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The Impact of Electronic Publishing on Academic Libraries

Thomas B Hickey
OCLC Online Computer Library Center
Dublin, Ohio, USA.

Abstract

As a result of the availability of electronic publications, the libraries have the option of not subscribing to their printed versions. The paper discusses the transformation of academic libraries with such technological changes and why it is occurring now. It also discusses the impact of the World Wide Web and the role of publishers in the electronic world. It also discusses the role of the librarian and the library in future.

1. INTRODUCTION

The impact of electronic publishing is just beginning to be felt in academic libraries. All the major abstracting and indexing (A & I) services have been available electronically for decades, and a visit to a typical library's reference area will show few, if any, users of the printed indexes, but many users of online and CD-ROM indexes. With the advent of fixed-cost subscription access to A & I services, libraries have the option of cancelling many paper-based subscriptions altogether. This type of change is about to happen with scholarly journals also, and as a result, libraries will never be the same.

Technical innovation is nothing new to libraries [1]. From the advent of the typewriter and electric light to the photocopier and online catalogue, libraries have adapted to new technologies with relatively minor changes in the institution as a whole. Given this, it is reasonable to ask, since electronic information systems have been around for many years, why should electronic publishing have any greater impact on libraries than other technical changes, and just as important, why now? Won't the sheer inertia of publishers and libraries' investment in paper form make any transition to electronic a gradual one?

Clifford Lynch makes the distinction [2] between modernisation and

transformation. Modernisation is the adoption of new technologies to improve current services. The library does not change in any fundamental way during modernisation; it continues to do what it has been doing, albeit more efficiently. Many current electronic publishing experiments, such as Elsevier's TULIP (The University LIcensing Program) project [3,4] fall into this category. In the TULIP project, documents, previously available through paper subscriptions, are being scanned and supplied in electronic form to a group of libraries, which in turn are developing systems to work with these documents to make them available to their patrons. The desire of both the publisher and the libraries is to see how such electronic versions of the documents can be accommodated within, and what changes need to be made to, current operations. In many ways, the amount of information made available is large (something like 100,000 pages, or 10 gigabytes of data), and simply the technical aspects of providing access to it can be challenging, let alone implementing the related changes in training and procedures. But this is still modernisation. The documents are subscribed to and acquired by the library. The only fundamental change so far is a transition from reliance on copyright to restrict use of the documents to signing a contract specifying the use of the electronic versions.

Transformation is more radical, and that is what is happening to A & I services in libraries. The paper copy is no longer available at the library at all. In many cases, the library is still acquiring the information (e.g., on CD-ROM), but there is no real need to restrict the user's access to this information in the library. Given the proper equipment, users can access the services from anywhere. The advent of fixed-price subscriptions to online services, such as OCLC's FirstSearch service, have, in many cases, made it more economical for libraries to not acquire the material at all, but to rely on a central service. Electronic publishing of primary materials will intensify this transformation.

2. WHAT IS A LIBRARY?

My favourite definition of a library is an institution that selects, acquires, organises, and provides access to recorded knowledge. This is obviously a very broad definition, but both the collecting and organising aspects of librarianship are threatened by electronic publishing.

When it becomes cheaper to offer patrons access to material that is stored electronically than on paper, then electronic access will rapidly become accepted, in spite of any limitations it has. One of the primary characteristics of scholarly publishing is that the use of any particular article is fairly low, low enough that it will probably be cheaper to store the material at central sites rather than at each library. In spite of being in electronic form, the amount of material that a typical library acquires in paper form is still a substantial burden. This will push libraries into using (or creating!) central repositories to handle the electronic versions. Remote access to electronic publications is so easy and fast, that the lack of local storage should not be a problem to the users; hardly noticeable, in fact, if the system is constructed properly.

Reducing, and eventually halting the collection and storage of primary research materials will be the biggest change that academic libraries have ever faced. Much of what we presently think of as a library will have to change, although the physical changes will not be apparent for years. Libraries will still be collecting books, CDs, and many other forms of packaging information for distribution, but probably not the journal literature that they collect today.

3. WHY NOW?

Computers, electronic typesetting, and computer networks have all been around for decades. If there is really a change coming, why now? Are our predictions now any better than those of previous years [5]? A number of things have changed:

- **Personal computers** : Today's PC has the power to handle the software needed for remote connections and display of journal articles.
- **Windowing systems** : Microsoft Windows gives the PC the ability to handle complex documents and telecommunications protocols.
- **Network access** : Use of the Internet is exploding. In academic circles, access is nearly universal in the U.S.
- **Price** : Prices of storage, displays, CPUs, software, and networks are all dropping to the point where student use of sophisticated workstations is the norm.

