surprisingly small, as little as $1,000 but typically $5,000 to $50,000. A well-equipped medium-size workstation supported by the staff of a university library could house many different journals. And at many universities, Web sites can be created on central site computers that are maintained by the academic computing staff. Some universities could thus support electronic journals without any additional hardware or software. Realistically, however, there are both hardware and personnel costs associated with maintaining a Web site where an electronic journal resides. It would not be difficult today to slip a journal onto an existing site, but if a university found itself providing space for 10 or 20 or even a hundred such sites, the costs would be more obvious.

The same is true of the last step in scholarly publishing—archiving. Storing one electronic journal on a site in a library is easy; storing 10,000 so that they are available 75 years from now is neither easy nor inexpensive. We believe libraries will continue to take the lead in archiving, just as they have done for centuries with paper publications.

One of the possibilities, an electronic journal Web site supported by university library staff, brings us

to the two aspects of scholarly publishing that might change the most under this new model – publishing and marketing. In Table 3 both of these functions are listed as performed by a "non-profit" institution, but that term is little more than a placeholder. In reality, the non-profit organization could be a professional society, a commercial publisher, a university press, or another entity that provides the editing and design infrastructure needed to support an ongoing scholarly publishing activity. Franks (1993) considered this issue when he asked, "Who might underwrite the costs of electronically publishing a journal if there are no subscription revenues?"

He answered,

> There are a number of possibilities. A professional society might sponsor such a journal and pay for it out of members' dues. Costs might be covered, at least in part by government grants. A journal might be sponsored by a university, or even a single academic department as in the case of the Ulam Quarterly. An important factor is that with effectively free distribution via the internet, and the fact that authors and editors are not paid, the cost of producing an electronic journal can be quite modest.

We would agree that the costs can be modest, but not "free."

Just who will become the "non-profit" institutions of the future is probably the unanswered question today. Will commercial print publishers become the Web publishers? And will they continue to charge sizable subscription fees for access? Thus far the answer for many commercial journal publishers is “yes” and “yes.” Will university libraries take on the role of midwives to the creation and nurturing of electronic journals? Will university presses, which generally are not as profit-driven as the commercial publishers, become Web publishers? It is even possible for an individual faculty member, or a small group of faculty who share common interests, to become the “non-profit” entity that publishes an electronic journal.

The model illustrated in Table 3 leaves open the question of who pays for the publishing and marketing costs (and profits in the case of a commercial publisher). Electronic journals available over the World Wide Web are supported via traditional subscriptions in some instances. That is the case with several journals published by Johns Hopkins University Press, including *Modernism/Modernity*, *Modern Fiction Studies*, the *American Journal of Mathematics*, and *Reviews of American History*. A one-year library subscription to *Modern Fiction Studies*, for example, is $55 for the print version, $49.50 for the electronic version, and $71.50 for both. This approach, termed *uncoupling*, lets subscribers buy either the print or electronic version of a journal, or both. It is appealing, but this pricing model is not the one the major commercial publishers have adopted. Elsevier Science, which publishes 1,200 journals, requires a library to subscribe to the print version of a journal before it will sell, for an additional charge, the electronic version (Guernsey, 1998).

Another option is to make the journal freely available, with the cost of publishing and marketing borne by a scholarly society, organization, or university publisher. An example is the *Journal of Computer-Mediated Communication*, which is a joint project of the Annenberg School of Communication at the University of Southern California and the Information Systems Division of the School of Business Administration at Hebrew University in Jerusalem. The journal is available via the Web from sites at USC in Los Angeles and Hebrew University in Israel. The journal site contains archives of the journal issues, as well as other resources and links of interest to scholars interested in computer-mediated communication.

Table 4 illustrates the decisions we have made for *CITE Journal*.

Table 4. Publishing Model Adopted for the CITE Journal

Function	*Conducted By*	*Paid For By*	*Value Added*

Conduct Research	Faculty	University or Grant	New Knowledge
Generate Report	Faculty	Faculty	Dissemination
Gate Keeping	Editorial Board	University	Quality
Publishing	AACE	Indeterminate	Structure
Marketing	Societies	Indeterminate	Awareness
Distrtibution	Web	Internet	Accessibility
Archive	Digital Library	Institution	Accessibility

Five teacher educator professional associations have selected editors for their respective section of the journal, which currently address the core content areas—science education, mathematics education, English education, and social studies education—and educational technology. Each editorial board will select reviewers who will evaluate papers submitted to their section of the journal.

The Association for the Advancement of Computing in Education (AACE), will publish the journal. This function includes all of the roles traditionally assumed by publishers, including distribution of manuscripts (electronically, of course) to reviewers, copy editing, and publication via the World Wide Web. During the start-up phase, a grant from the US Department of Education is supporting software development within the Department of Computer Science at the University of Virginia. Marketing is a joint function of the publisher and the professional associations participating in development and creation of the journal. The journal will be archived by the Digital Library system at the University of Virginia.

Decisions to Be Made in the Transition Period

The decision to publish a journal electronically is not the end of the decision-making process. It is the beginning. Many of the most critical and most contentious decisions involve issues related to electronic publication. A few of the more critical decisions about which there is considerable debate will be explored in this section of the paper. The topics selected seem to us to be the most important for the transition period between print-dominated and electronic eras in scholarly publishing.

Refereed or Non-refereed?

We agree with O'Donnell (1995) about a value added by scholarly publication: "The article is certified as a significant contribution to a particular scholarly discipline, saving individual readers the work of filtering out insignificant texts" (p. 184). A number of electronic newsletters and "journals" now published via the Internet are not refereed or are refereed lightly. The quality varies considerably, as does relevance. There are, in fact, growing complaints about newsgroups and lists on scholarly and professional topics that are unmoderated or lightly moderated, because readers must wade through many irrelevant messages to find important information.

