

A year without print at Princeton, and what we plan next

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Abstract: Princeton has begun to receive some major titles as electronic only, beginning with the 2000 subscription year. We are doing this in appropriate cases where we have confidence in the stability, archiving, and performance of the publisher, and where the financial advantage is significant. Not only have there been no complaints, but there have been almost no comments. Apparently users now look for current journal articles online, using the paper versions only if online is not available.

0. INTRODUCTION

Among large American research universities, only Princeton has begun to receive some major titles as electronic only. Drexel has done the same, but it is a technologically-oriented small university with the special benefit of a library school, and is part of a program to rapidly provide library resources primarily in electronic form in conjunction with a campus equipped for overall wireless access. At Princeton, we do not plan such a rapid change, but rather a continuous series of changes in the way library services are requested and delivered.

This discussion represents the author's personal view, and should in no sense be taken as the official position of the Princeton University Library. Rather, it represents his interpretation of current trends in the thinking of himself and many of his fellow librarians. Even when I refer specifically to our policy, it represents my understanding of what the administration and staff of the library jointly intend--but still is not to be taken as an official statement. Certain possible developments of our system will be discussed, but no guarantee whatsoever is given that any of the possibilities will actually reach fruition.

1. BACKGROUND

Princeton is relatively small for an American research university, with an enrollment of about 4600 undergraduates and 1700 graduate students; there are about 900 faculty and 800 professional and technical staff. This is a much higher faculty/student ratio than usual in American universities, and a greater emphasis is placed upon undergraduate education than at larger research universities. But the main difference is that there are no professional schools except small ones in architecture and public affairs: no business school, no medical school, no law school, no school of education, no schools of natural resources, agriculture, or forestry.

The Princeton library is not the largest or richest among American university libraries, but because of the small student body, is by far the most expensive per student: the acquisitions budget alone is over \$1600/student; with a comparably very high staff/user ratio. This permits us to offer a very personal level of library service; good American college libraries, many of which give the same individual attention, do not generally attempt to maintain as complete a research collection. The library has great depth in all the classic departmental areas of the humanities, social sciences, and sciences; it has much less strength in applied, interdepartmental, or newly arising subject areas. We have very ample storage facilities, and a general policy of never discarding any item in usable condition unless a duplicate.

2. E-JOURNALS AT PRINCETON

When we first began to get e-journals at Princeton, we, like everyone, got them as supplements to the print.¹ Our first experiments without print were, as typical, with databases. We quickly observed that the students would use only the electronic versions. I remember during one network failure of our *Medline*, trying to get some of the students to use the printed *Index Medicus* along the wall of the same room; they all preferred to wait until the next day if necessary. After a few experiences like that, we discontinued print versions. We do make a careful distinction of those services like *Ulrich's*, where the online version shows only the current year's data, and maintain a continuing complete set of the print.

At the Biology Library we made a brief count of unbound journal usage for two months in the fall of 1999. As we had suspected, only a very few titles were used significantly in that format, even those that were used very heavily as bound journals. People apparently read through or even browse a very small range of titles, compared to the wide range they use for articles to read. At the same time, as more and more journals became available electronically, we realized that we should offer them in that format if at all possible.²

For many years, Princeton's general policy had been not to join plans like IDEAL or ScienceDirect. For the titles we owned, paying a 20% surcharge did not seem attractive, considering the second-rank level of a good many of them. For the ones we did not own, we would have bought a few if we had the money, but most would have been of so little use that document delivery of some sort was a preferable solution. Nonetheless, our patrons very much wanted the easy availability from their desktops, and the e-journals were at that time not available except as part of a complete consortium package.

At the end of 1999, we were offered an end-of-the-year opportunity to join IDEAL as part of the NERL (North East Research Libraries) consortium. Of course, by that time we had already spent almost all of the science funds for the 1999-2000 year on our regular subscription renewals. By various administrative tricks, we were able to find just enough money to pay the necessary charge to continue them--but to continue the electronic only, and to begin with only the 1999 subscription year, not the full 1993+ backfile. Any individual selector who thought worthwhile had the option of paying the

¹ The best printed summary of the state of the art in electronic journals is. C. Tenopir and D. K. King, *Towards Electronic Journals: Realities for Scientists, Librarians, and Publishers*. New York, Special Libraries Assoc., 2000.