Decreasing costs are what drives all of this. The combination of all these changes has helped to create the World Wide Web. They have also combined to affect libraries to the point where it is now probably cheaper to provide access to scholarly journals electronically than to acquire, store and manage paper versions.

4. THE WORLD WIDE WEB

The World Wide Web (WWW) [6, 7] is a hypertext system built on top of the Internet. Web browsers, such as NCSA Mosaic, allow users to easily browse through tens of thousands of sites around the world. More importantly, the protocols that the WWW is built upon are simple enough that anyone can learn how to create documents and, with a little bit of help, mount them for general access. All of the sudden, nearly anyone with access to a computer on the Internet can publish one's own papers. Obviously this self-publication is not quite the same as getting one's paper in a well-known, peer-reviewed journal read by thousands of people, but it does have these advantages: It is immediate—no publication delay; revisions can be made just as fast. Anyone can get to it—millions of people have better access to it than to articles in their library.

Over the last two years, electronic access has been provided to all sorts of things, which were difficult to obtain before, ranging from manuscripts to technical manuals. Much of this material has colour graphics and typeset appearance, and, with new technologies such as Java [8], pages are starting to have sound and animation. This has increased expectations about obtaining more conventionally published materials.

Another aspect of networked communications, which is startling when

first encountered, is the speed at which ideas can propagate. Web browsers are a good example of this. Within 18 months of the introduction of Mosaic by NCSA, millions of people were using the software. Even more amazing was the introduction of Netscape's Web browser, which persuaded the majority of Web users to start using their browser instead of Mosaic, within about six months. Without the immediacy and ease of access that the Internet allows, developments like these would have taken years, not months.

It is hard to overstate the impact that the WWW has had on how electronic publishing is viewed by existing publishers. Three years ago, electronic publishing was something that was starting to look possible, but with uncertain demand. Now both commercial and scholarly associations are aware that their clientele is rapidly using publication channels outside the traditional ones and are willing and expecting to use the same access techniques to get to scholarly documents. To publishers, the process looks slightly more complicated than it appears to a Web user. Electronic journals are still in rapid development [9]. Many technical problems need to be solved, but most professional associations and large commercial publishers are investigating electronic publishing as rapidly as possible.

5. PUBLISHERS IN AN ELECTRONIC WORLD

It is hard to predict what long-term effects the WWW will have on existing publishers. Their role in managing the peer-review process and collecting papers into reasonably coherent and stable journals has been of great benefit in paper publishing, and it seems likely that it will be important in electronic publishing. Whether new forms of hypertext publishing, refereed or not, will displace any of the more traditional forms of publication remains to be seen, but it is certainly possible, as is the possibility that traditional publishers can broaden their offerings and actually expand their contribution to scholarly knowledge. Few of the probable scenarios, however, have libraries as central to the process of transferring knowledge in the future as they are at present.

What is clear is that publishers will not be eager to accept substantially less compensation for their materials than they do now. As a matter of fact, the need to publish articles in both electronic and paper forms is increasing their costs; with lower printing costs being the only real possibility for immediate cost reductions. Atkinson [10], along with many others, proposes that universities reserve copyright to their faculties' works and form consortia to do the publishing, but as Lynch [11] points out this idea does not seem very likely to survive either the outcry of the faculty, who would lose control over where to publish their research, or the legal challenges by publishers and others.

6. ELECTRONIC ACCESS IS DIFFERENT

Electronic publication is a transforming technology to libraries. It fundamentally changes the availability of publications. Electronic material is on the Web. There is no immediate need, or at least little

possibility, of actually collecting it. Electronic access does not just make it cheaper or easier for libraries to provide material to patrons; it makes the librarians nearly irrelevant to the access. Previous technological changes in libraries have changed the tools available to work with library collections. Electronic publishing changes the substance of what libraries deal with. Electronic access by-passes much of what is central to the library's role today.