The process of evaluating the significance and importance of a scholarly paper may well be the single most important element in scholarly publishing, because it frees the reader from the burden of looking for needles in haystacks, and it provides feedback to scholars on how they can improve their work (or informs them that they need to find another scholarly community that values the work they are doing). In addition, the published paper is almost always a better paper than the original version submitted for publication. Valauskas (1997) took a similar position in his evaluation of the place of electronic journals, "I would argue that electronic scholarly journals are, like their print relatives, decidedly not about communication per se, but about validation and acceptance, so that a given idea expressed in a paper is legitimized by its publication." The gatekeeping role of editors and reviewers is a vital one. The decision is not, however, a simple *refereed* or *not refereed* choice. In his discussion of the

European Research Papers Archive, Nentwich (1999) suggested there are several levels of “quality control.” These levels range from no quality control effort to stringent quality control involving full reviews.

The *CITE Journal* is a refereed publication; the editorial board has agreed to adopt a stringent approach to quality control that sets the bar at least as high as the corresponding print journals published by the sponsoring teacher educator associations. The professional associations sponsoring each section of the journal have assumed responsibility for appointment of editors for their respective areas of the journal. These editorial boards, in turn, will appoint reviewers. The section editors will compile the comments and recommendations made by reviewers, make a decision, and communicate that decision to the authors. This process is similar to the traditional method for print journals, with two exceptions.

First, rather than being transmitted to a reviewer by surface mail, articles will be placed on a Web site, and the reviewer will be given the address of the paper. When the reviewer is ready to read the paper, he or she will simply go to that web address and read the paper there or download and print the paper locally. Second, the entire process is electronic. Each step, from submission to reviewer to notification is via the Internet. Elimination of mechanical delays could speed up the process considerably (Harnad, 1997), but the delays imposed by tardiness in the responses of reviewers will remain as great a challenge as it is for a printed publication.

Electronic Only or Electronic and Print?

A growing number of electronic journals are published only in electronic format. One of the best known examples of this is PSYCOLOQUY. Many journals, however, are published in both print and electronic form. This approach is taken by The On Line Educator. Subscriptions to the print and electronic versions are priced separately – $25 for the print version and $20 for the electronic version. The journal CATALYST, published by the National Council on Community Services and Continuing Education, is another publication that offers both print and electronic versions. A print subscription costs $40 per year for libraries and is one of the services offered to members (annual dues are $35) of the organization. However, the electronic version is available to anyone via a Web site.

The print/electronic options need not, however, be limited to print, electronic, or both. The bimonthly Web Journal of Current Legal Issues published by the University of Newcastle is only available electronically, but the publisher, Blackstone Press, produces a printed *Annual* of selected material.

On the question of whether a publication should be electronic, print, or both, there are traditionalists who maintain that *real* scholarly journals are ink on paper. There are also early adopters who believe the sooner the demise of the print journal arrives the better. In this transition period, social, organizational, economic, and political realities will probably dictate that some journals will remain print only, some (particularly new ones) will be electronic only, and some will be published in both formats. However, since even the current advocates of electronic journals passed through their critical periods of scholarly development in a papyrocentric world, many still have an emotional attachment to printed material that is akin to imprinting. Technology does not address that emotional attachment. As Roy Johnson (1995) put it, "The more books one reads on electronic publication, hypertext, and digital technology, the more one realizes how convenient, comfortable, portable, and aesthetically pleasing the printed book remains—produced by what Nicholas Negroponte describes as ‘squeezing ink onto dead trees.’"

The rationale for the printed page is more than tradition, however. There are valid ergonomic reasons to prefer printed documents in some circumstances:

1. The resolution of the printed page is generally higher than that of the computer screen. Glossy printed magazines sometimes achieve resolutions of 2000 dots per inch. The resolution of computer displays is considerably less.

2. Flicker is another problem. A cathode ray tube (CRT) employs a magnetically-controlled beam of electronics to repaint the screen phosphor at rates generally in the vicinity of 50 to 75 times per second. This continual flicker, while subliminal, can generate visual fatigue. This, of course, is not an issue with the printed page.

3. The average monitor cannot display an entire page of text except at reduced size. This affects the way in which the page is scanned. One ergonomic expert suggested the exercise of sliding a template across the New York Times to get a sense of the way in which reduced page size affects scanning efficiency.

As result of these and other ergonomic factors, a number of studies have concluded that reading comprehension can be higher for the printed page than for the same materials displayed on an electronic screen. Information technology specialists who are unfamiliar with this body of research sometimes dismiss the desire for printed output as irrational, but in fact some of the reasons for the printed page are grounded in both physics and human physiology, even if users are not always able to articulate the reasons they sometimes prefer the printed counterpart of electronic documents.

The *CITE Journal* will be electronic, with the online version of each article being considered the complete original. An alternate version of each article will be made available for downloading and printing but may be incomplete in that it cannot include audio or video files and may omit some URL links. Print versions of each article will carry a notation to this effect, along with a reference to the online version of the article.

It is also likely that selected readings will be disseminated in the form of printed monographs in cases in which the audience, needs, and economic support permits. This latter option is the one employed by the *Web Journal of Current Legal Studies*.

Level and Type of Copyright

Commercial publishers tend to copyright their electronic journals in the publisher's name and place significant restrictions on the way papers from the journals can be used. A coalition of academic libraries recently drafted a statement that criticized both the high cost of electronic journals from commercial publishers and the restrictive rules about copying material from them. Some commercial publishers, for example, insist on rules that are far more restrictive than the fair use guidelines that apply to print journals (Guernsey, 1998). The Web site of the International Coalition of Library Consortia includes a detailed statement of principles about both pricing patterns and access issues that few, if any, commercial publishers have agreed to follow.

Electronic journals published by faculty groups, universities, libraries, and scholarly societies tend to leave the copyright for individual papers in the hands of the author and to give readers wide latitude in how they can use papers from the journal. The Web Journal of Current Legal Issues takes the “author copyright/loose restrictions” approach. Authors retain the copyright and readers can reproduce and distribute the papers without obtaining prior consent if (a) there is no charge for distribution, and (b) the author's name and the publication data are included. Authors who publish in the Journal of Statistics Education, which is also available at no cost, retain their copyrights as well. The journal does not allow papers to be republished in another publication without permission, but it does allow the journal to be archived (e.g., on the computers of a library or university) at no cost.