² D. Goodman, "Should scientific journals be printed: A personal view." *Online Information Review* 24(5): 357-363 (2000).

25% surcharge for print. In the event, we paid it for only 9 of the 112 titles, mostly in mathematics. We also obtained electronic versions only for the three biology titles from Rockefeller University Press, which were priced so that electronic and print together cost twice as much as either one alone, and the 6 titles from the American Physiological Society, which were voluminous in paper and offered a 10% discount. For the 2001 subscription year, we added another small group of titles from American Society for Microbiology and from the Society for Plant Physiology. We are still not a member of Elsevier's ScienceDirect, but if we ever join, we will certainly continue only very few titles in print. Many of the titles not continued in print are by no means marginal titles, and in some cases leading titles in their fields.³

Many universities have received special funding for electronic resources. If we had had such funding, would we still have discontinued the print? We chose not to get both versions of the biological society journals, though the cost would have required only the cancellation of one or two additional commercial titles. We consider this justified where the financial advantage is significant, where browsing use is trivial, and where we trust the stability and performance of the publisher. We are driven by two different considerations: the desire to anticipate inevitable future developments, and the financial advantages. Many universities are willing to adopt electronic-only but just for marginal titles, and universities joining plans like IDEAL are automatically accepting it for the additional titles made available. In general research universities are continuing to receive major core titles in print--even when it costs double. Naturally, many smaller institutions are adopting electronic-only to varying degrees, and in their case it seems an even more obvious strategy.

3. ACCEPTANCE AND USABILITY

Before proceeding with IDEAL, some selectors did obtain the specific approval of all concerned faculty--or at least of the ones who spoke up. Others, including myself, did not make a formal survey, or ask the faculty or other users as a whole, knowing from continuing discussions that our users would find it desirable. Several faculty members in various departments, who in past years had expressed their total unwillingness to consider such projects, now said some version of "well, I guess the time has come."

This seems to have received total acceptability at Princeton, where we have now been without print copies of these journals since January 2000. Our Voyager online catalog shows the print and online status, and we have an electronic journals page on the web, but we have otherwise deliberately made the minimum of formal announcements. At the Biology Library, we initially obtained electronic tables of contents from the publishers for all titles received in electronic form only. They were placed in binders, on the shelf where the unbound issues had formerly been, but, as they received very little use, we have now discontinued them. One user expressed his unhappiness at not having the printed contents, but was delighted when we explained how he could get tables of contents e-mailed directly from the publisher, which he considered a much superior solution. Now we retain only signs reminding them of the situation.

There have been no complaints; even more significantly, there have not even been any comments. Users in the sciences and corresponding social sciences now look for current journal articles online first, using the paper versions only if there is no online available. We think they generally do this directly from databases like PubMed or

³ A complete list is available on our web site (<http://www.princeton.edu/~biolib/serials/ap>)

Inspec or from citations in other articles, more than they look for the journal specifically. They do not yet do this for earlier years, although an increasing number of titles are now available. In the humanities, where few titles are currently available, some of the most important have backfiles available from J-STOR and similar projects, and these receive heavy use. Over the next two years we will be studying the relative use of the print and online version of these titles, in order to decide whether they should be transferred to a storage area.

Users have been quite forgiving of occasional difficulties. There was one period where the Academic Press titles were unavailable for almost a week due to failure of their server. Patrons, somewhat to my surprise, accepted this: they were in almost all cases indeed looking for an individual article, and the situation was just the same as if the issue had been unavailable at the periodical bindery. What they really complain about, is when a title once available becomes totally unavailable--as with *Nature*.⁴

Asides from this, the very first complaint occurred this spring in a special context. One of the biology graduate students had the responsibility of scanning certain current titles for her group. Her complaint was that she found both the online tables of content on the publishers web site, and the emailed contents from the publisher, much less compact and readable than the printed version.

This is a valid complaint. No publisher or distributor has yet found an adequate information-dense way of presenting the contents of a journal issue in browsable form. The actual articles are no problem, since no human reads them on the screen, but rather prints them out and then reads them. This is probably a function of current screen resolution; tech-nological progress in this area has been very slow as compared to other aspects of computer technology. Some of it may be biocultural adaptation. I find that I (and others) have an expectation based on format: something on screen is something to be read quickly--a source of immediate current information. Something on paper is to be studied. Furthermore, like most librarians I am very rapid at scanning printed material. I am much slower with online material--but over the last two years I have found myself getting faster at it, as my mental and visual circuitry adapts.