Libraries are an integral part of the publishing process of today. They are both a major source (in many cases the major source) of the revenue that supports scholarly publications as well as the repository that makes the material available into the indefinite future. Librarians like to think of access to their collections in terms of hundreds of years. This is in stark contrast to the typical computer systems administrator who seldom can plan even a decade ahead, because the rapid and unpredictable changes in hardware and software make such planning impossible. Centralisation of electronic publications places a long-term archiving function on computer services, which are ill-equipped to handle them. It is not that long-term storage of computerised data is impossible, but that computers are so recent that few databases have been maintained much longer than 20 years, and the complexities of the formats needed for publishing quality documents make their storage more difficult than the relatively simple databases created in earlier decades.

The publishers have relied on libraries to preserve the paper versions of their products, but, without economic incentive, it seems unlikely that libraries will reliably undertake the preservation of the electronic versions. Centralised services, such as OCLC's, are certainly capable of such preservation, but collection into only a few such sites will be a much more delicate system than the present one of paper and libraries. Solutions seem far off for preservation problems of digital information, but they are getting some attention [12].

7. THE LIBRARY'S ROLE

The library as a building will not go away in the foreseeable future; there will still be plenty of paper documents to store in libraries for many years to come, but the library's role as the principal collect or of documents used by advanced students and researchers will disappear. As an institution, the library has been created mainly to manage a large volume of paper, most of which will no longer be printed. We must then ask "What does that leave as the mission of the library?"

Some of these are:

- **Contracting for services** : Many of the electronic services that are to replace the current paper services will not be free. They will need to be identified, organised, and contracted for. Subscriptions to the services seem like the most viable method of payment, since subscriptions provide a predictable cost that libraries can budget for, as well as a reliable revenue stream for the producer. All of this is an obvious and useful role for libraries.

- **Instruction** : Most services will be designed to be used by the patrons themselves, rather than through

intermediaries such as librarians, but that doesn't mean that locating and using them all is going to be easy. Problems inherent in the location and use of information will always require professional expertise to deal with. The instructional role librarians have traditionally filled in the use of collections should transfer fairly easily into instruction about electronic services. This may be more challenging than before; given the volatility of electronic services, the librarians may be hard-pressed to keep up with the continual changes we can expect.

- **Hardware and software** : Academic libraries have for years been places where the resources to access electronic resources, such as personal computers, CD-ROM, and telecommunications, were available. Although personal access (say from a student's dormitory) to such resources is becoming more common, we can expect that there will always be patrons for whom access at the library is more convenient. The library can also be a place where new equipment and telecommunications capabilities, which are beyond the financial reach of most patrons, could be made available. These systems, combined with the availability of instruction, will perform a necessary service.

- **Space** : Academic libraries have also always been places to study, beyond any actual use of the library collection. This need will still be there, for both individual and group study. Space for collaboration may become even more important than it is today because of the need of groups to be physically near each other and with access to the sort of computer and telecommunications systems that the library could provide.

- **Local collections** : The increased ease of publishing electronically is true for libraries as well as individuals and other groups. All libraries have collections of local interest and many have unique collections of wider interest, but which are presently nearly inaccessible. Electronic publishing and the WWW offer methods for libraries to digitise existing collections and make both descriptions and facsimiles of the items universally available. Although many local collections are hardly used, electronic access could completely change that, and, if a modest fee could economically be collected for access, the whole system could be self-supporting. Publication is not one of the strengths of current libraries (beyond their catalogues), but the transformed institution envisioned here may well be able to successfully mount information for their institution on the WWW. Libraries to date have certainly been among the most progressive institutions on university campuses in taking advantage of the Web.

The changing role of libraries will affect how libraries are built as well as operated. A good reflection of this can be found in Bazillion [12].

8. THE LIBRARIAN'S ROLE

It is tempting to define a librarian as 'someone who works in a library; but that definition is much too narrow. The

tasks librarians perform in identifying and organising materials are still needed for electronically published materials, and may be appreciated more, since the alternative is more visibly obvious. The title librarian may gradually disappear as fewer librarians are actually associated with a physical library, but the needs will still be there.

9. CONCLUSION

Academic libraries will be undergoing rapid and profound changes over the next decade as electronic publication of scholarly materials becomes prevalent. As the need for collection of periodicals dwindles, much of the mechanism which is the library, will no longer be needed. Librarians, however, will be needed more than ever to cope with the increased availability of materials, indexes, interfaces, finding aids, and formats. Long-term archiving and access to electronic materials are an unsolved problem.

The changes discussed in this paper are becoming so widely acknowledged that recently a large number of articles have appeared about the 'future of the library'. The best place to get an overview of these is in Drabenstott [14].

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