There are examples at virtually every point between the extreme of typical commercial copyright and the open approach of the *Web Journal of Current Legal Issues*. Johns Hopkins Press has a particularly enlightened approach to the use allowable when a library purchases an electronic subscription to one of its journals. A $54.90 annual subscription to the electronic version of the Journal of Democracy, for example, allows a university library to make the electronic version of the journal available throughout the campus network. Any number of additional copies may be made for use on that campus without additional charges or permission requests, and Johns Hopkins Press gives that right in perpetuity. Should a university stop subscribing to a journal, it still has the right to distribute the issues they subscribed to on the campus network. Some commercial journal publishers have adopted the opposite policy. If a subscription is not renewed, the university looses all rights to distribute the issues they have already paid for.

The publisher for the *CITE Journal*, AACE, will own the copyright for the papers published in the journal, but it will adopt a loose restrictions policy. Authors will be able to republish and use their articles freely, and readers have permission to create printed copies of the papers for student use (but not to sell for more than the cost of copying). And since subscriptions are free, there will be no issue of whether libraries have access to the journal after their subscription expires.

What Will Be Distributed?

Several publishers who want to maintain a presence on the Web have created Web sites that are essentially extensions of their traditional marketing efforts. Several electronic journal sites from commercial publishers list the names of articles and, sometimes, the abstracts, but full papers are not available. The goal of such Web sites is to sell wares, and they will not be considered here.

However, suppose the intent is to deliver the journal electronically. What should a subscriber receive? Some electronic journals transmit the entire issue of a publication to subscribers. Others transmit individual papers as they are accepted, and eliminate the idea of an "issue" entirely. (There is no economic reason to publish issues of electronic journals, as there is with printed journals that must be posted to subscribers.) Still other journals send only announcements, such as titles or titles and abstracts. ACM's electronic publishing plan calls for distribution of "notices of availability" rather than journals or documents (Denning and Rous, 1994). Readers can then download copies of full papers that interest them from the ACM database. Postmodern Culture also uses this approach. This journal uses mailing list software to disseminate to subscribers the table of contents (with abstracts) for each issue. Full copies of individual articles can then be downloaded, again using mailing list software or a Web site.

It seems likely that in the future electronic journals will provide subscribers an option. If the journal is one that is central to scholars' work, they may want to receive the full version of every issue or paper. This is sometimes referred to as the "just in case" or "subscription" model (Naylor, 1994). An individual or a library subscribes to a journal and has a copy of all the papers in that journal just in case someone wants to read them.

If a journal is less critical but occasionally contains relevant papers, a subscriber may prefer an "announcement" or "just in time" approach that transmits only the titles or titles and abstracts of articles. And, for the vast majority of journals, an individual scholar will probably rely on one or more search engines to locate relevant material. A number of journals, including the Electronic Journal of Analytic Philosophy, give readers options. Subscribers to this free publication receive the full text of issues or only abstracts. Also, the journal is available in several versions—ASCII text, HTML, or Postscript.

The decision about what to deliver also has implications for libraries. As McKnight, Meadows,

Pullinger, and Rowland (1994) noted, "Recent years have seen a shifting in library attitudes away from an emphasis on the library collection (‘just in case’) towards the timely provision of access to information (‘just in time’)." Just-in-case approaches call for the library to have in its electronic databases copies of the full journal, while just- in-time approaches emphasize search engines that help scholars find relevant material, along with access connections that make it relatively easy to obtain relevant papers. Harnad (1994)called the current system of interlibrary loan for scholarly print materials *just too late* because of the time required to obtain anything. He believed, however, that electronic publication would be ideal for just-in-time approaches.

The editors of the *CITE Journal* have not yet made a complete decision about "what to distribute." The journal will be available on a freely accessible Web site, but we may also establish a subscription system that sends subscribers announcements of either all the papers published in the journal, or all the papers published in a particular section of the journal (e.g., papers published in the section on mathematics education).

The Author's Role in Preparing Materials

In traditional scholarly publishing, the role of the author in formatting and preparing the document has been defined somewhat by the capabilities of a 1930s-era typewriter. The *Publication Manual* of the American Psychological Association, for example, still demands that material to be set in italics by the typesetter be underlined in the paper submitted to the editor – the only reason for this being that a 1930 Smith-Corona typewriter could underline but could not print in italics. Material to be printed in bold, by contrast, is submitted as bold in the manuscript, because a 1930 manual typewriter could produce bold type (by backspacing and typing the letters again).

Some electronic journals require submissions that follow the APA manual to the letter but add an additional stipulation that the submission be provided in both paper and word processor file formats to facilitate editing and electronic publication. The *CITE Journal* will accept submissions in standard word processor formats (e.g., Microsoft Word) as well as HTML. We will expect authors to submit papers in APA format, with some modifications to take into consideration that the paper will be published electronically. The University of Virginia Digital Library, which will serve as archivist, is currently developing standards for sound, graphic, and video components of electronic documents.

The Authoring/Reading Software

A topical issue that will not be explored in detail here is the question of what software will be used to create the electronic journal and how it will be "read." Virtually all of the early computer software for creating documents was for material that would be printed. Text editors, word processors and desktop publishing programs are all tools for creating "ink on paper" documents. When used in scholarly publishing, they represent significant advances when compared to the traditional tools they replaced, such as the typewriter and the typesetting machine. They were, however, well within the ink-on-paper paradigm. More recent developments, such as SGML, HTML, Common Ground's Digital Paper, and Acrobat Portable Document Format (PDF) are all examples of advances that break with the traditional ink-on-paper paradigm and produce documents that are to be read on the screen, or at least accessed electronically and perused to select papers that will be printed locally. There are free "readers" for virtually all these new electronic document creators and each has significant strengths as well as weaknesses. Whether one will or will not emerge as the market leader in scholarly publishing is unclear. Currently most electronic journals are published in one format via one delivery system, such as the World Wide Web or a simple mailing list. A few, such as the Journal of Statistics Education are published in more than one format or via more than one distribution system. The *Journal of Statistics Education* is available via a listserv [listserv@jse.stat.ncsu.edu with the message SUBSCRIBE jse-announce-], via ftp [ftp.jse.stat.ncsu.edu and cd/jse/v1n1/contents], as well as the World Wide

Web.