Another distinction is that I myself, and an increasing number of users, do not store the paper printouts. I read them and discard them. I myself usually save the PDFs or other images on my computer: hard disk space has become extremely inexpensive and we have automatic central backup and archiving. I am much more likely to locate a paper by the criteria in an electronic search than in a physical filing cabinet. Those more advanced than I do not even store the images: they know they can find the item again from the original source if they have the need.

4. ARCHIVING AND STABILITY

We are aware that this is in advance of the full development of the technology. Distrust of the stability and permanence of electronic publishing enterprises can cause rational hesitancy. There are several levels to ensuring availability. The most basic level is that a journal work consistently, with essentially 100% uptime. This should even include Jan.1, where the journal should work without the need to re-register or re-verify the subscriptions. The technical requirements are known: a competent business office, competent technical support, advance notification of changes and downtime, a sufficient

⁴ D. Goodman. "Nature and others: Restricted electronic access as financial discrimination" *Proceedings of the 22st National Online Meeting*. N.Y. Information Today, 2001, in press.

number of reliable mirrored servers with automatic switchover--not just for the journal content but for the auxiliary files like the subscriber list--all in at least two separated locations, with redundant internet connections and no single point of failure.

The next level is that a library must retain ownership and access to what it has purchased. The simplest way for this, with the lowest administrative costs, is the current proposal to make all content free to the world after 6 or 12 months. Alternative acceptable routes all have significant administrative costs, which the library that has cancelled can expect to pay.

The third level is long term rights availability. Unless the rights become public after 6 or 12 months, this requires that the publisher possess either ownership of the electronic rights to the material, or a perpetual and non-revocable license, and a commitment to making the material available through an acceptable and reliable source such as OCLC, regardless of business or technical changes. Many commercial and university publishers are publishing journals for scientific societies, and the societies own the rights. This is not acceptable unless the publisher has at the least a non-revocable license to the years already published if the society should change publishers. It is also not acceptable for a publisher to sell a journal to another publisher, without retaining the electronic rights to the years published, or making equivalent or better arrangements. Now that we are aware of this, all contracts should provide not merely that the publisher use his best efforts, but that he guarantee: what he sells when he sells the journal is under his control.

The fourth level is long term technical availability--the conventional meaning of electronic archiving. The standards are known, and will not be discussed now. They include the commitment to transfer the material to new media as it develops, to use long-lived standards, and to rely on a permanently existing non-commercial agency that can guarantee this--preferably a national library. Personally, I think that this should be supplemented by additional dimensions of protection, and that the major scientific societies, and major universities should replicate the preservation process. The free availability of the rights obviously facilitates this.

The fifth level is very long term survival, possibly past the demise of technological civilization. The simple answer is short-run printing, on paper, microform, titanium, or granite. Given a large enough comet, the preservation of *BBA* or even *Cell* will be the least of our worries.

5. MEASURED USE

It has been generally observed in a very wide variety of situations that the use of a journal electronically is about 5 to 10 times the use of the same journal in print at the same institution. Part of this is measurement error: one cannot capture every print use; one can in the right circumstances capture each electronic use. The difference is partly the substitution of direct electronic access for indirect access, such as lending someone a copy. But it is partly the actual true increased use of the information. I am not aware of any adequate studies of these factors; interviews with my users suggest that the increase in true use is a factor of about 2. This is not as startling as the apparent factor of 10, but it is a real major difference: it corresponds to a doubling of circulation.

Some studies have found that users will use anything in electronic format, even material that is of no apparent value, would not be used in print, and would not be requested on interlibrary loan. This is sometimes called the Ohio paradox, as it first became apparent in the analysis of the Ohionet data. Typically, it is found that if an

institution obtains electronic access to all the journals of a publisher, those that the institution had not previously subscribed to are used almost as much as those it had. The cynical explanation is that selectors can't tell the difference, and select based on tradition rather than usefulness. I am aware of such examples at Princeton, and I assume it occurs in Ohio, but the general level at most universities is better than that.