Different disciplines may require different types of software. Mathematics journals, for example, tend to prefer a version of Tex (e.g., AMC TeX or LaTex) because it handles mathematical formulas well. We have elected to develop the *CITE Journal* as a Web-based journal that can be accessed by readers using the current version of a standard browser, such as Microsoft's Internet Explorer or Netscape's Communicator. The reason for this choice was simple – this is currently the dominant model.

One Version or Many?

The editors of Postmodern Culture grappled with the question of whether an article printed in their electronic journal is "finished" as it might be in a print journal or is it more like a preprint that appears before official publication? "Is the 'finished' work more appropriate in the print medium, while works in progress, collaborative essays, and interviews are more appropriate for an electronic journal? Or, is there room for both in this medium" (Amiran & Unsworth, 1991)?

These editors decided that both finished works and works-in-progress were appropriate for their electronic journal. After some experience with the electronic journal, they also concluded that perhaps the ability to publish responses, feedback, and responses to responses in a matter of days may well change "what it is that constitutes a finished work."

Another approach was taken by the editors of *Living Reviews in Relativity* editors (Wheary, Wild, Schultz, & Weyher, 1998), an electronic journal of reviews in physics. "We consider those updates to be new articles that must go through the peer-referee process again."

The *CITE Journal* will adopt an approach combining the approaches taken by *Postmodern Culture* and *Living Reviews*. The *CITE Journal* will publish "finished" articles. That is, articles, once submitted and published, will not be changed. However, readers can submit comments on the articles, and authors are free to submit comments on the comments. Authors can also submit substantial revisions to their original papers that will be reviewed as new articles. We hope, in fact, to stimulate extended scholarly discussions by making the journal open to this form of conversation and by providing rapid review of both articles and comments. This aspect of the journal will be discussed in more detail in the next section.

Traditional Journals in the Ether or New Forms of Journals?

In an interesting paper on electronic scholarly publishing, Guedon (1994) made the point that two distinct positions have been articulated in the literature about the relationship between traditional and electronic journals: "that electronic publishing is so radically different from print that any reference to print is bound to create difficulties rather than help in understanding the nature of the new electronic medium" and, in contrast, "that electronic publishing is little other than print transferred to the electronic medium."

Guedon argued that both viewpoints are wrong and both are right. However, a substantial percentage of the literature comes down on one side or the other. O'Donnell (1995) expressed the views of many when he concluded, "The basic protocol of publication in a scholarly journal . . . is independent of the medium. There is no reason to change that highly successful protocol in converting from print to electronic network publication" (p. 186). O'Donnell did, however, point out that there are experiments in formats that depart significantly from the traditional. Others, including Harnad (1995b) and Odlyzko (1994), believe the electronic scholarly journal can be something quite different from a traditional print journal. The ability to include additional types of media such as video is obvious, as is the ability to create hyperlinked material as well as traditional linear texts.

Most electronic journals today are examples of what Okerson (1991) called the "conservative view" of what an electronic journal can be, an electronic publication that "mimics the current paper journal format." She pointed out, however, that even the shift in medium, from ink on paper to electronic form, "fundamentally alters the way in which information is used, shared, and eventually created. Changing the medium of journal distribution, even with so modest, cautious, and imitative a vision, carries unpredictable consequences." The consequences may be unpredictable, but a number of people Okerson called "visionaries and electronic seers" are trying hard to create a new form of journal. These visionaries "find mere electronic substitution for paper archiving a timid, puny view of the electronic journal" (Okerson, 1991). Two such visionaries are Odlyzko (1994) and Harnad's (1991a). They believe the best forms of electronic journals will be quite different forms of communication from print journals.

Although the transition may be painful, there is the promise of a substantial increase in the effectiveness of scholarly work. Publication delays will disappear, and reliability of the literature will increase with opportunities to add comments to papers and attach references to later works that cite them (Odlyzko, 1994).

Harnad's (1991a) vision of electronic journals is even more expansive. He sees the arrival of electronic communication as "the fourth revolution in the means of production of knowledge," with the other three revolutions being the development of spoken language, the creation of written language, and the invention of the movable type printing press. Harnad pointed out that a written language gives us the ability to reach many people with our message. He stated, however, that this strength "was purchased at the price of becoming a much less interactive medium of communication than speech." Even when the topic is the same, carrying on a conversation with a group of colleagues at a conference is much more interactive than publishing in a journal. Traditional journals cannot support exchanges between authors and readers that are like serious conversations, because of the delays inherent in print publication. Harnad hoped the fourth revolution would "restore scholarly communication to a tempo much closer to the brain's natural potential while still retaining the rigor, discipline and permanence of the refereed written medium." The electronic journal he edits, PSYCOLOQUY is an example of the new model of publication Harnad (1991b) proposes. "Open peer commentary" is an important element of the journal. Here is how he describes the process of publishing in *PSYCOLOQUY*.

All contributions are refereed by a member of the *PSYCOLOQUY's* Editorial Board (currently 70 members and growing), but the idea is not just to implement a conventional journal in electronic form. *PSYCOLOQUY* is explicitly devoted to scholarly skywriting, the radically new form of communication made possible by the Internet, in which authors post to *PSYCOLOQUY* a brief account of current ideas and findings on which they wish to elicit feedback from fellow-specialists as well as experts form related disciplines the world over.

The refereeing of each original posting and each item of peer feedback on it is to be done very quickly, sometimes within a few hours of receipt, so as to maintain the momentum and interactiveness of this unique medium, just as if each contribution were being written in the sky, for all peers to see and append to. Skywriting promises to restore the speed of scholarly communication to a rate much closer to the speed of thought, while adding to it a global scope and an interactive dimension . . . all conducted through the discipline of the written medium, monitored by peer review, and permanently archived for future reference." Harnad believes scholarly skywriting is especially appropriate for "that prepublication 'pilot' stage of scientific inquiry in which peer communication and feedback are still critically shaping the final intellectual outcome."

Authors submit papers that are refereed, edited and published. Responses to the paper by referees are also published in the same issue of the journal, and additional responses from both author and readers may be subsequently published. Because of the speed of electronic publication, the responses can come

quite quickly are thus locked into a communication pattern that is less interactive.

A position somewhere between the conservative view of electronic journals as print journals on computer screens and the radical view of electronic journals as a new genre of scholarly publication is held by Edward Valauskas (1997), the editor of the electronic journal about the Internet titled First Monday. Valauskas pointed out that thus far "most electronic journals are not all that different in their fundamental editorial processes than print." He noted that the electronic medium offers several advantages – faster processing of submissions, quicker revisions, easy access to digital archives of back issues, a generally shorter submission to publication cycle, and opportunities to experiment with interactions between authors and readers ("although many electronic journals fail to take advantage of these opportunities for debate and discussion"). Valauskas saw considerable additional potential in electronic journals. He said that while the editorial process of electronic journals will be supported by telecommunications, the process will be about the same as for print journals. The content of an electronic journal, however, need not be restricted to what can be done with ink on paper.

The counterpart of *CITE Journal*, JITTE, has been published in an electronic format for several years, but simply makes the equivalent of the print journal available in an online format. The *CITE Journal* goes well beyond the idea of simply creating a print-style journal in electronic form. It will, for example, publish multimedia papers that include sound, video, and graphics elements. More importantly, however, is our adoption of a format similar to that of *PSYCOLOQUY*. Zoltan Nadasdy (1997) highlighted what we consider to be one of the main weaknesses of traditional print journals.

> One major weakness of paper publishing is the lack of discussion. Reviewers rarely see one another's work, and readers never see it. Paper journals could send the manuscript to selected peer reviewers and publish the original paper with the corresponding commentary articles and author's response. This is currently a successful central part of the print journal Behavioral and Brain Sciences. Still, that is only one cycle of dialogue. The reviewers have no chance to reply to the author's responses. Electronic journals can easily handle multiple cycles of discussion.

We propose to do precisely that in the *CITE Journal*. One part of the journal will be devoted to conceptual and theoretical papers that deal with significant issues in the field. When a paper is accepted into that segment of the journal. the reviewers will write comments on the paper. Those comments may be positive, negative, or mixed, but the general purpose is to start a scholarly conversation about the paper. In subsequent issues, the author and readers can submit their comments on the paper as well. These comments will also be refereed, and if accepted, they will be published as short articles. We hope readers will become not only consumers of the journal but contributors as well, either by submitting original papers or commentary on papers authored by other scholars.

How Will Costs Be Covered?

In many ways this question is at the heart of a major debate over whether commercial publishers of scholarly journals have a significant future in the field or whether it is time for scholarly organizations, universities, and libraries to take on the task of producing and disseminating scholarly publications. Many scholars believe the large commercial journal publishers have raised prices on journals to unconscionable levels simply to increase profits that are already healthy. Resh (1998) expressed that view when he quoted a Forbes magazine article (Hayes, 1995) that began with the sentence "It's hard to imagine a sweeter business than publishing academic journals." Resh went on to point out "The magazine reported that Reed Elsevier, a publisher of over 1,100 academic journals, had pre-tax profits of 40% on $225 million in journal sales." Singleton (1993) was even more blunt when he called the current journal situation "at best, an unconscious conspiracy of money-grabbing publishers, foolish and vain academics, and cowardly librarians."

There are many perspectives on this issue. O'Donnell (1995), the editor of the Chicago Journal of Theoretical Computer Science, which is published electronically by MIT Press, argues that while electronic publication will reduce costs somewhat, there will still be expenses that must be covered. His journal charges a reasonable subscription fee and is very flexible about how papers can be used. O'Donnell is concerned, however, that many of the ways costs could be covered (as well as profits for commercial publishers) may reduce or eliminate the potential advantages of electronic journals. He feels the current practice of providing free subscriptions to anyone will help establish this new genre. "In the short run, a number of them are being given free to readers, and subsidized completely by volunteer editorial effort from scholars, donations of computing and storage service from research organizations, and the free use of Internet communications" (p. 196). He believed, however, that "it is unlikely that all these subsidies will continue for many years . . . . It is nearly impossible for a shoestring volunteer organization to make a credible commitment to the longevity of published texts, especially when format conversion is required" (p. 196). O'Donnell recommended serious consideration of several possibilities, including some that would require additional technology and arrangements:

1. Small charges for access to a journal database on the Internet that would be like long distance or 900 number charges.

2. Subscriptions to individuals as well as institutions for a whole category of journals based on volume of use.

3. Funding of commercial journals by scholarly organizations in exchange for access for all members of the organization paying the fee.

4. Funding of journals directly by scholarly organizations with money derived from dues and conference proceeds.

All except the fourth seem unworkable today as a general solution, although the second option is being considered by ACM for its members: "Individuals will cease to purchase journal subscriptions and will instead purchase a right of access to the entire [ACM publication] database" (Denning & Rous, 1994). However, many of the stakeholders in scholarly publishing are quite concerned about the need to provide a dependable and substantial revenue stream to support electronic journals. Day (1995), the director of the University of Michigan Press, described several other pricing schemes for journal publishers. He praised Johns Hopkins University Press for the pricing scheme used for journals in their Project Muse. The subscription rates of print and electronic versions of the journals are based on the publisher's cost of producing the version (base cost plus costs associated with that version). Subscribers who want more than one version are charged the base price once plus the costs for each version. "Base cost" could be interpreted as the "cost of producing the first copy of a journal," and Day praised MIT Press for the pricing of their *Chicago Journal of Theoretical Computer Science*. Institutions are charged $125 as a base cost because the journal is distributed electronically and readers print their own copies locally. For $125, an institution purchases the rights for any person at the institution to access and print copies of papers from the journal.