Table 1 reports the data for Princeton's experience with Academic Press, as compared to the reported figures from Ohio State University. For our users, mere availability of the additional titles did not result in their extensive use, thus showing that the electronic format can be a delivery system for increasing appropriate use, not a way to encourage the patrons to use articles they don't need. The data from the two universities are not strictly comparable: Princeton's data is for IDEAL only, the OSU for both IDEAL and ScienceDirect. Princeton's availability covered only 1 to 2 years of each title; Ohio's covered 5 years or more. The Ohio project was promoted extensively; ours was not, and any novelty effect of electronic journals had worn off in the two years before Princeton's project. OhioNet and others will surely report more data for subsequent years, and it will be possible to determine the cause of the initial anomaly. I predict that their use will come to resemble the Princeton data.

Table 1. Use of E-Journal Articles From Owned And Unowned Titles

	Titles Previously Held	Articles Read From Titles Previously Held	Titles Not Previously Held	Articles Read From Titles Not Previously Held
Princeton	60%	93%	40%	7%
OSU	56%	72%	44%	28%

6. FUTURE PLANS

6.1 Additional journals

One might think that the obvious course of action is for us to expand this to other publishers. For some publishers there has been no question of the value of the material to us, and we have added the electronic versions under contracts providing access to additional titles. Unfortunately, these publishers' contracts are often such that we would get little or no savings from discontinuing print. Worse, they often also do not yet provide the guarantees of third party continuation of material that Academic Press and Elsevier provide. When both conditions are met, we will gladly drop our print to the same extent as for Academic Press. It is true that even if there were no savings in price, there would be a cost savings from the lack of the need to process and store the print, but we do not regard that as sufficient financial incentive, for the purely chauvinistic reason that this savings does not come from the acquisitions budget. We similarly have blanket order plans with many scientific societies, most of which similarly offer no cost savings.

For some publishers, the question here has been the value of the material. Many of my colleagues question whether the intrinsic quality of their journals is worth the price; even if they provide all their journals in electronic form, many of my colleagues think it is still not worth the price. I do not always agree. Though the content for many

titles is objectively not of great use, the additional accessibility does increase what usefulness there is, and the only readily apparent way of getting the accessibility is to pay the cost, outrageous as it is. We have the obligation to reform the system for future users, but I am very aware of our obligation to provide currently needed material for the present users. If our non-participation could change the system, I would support not participating, but that unfortunately does not seem to be the case. We are currently attempting to resolve the situation by exploring various subject options as now offered. But it is certain that, if we were to participate in additional plans, for those publishers with assured third-party backup, we would continue only a very few of the journals in print--probably about one-tenth, as for Academic Press.

6.2 Non-journal material

We are very interested in the various e-book schemes. With current display technology, we do not see using them for our basic copy of any material, except perhaps some relatively ephemeral items. But we want them as second copies, and we especially want them for electronic reserves. So far we have been limited by the willingness of the publishers to publish current academic and research material in this format. The most popular service any university library can offer, as far as its undergraduates are concerned, is electronic reserves. At present we are photocopying most of the material ourselves under license, and find the photocopying is even more burdensome than the licensing. For those subjects that require whole books, rather than selections, we will wait until the publishers make them available.

The most truly revolutionary use of electronic publishing is in making archival material and primary sources generally available. Like other major universities, we are engaged in a number of these projects. This of course also applies to scientific material whose use will remain too scattered for formal publication, and much biological data is beginning to appear in this format only.

7. FUTURE CATALOGS

7.1 E-journals, indexes, and the catalog

Our Voyager online catalog has the potential to incorporate other Z39.50 data sources. This would permit us to offer searching the Princeton catalog together with Medline, or Inspec, or other indexes. This would have obvious advantages: the user would directly retrieve references to books and articles on his subject at the same time. The distinction between journal articles and books in even obvious cases has long been very unclear to users, and consequently poses a problem to librarians. In the sciences, where almost all research is published in short items that are either articles in journals, chapters in books, or short books in long series, the distinction can be unclear even to specialists; this makes for the relative invisibility of many items. This is accentuated by the lack of consistent handling by both indexing services and libraries. We are not convinced that this step is not yet appropriate: the users, we fear, will find this more confusing than helpful. This will change when all such sources are available electronically. At that point, they will all be reachable by the same route, and the distinction between indexing services and catalogs will disappear.