Over and over again in the literature the question of costs and payments is at the heart of some of the most heated debates. Many people, including several cited already, are not ready to accept that electronic journals can be subscribed to for free with the funding coming from a source other than the subscriber. McKnight et al., (1994), for example, argued that there are significant hidden costs for many "free" electronic journals because they "are heavily subsidized—either by the institution that hosts them or by the individuals who give their time freely at present, or both." They believe "individuals and institutions cannot continue to provide their services indefinitely and it is therefore important that realistic charging models are developed." Most of the suggestions from this camp involve some variation on the traditional subscription model. This argument, made many times in the

literature, says essentially that you cannot build scholarly publishing on the work of a group of volunteers, even though there are apparently successful examples already in operation. When existing free electronic journals created by volunteer editors and reviewers are cited as examples, critics generally argue that (a) volunteers will burn out and the electronic journal will die, (b) the savings derived from switching from print to electronic journals is only about 30% of the total cost, and (c) financial support supplied by a university, scholarly society, or granting agency will not last. Day (1995) called the assumption that universities will cover the costs of producing electronic journals "rather hopeful" and questioned whether there are substantial savings to be made by switching to electronic publication.

This viewpoint is increasingly called into question, however, as more and more "free" electronic journals are launched. Some are subsidized by scholarly societies, some by universities or departments, and some by a faculty group. Free, however, does not mean there is no cost other than the time and effort of volunteers in publishing an electronic journal. There are costs that must be subsidized by someone: and the traditional model has involved readers or their home institution paying for the privilege.

Another option, which has been used in several disciplines for decades, involves asking the author of the paper to pay for the cost of publication. Psychology journals such as *Perceptual and Motor Skills*, *Psychological Reports*, and many others charge a page fee. That is also an option for electronic journals. In a paper titled "Some On-Line Journals Make Ends Meet by Charging Authors Instead of Readers" Lisa Guernsey (1998) described several electronic journals freely available on the Internet that charge authors a fee for publishing their article. One example she cites is Optics Express, which is published by the Optical Society of America. *Optics Express* charges an author a $50 submission fee and another $300 if the paper is accepted for publication. The society expects this fee to cover the cost of producing the journal (including the salary for a part-time employee) plus the costs of hardware and software. The decision to ask authors to pay instead of readers was not made without serious consideration of several options. The Optical Society of America felt that launching a new journal that charged a subscription fee to every library and individual who used it would limit the number of scholars who had access to it, especially in a time when many research libraries face budget cuts that mean fewer rather than more journal subscriptions can be purchased. Thus, the decision to charge authors was an effort to make the journal more widely accessible. That issue is at the heart of a proposal by one of the leaders in electronic journal innovation – Steven Harnad.

Harnad's Subversive Proposal

It is difficult, however, to fully accept some of the deep skepticism about "free" electronic journals when much of the work of scholarly publishing is already done by volunteer authors, volunteer editors, and volunteer reviewers. It is also simply a fact that many successful electronic journals do not charge for the electronic version of the journal. Postmodern Culture, for example, offers free subscriptions to anyone but charges a small fee if subscribers want a diskette or microfiche ($15/year for individuals, $30 for institutions of each issue of the journal mailed to them). It is a refereed journal with two editors and a review board. The editors acknowledge the financial and technical support provided by several units at their institution (North Carolina State University), including the academic computing staff (Amiran & Unsworth, 1991).

Harnad (1995b), one of the most prolific and consistent critics of the current system of scholarly publishing, has carefully rebutted the 30% savings figure frequently put forward by commercial publishers and makes a strong case for a savings of 70% or more when a journal is published electronically instead of in print. Harnad, as the editor of one print journal (*Behavioral & Brain Sciences*, published by Cambridge University Press) and one electronic journal (PSYCOLOQUY,

published by the American Psychological Association), speaks from a base of relevant experience. In a paper published in the London *Times Higher Education Supplement* (1995b), he made his position clear. He distinguished between "trade literature," which is written by authors who expect to be paid for their work and "esoteric" scholarly literature. Harnad's definition of esoteric scholarly literature is precise:

> (1) the authors are not paid for their texts and (2) the "market," in terms of individual readers per article, is infinitesimally small. To this, one might add that esoteric authors not only do not expect or want to be paid for their words, but they are so eager to reach the eyes and minds of their tiny fellow-specialist readership that (3) they are often willing to pay to do so, by purchasing and mailing reprints of their articles to those who request copies (and some who do not); in some fields they also pay page charges to accelerate the publication of their work. (p. 2)

In Harnad's view, authors of esoteric scholarly material were forced into a "Faustian bargain" in the Gutenberg era when the only way to disseminate their work was via traditional print publication. The Faustian bargain authors made was "trading the copyright for their words in exchange for having them published." Harnad believes the bargain is appropriate for trade authors who expect to be paid for their writing. For esoteric authors who will not be paid, the exchange of copyright for publication is unfair, because the goal of the publisher and the goal of the author are in conflict. The author wants to "get the words out there to everyone who might be interested" but agrees "to erect a price-tag as a barrier, to cover the costs (not one's own, but those of the publisher) and a fair return (again not oneself, but to the publisher who had incurred the costs)."

With the arrival of the electronic publication options in the post-Gutenberg era, Harnad said there is no longer a need for authors of scholarly papers to freely turn over their copyright to commercial publishers who will charge subscribers very high prices for the right to read the journal—either in printed or electronic form. The heart of Harnad's subversive proposal is this: All authors of scholarly papers should make preprints of their papers electronically available before they are published in print journals. That would force commercial journal publishers to revise the current system that is expensive, limits access to those who can afford the high cost, and frequently involves publication delays of a year or more. Harnad points to the electronic archive of papers on high energy physics developed by Paul Ginsparg at the Los Alamos National Laboratory as an example of what is possible today.

> Starting in 1991 . . . the remarkable global archive he created has already grown to encompass virtually the entire current literature of high energy physics, general relativity, condensed matter theory, nuclear theory, and astrophysics . . . 25,000 physicists worldwide are accessing the archive 45,000 times a day, with 350 new papers deposited per week.

Harnad's subversive proposal is the focus of a book published by the Association of Research Libraries. Edited by Okerson and O'Donnell (1995), the book *Scholarly Journals at the Crossroads: A Subversive Proposal* was created from an exchange of ideas on a discussion list about electronic scholarly publishing that originates at Virginia Polytechnic Institute (VPIEJ-L). Harnad said, "What scholars . . . need is electronic journals that provide (a) rapid, expert peer-review, (b) rapid copy-editing, proofing and publication of accepted articles, (c) rapid, interactive peer commentary, and (d) a permanent, universally accessible, searchable and retrievable electronic archive."

When the discussion comes to the question of "who pays" for the type of electronic scholarly publishing he proposes, Harnad argued that the Internet is freely accessible and will be supported by the government and by user institutions. Costs for adding an electronic journal to the Internet would be, Harnad argued, relatively small. Those small costs could be paid by the author (personally, via publication costs included in grants, through institutional funds allocated for that purpose, through support provided by research libraries, or through support provided by a scholarly organization). Whether Harnad's solution is actually adopted by the scholarly communities or not is still an open

question. It is, however, an intriguing alternative that seems to offer a possible solution to many of the problems in the current system.

The *CITE Journal* is currently funded through a combination of federal support, contributions by the sponsoring professional associations, and the institutions and universities at which the faculty members of these associations reside. It thus does not immediately face the question of how to fund the publication of the journal. The editors are, however, committed to keeping the journal accessible to readers.

Even when the editors and referees are volunteers, there are still substantial costs associated with preparing accepted articles for publication. The publisher, AACE, does that work and is supported by the grant. We hope that during the two years of grant support we will identify ways of supporting the journal that will allow it to remain freely accessible to anyone who wishes to read it on the Internet. Harnad's solution, charge authors a fee for publication, is one possibility. We might, for example, impose a fee upon acceptance but only collect the fee from authors who work at institutions that pay page charges. Many authors in our potential publication pool do, or have a grant that can pay the charge. This is, however, only one of a number of options.

Summary

The new journal we are launching is different in four major ways:

1. It will be distributed in an electronic rather than an "ink on paper" format.

2. It will accept a range of media, including audio and video.

3. It will employ the rapid turnaround possible with electronic refereeing and publication to encourage scholarly conversations rather than the publication of individual articles that stand or fall alone.

4. It will be freely available to anyone with access to the Internet.

Any evaluation of the promise and potential of this type of electronic scholarly publishing must consider two points. The first is that most efforts in this bridging period are likely to be fraught with technical and infrastructure problems. Early procedures for converting word processing documents to HTML, for example, were complex and frustrating. They involved manually entering HTML tags, something that takes many of us back to the early days of personal computing when WordStar was the dominant word processor. Today more mature programs for creating HTML documents exist, but we are still grappling with how to best incorporate nontext elements such as video. We must address these problems in order to publish an electronic journal today, but it is important to remember that the technical barriers, problems, and difficulties faced by pioneers in this bridging period are not necessarily an indication of the issues scholars will face a decade from now as electronic scholarly publishing matures. We expect that the *CITE Journal* will quickly evolve and change, and that, in the process of maturing, we will make many mistakes, travel down technological roads that turn out to be blind alleys, and find ourselves revising and reforming the basic format of the journal many times.

The second point relates to the human and organizational aspects of electronic scholarly publishing. The problems faced in the transition period are not likely to be the most significant ones scholars face after the transition. As Kuhn (1997) has pointed out in his book, *The Structure of Scientific Revolutions*, a paradigm shift does not generally take over a field completely in one generation. In the transition period, some will enthusiastically adopt the new paradigm not so much because it has proven to be superior to the old paradigm but because they know the weaknesses and failures of the old paradigm. They are hoping for something better. And, by the same token, some will reject the new paradigm because it is new and because they know and understand the old one.

We are in the middle of a paradigm shift in scholarly publication, and some of the resistance and concerns expressed in the literature about electronic journals is more a reflection of the social and psychological aspects of change than a neutral, objective evaluation of the options. Kuhn, in fact, does not feel that the changes occurring during periods of paradigm shift, the tumultuous periods between periods of "normal science," are based on objective, rational analysis. Although the literature will generally be filled with what appear to be rational, even empirical, analyses of the options, the fact of the matter is that most will make their decisions on factors other than "the data." Feyerabend (1980), pointed out that the opposing viewpoints at the heart of many paradigm shifts are "incommensurable" – that is, proponents of different viewpoints cannot agree on what type of data should be considered when evaluating the competing claims of different theories. Or they cannot agree on how the data should be evaluated to arrive at an objective decision. Much of the discussion over the relative costs of publishing print versus electronic journals has that flavor. Opposing sides tend to present different data sets and analyze the data quite differently.

This transition period is thus likely to be one of high emotion and considerable disagreement within the academy. The transition period will probably last for almost a generation. Leslie (1994), for example, noted that "most members of [current] university tenure committees belong to the last generation of scholars not steeped in the computer culture, and have so far declined to acknowledge publication in electronic journals as a credential for promotion" (p. 71). But, as was noted earlier in this paper, a recent decision in the UK calls for electronic publications to be considered on the same basis as print publications.

The *CITE Journal* and other electronic journals will face some resistance—from scholars who believe the quality of a publication is related to the publication medium (e.g., ink on paper), and from those who see commercial publishers as the best keepers of the scholarly journal tradition—but we also believe that electronic journals will come to dominate scholarly communication. We believe, in fact, that electronic journals will evolve into a new form of scholarly communication that encourages and facilitates more free and open communication. Today, reading a scholarly paper is much like reading an article in an encyclopedia. Tomorrow, it may be more like having a conversation with a colleague.

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Resources

The *CITE Journal* is a step into the somewhat uncertain future of electronic scholarly publishing. If you would like more information on this growing phenomenon, the sites described in this section will help you begin your exploration:

NewJour. This electronic publication is an archive that can be searched for information on new electronic journals. You can also subscribe to NewJour by sending the e-mail message "subscribe newjour" to majordomo@ccat.sas.upenn.edu with no subject heading in the mail message. If you would like a single transmission each day that includes all the messages for that day, send the message "subscribe newjour-digest."