E-journals are of course integrated in our Voyager catalog, complete with the exact holdings. They are if possible entered as a copy, not a separate entry, and the

sequence of copies is adjusted so the electronic version or versions appear at the top. In those cases where e-journals are accessible for only a limited period, or only after a time delay, they are entered in the catalog if the subject selector considers it worthwhile. We do not currently list journals available in electronic form from aggregators such as Proquest or Lexis because such services cannot guarantee the availability of their journals in future years, and not all the articles actually contain the full page-by-page content. These services are useful as a general purpose source of a wider array of material, but not for scholarly purposes. If we could list them in a way that does not confuse them with the real thing, we would.

If the articles were listed equally with the books, we would have a catalog growing at the rate of 1,000,000 entries a year, not 60,000. Students find great difficulty selecting relevant material from 5 million cataloged items. How would they manage with 500 million? I do not think that the present generation of indexing techniques is capable of dealing with this. It is not just selecting the relevant material, but the high quality material. Currently, *Science Citation Index* is our most popular index--the usefulness of citation techniques is not hard to understand. On the web, those indexes using citation techniques seem to perform better than others, at least from the perspective of materials wanted in an academic library.

We foresee that as the use of informal publication on web-based servers increases, either in place of or supplementary to the regular journals, the indexing services will be forced to include this form of publication or gradually become useless. This will further complicate the situation, especially as this too becomes integrated into the catalog.

Some of us--including even some in technical services--are realizing that there must be an alternative to the catalog for finding things. We are currently planning a document delivery service, which will be a new service at Princeton. The interface for it will have the usual choices: Item owned by Princeton, Item from storage, Interlibrary loan, etc. It will also have the usual selections: Book, Book chapter, Journal article, Dissertation, etc. And it will have, as appropriate, the usual entry boxes for Title, Author, Date and the like, and the opportunity to cut and paste in a citation. But it will also have a label "GET ME THIS:" followed by a big empty box for input. A highly experienced paraprofessional will then screen all the items, including those where the patron specified exactly what was wanted, and will divide them into streams for routine processing, and a stream for professional manual intervention. I call this "Imitation Artificial Intelligence." It's better than waiting for the real thing: it should be in place in September 2001, not September 2020.

7.2 The personalized library catalog

I do not seriously expect that any user except the most sophisticated will be able to navigate a truly complete integrated catalog successfully. This obviously provides a great field of opportunity for reference librarians like myself. Most users will not consult a librarian unless desperate; if they did, the librarians would not be able to handle the workload. My university has one librarian in most subject areas; if everyone who needed help asked for it, we would need ten times that number. Devices like those suggested in the last section will intercept some of this need; if widely used, they will pose the same problem of staffing.

An equal problem is that the students' working hours do not correspond with ours. Reference service is available in the main library till 10PM, and in the branches till 5 or 5:30 PM. The students, especially the undergraduates, seem to do most of their

work from 9 PM to 2 AM. We could not obtain librarians willing to work these hours. Even if we did, the users are as much more likely to be working from their rooms or labs than from the library. The common solution offered is telephone, e-mail, video, or chat based serviceS. We provide a little of this on a uncoordinated basis, and plan to do much more, but I do not think that even librarians working from home could match the students' hours. Rather, I see us developing interfaces that will guide the students--and the faculty. The process of library research, like academic life, is relatively standardized. An undergraduate using the library is doing the assigned reading and writing the expected papers for the courses being taken. A faculty member is engaged on one or more research projects, and knows what areas need be followed. A person investigating a new subject for personal interest will do best with a relatively predictable approach. These will not meet all situations, but should cover most. And there will always be the box: "JUST TELL US WHAT YOU WANT:"

8. IS THERE A CONTINUING ROLE FOR PAPER?

Will there be a continuing role for paper? Only in special cases. First, it will be a long time until all research materials are converted into electronic format. There is quite a bit of material, relevant for special historical purposes, that may never be. (Five hundred years after the invention of printing, not all previously written manuscripts have in fact been printed.) More essential, there will always remain a role for the paper as artifacts. A digitized drawing is not the same as the drawing; a digitized folio of Shakespeare is not the same as the book itself. And the backup preservation role of print has already been mentioned.

In addition to all this, there is in my opinion a wide range of material for which print will long remain the preferred format--for which it meets the necessary conditions of size, weight, readability, and lack of technological complications. My empirical test is whether it fits into a jacket pocket.