Scholarly Journals at the Crossroads: A Subversive Proposal. This book, published by the Association of Research Libraries, is a compilation of e-mail messages between a number of the major players, including Steven Harnad, Ann Okerson, and Andrew Odlyzko, in the debate over the future of both traditional and electronic journals. The book is available in print form from The Association, but the files used to create the book are also available via ftp at this address: ftp.princeton.edu/pub/harnad/Psycholoquy/Subversive.Proposal

Most of the major issues in the print/electronic journal debate are discussed in this material, usually from several viewpoints.

Directory of Electronic Scholarly Journals, Newsletters, and Discussion Lists (5th ed.). The fifth edition of this publication, from the Association of Research Libraries, is one of the most frequently

consulted resources for information on electronic publications. It is available in paper from ARL, but an electronic version can be found at [http://arl.cni.org]. This version is "clickable." Click on an entry and your net browser will jump to the location of that publication.

Scholarly Communication and Technology Conference. Papers from this conference, held in April 1997, are available on line. They cover a range of topics about electronic publishing, but most of the papers deal with the issue of how much it costs to produce and distribute electronic versions of journals versus print versions. Different authors come to very different conclusions – some say it costs more to publish an electronic journal with a small number of subscribers, for example, while others say electronic journals are much less expensive.

Hyperjournal. This is a discussion list devoted to all aspects of electronic journals. The Web site, which is at [http://www.gold.ac.uk/history/hyperjournal.htm] contains much useful information as well as links to many other relevant locations. There is, for example, an electronic version of the ARL's Directory of Scholarly Journals, Newsletters, and Discussion Lists at this site as well as links to many other sites that maintain lists of electronic publications. Hyperjournal is also available on a mirror site in the United States [http://www.sil.org/general/epub.html]

Scholarly Journals Distributed Via the World Wide Web. This Web site at the library of the University of Houston contains links to other resources as well as clickable lists of electronic journals that are (a) on the Web, (b) distributed free of charge, and (c) published in English. The Web address is http://info.lib.uh.edu/webjour.html

e-journal. A link to this publication, a refereed publication on electronic journals, is also available at the Hyperjournal Web site mentioned above. e-journal is an ASCII-text only publication. To subscribe (it is free) send the message

SUB EJRNL yourfirst name your last name

to LISTSERV@ALBANY.EDU.

Public-Access Computer Systems Review. PACS Review is one of the most widely read and highly respected publications on a wide range of topics related to electronic dissemination of information. Scholarly publishing is a major focus of the Review, which was created by Charles Bailey at the University of Houston. To subscribe, send the message

SUBSCRIBE PACS-P yourfirstname your lastname

to listserv@uhupvm1.uh.edu.

If accessing it via a Web browser, the address is gopher://info.lib.uh.edu:70/11/articles/e-journals/uhlibrary/pacsreview.

Scholarly Electronic Publishing Bibliography. Dr. Charles Bailey has also published a number of articles, including one of the best bibliographics on electronic scholarly publishing. It is updated regularly and was in its 16th edition in February 1998. If you click on the title, you will arrive at a menu where you can download the current version of this excellent bibliography in several formats including Microsoft Word and PDF. You can also search the bibliography on-line. This paper and others are also available at http://info.lib.uh.edu/cwb/bailey.htm.

Electronic Journals in the Scholarly Community. This paper by Sean Beckett (1996), a librarian at the University of Alberta, is a good overview of the issues surrounding electronic scholarly publishing. It includes links to many papers, lists, and indexes about e-journals that are linked in the paper. Click on Gotze (1995), for example, and you jump to that paper.

Scholarly Communication Project. This project at Virginia Polytechnic Institute and State University (VPI), was created in 1989 as an effort to encourage and facilitate the publication of electronic scholarly materials as well as support a dialog on the issues related to electronic scholarly publication. The Project has an archive of documents and also publishes or mirrors several e-journals including the *Journal of Technology Education* and the *Journal of Computer-Aided Environmental Design and Education*. The project can be accessed via the World Wide Web at [http://scholar.lib.vt.edu/] and via gopher at [gopher://scholar.lib.vt.edu:70/].

Journal of Electronic Scholarly Publishing. This journal, which is published by the University of Michigan Press, is a combination archive of papers submitted to the journal and link/archive for other papers relevant to the topic. Some papers are on the server at the University of Michigan, and some entries in the journal's archive are actually links to other locations where an article is stored. [http://www.press.umich.edu/jep/]

Interpersonal Computing and Technology. This journal, published by the Association for Educational Communications and Technology and the University of Maryland, Baltimore County as well as Northern Ariona University, contains articles on a wide range of topics related to computer mediated communication. Frank James (1996), for example, published a paper titled "Electronic Publication - Does It Count?" in the January issue of IPCT (Volume 4, Number 1, pp. 34-56 if you use the address at the end of this paragraph to locate the journal). Some of the articles are on issues related to electronic scholarly publishing. You can subscribe to this journal in several ways. Go to the Web site http://www.helsinki.fi/science/optek/ for instructions and options.

Virginia Polytechnic Institute Electronic Journals List. VPIEJ-L is a discussion list on electronic publishing issues with a focus on scholarly publishing. It is part of the Scholarly Communication Project at VPI. A Web site that contains the archives of the list is online at http://scholar.lib.vt.edu/e-journals/vpiej-l.html. To subscribe to the discussion list send the following message to

LISTSERV@VTVM1.BITNET

SUB VPIEJ-L yourfirstname yourlast name

A listing of messages in the list's archives can be retrieved by sending a command

INDEX VPIEJ-L to LISTSERV@VTVM1.CC.VT.EDU

The list can also be read as a Usenet group. http://www.elsevier.nl/info/projects/tulip.htm

TheTulip Project. This program, from a major commercial journal publisher, Elsevier Science, is an experiment in alternative electronic delivery systems for journals. The study involves 17 American universities and around 100 Elsevier journals in the physical and engineering sciences. The Web site for Tulip is http://www.elsevier.nl/info/projects/tulip.html.

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