

"Fast Track" Transition to an Electronic Journal Collection: A Case Study

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I. Introduction

In 1998, the W.W. Hagerty Library of Drexel University made migration to an electronic journal collection as quickly as possible a key component of its strategic plan. With few exceptions, if a journal is available electronically, **only** the electronic version is purchased whenever possible.¹ Drexel's journal collection now consists of 800 print subscriptions and 5,500 current electronic journals. This paper describes the impact of this decision on the Library and the major issues, many not yet resolved, that we face.

II. Background

Once called Drexel Institute of Technology, Drexel is a technologically oriented urban university ranked Research Intensive in the new Carnegie classification. Its largest colleges are engineering and business, and it is also home to the highly rated College of Information Science and Technology.² The faculty and students are on average highly computer literate and students are required to own a computer. The entire Drexel campus, including the Library and dormitories, was upgraded to an ATM switched network during 1998 and 1999. During this time, all of the Library's computer hardware for servers, staff and public workstations was replaced with new state-of-the-art equipment. The Library also has a wireless network based on Lucent Technologies' WaveLan products and 30 laptop computers which can be used to access electronic resources via the wireless network. Drexel is a member of the Internet 2 group of universities that has high speed Internet connectivity. In June 2000 the University President announced that by fall the entire campus, including outdoor areas, would have a wireless network.

Thus, Drexel has the technological infrastructure needed to support access to electronic journals. About three years ago, after several years of trials and debate over the economic consequences, major publishers began making their journals available via the web. The number of scientific and technical journals in particular grew rapidly to form a critical mass. More electronic journals become available every month. We clearly have reached the point where libraries can consider electronic delivery the primary delivery format for scientific and technical journal articles. This will have a far more profound effect on library operations than the earlier, much slower, and now nearly complete, migration from print abstracting and index publications to online databases.

How are other libraries responding? The phenomena is too new for there to be much in the professional literature yet. In the summer of 1999 Bleiler and Plum surveyed all ARL libraries to determine how libraries have structured themselves to identify, evaluate, purchase and publicize all types of networked information resources including

¹ Some publishers continue to insist that print must also be purchased.

² Recently ranked #1 for Information Systems and #9 for Library and Information Science by U.S. News and World Report.

databases, full-text, and e-journals. (1) They found a number of approaches but that, most commonly, reference librarians and subject bibliographers play the dominant roles. Even from examination of only this subset of library operations impacted by acquisition of digital resources they concluded that: "Developments in computer technologies have irrevocably altered library operations" and more specifically that "Networked resources have changed the way libraries operate, and growth in number and importance of these resources should push libraries even more into a cross-departmental, multi-channeled team."

Together the survey of academic libraries by Ashcroft and Langdon (2) and the literature review of Miller et al (3) portray a relatively conservative approach to acquisition of e-journals. Ashcroft and Langdon reported that in 1999 UK libraries owned an average of 170 e-journals with a wide variation among libraries. North American academic libraries planned to add an average of 11 e-journal subscriptions in the next 12 months. By contrast Ashcroft and Langdon point out the existence of 7,288 e-journals at the time reported on the New Journals List (NJL) with a growth rate of 12 per day. (4) The NJL now (August 2000) lists 9,194 items and, JAKE, a database of e-journals maintained by the medical library at Yale University, (also in August 2000) contains 23,000 titles.³ (4) Chief concerns were archiving and site licensing issues. Miller et al argues that "Libraries should not substitute the content of a new electronic journal for that of an established print one. Because electronic versions tend to parallel, not exactly mirror, their print counterparts..." They go on to cite lack of advertisements and book reviews in the e-journal versions as potential flaws, especially in the social sciences and humanities.

III. Development of Drexel's Electronic Journal Collection

In the spring of 1998 only one full-text journal collection was accessible via the Drexel Library's web site, and database access was limited to text-based systems. During the summer of 1998 the web site was completely re-designed and by the fall more than 20 databases and several collections of full-text journals were available. At that time the total number of current print journal subscriptions was 1,850. For 1999 and 2000 the number of print journal subscriptions was reduced to 1,475 and about 800 respectively. Some of the reductions were made because we had subscribed to an electronic counterpart; other journals were not renewed primarily on the basis of low use. During the fall of 1998 through 1999, and into 2000, electronic subscriptions were sought aggressively and added as they became available, bringing the current total to 5,500 unique electronic titles. Print versions of approximately 200 of these titles continue to be purchased (but not necessarily received) because of publisher bundling requirements.

Library staff began developing and refining selection methods for electronic journals in 1998. This selection/ordering/acquiring process is far more complex than the one formerly in place for print journals. Whenever possible, we are purchasing only the electronic version of a journal and canceling the corresponding print publication in order to save the cost of receiving, processing, binding and storing the print journal. When the publisher's policy is to require purchase of the print journal in order to obtain access to the electronic journal, we attempt to negotiate a discount for the e-journal only. This has met with limited success so far, but does have the advantage of educating publishers about our needs. One of our most troublesome problems is stopping receipt of print journal issues.

³ This database contains an undetermined number of duplicates.

We are also evaluating the need to continue storing our JSTOR (5) print equivalents. We have discarded nearly all the print abstracting and indexing publications back to the date that the corresponding online database begins; de-accessioning the JSTOR titles is a logical next step in reducing the collection maintenance burden.

Drexel's approach to back files of print journals will seem cavalier, if not totally irresponsible, to those concerned with the archival role of libraries. Our position is that archival storage in most subject areas is not part of the mission of the Drexel Library. On a national, even international, basis archiving of old, little-used materials would be much more cost effective if done centrally or in a few places for redundancy. This is true of both electronic and print formats. We are willing to make the leap of faith that this will happen, and are ready to pay the cost of access to the archived materials when they are needed. In strategic terms, we believe that our future environment will include central archives that we will be able to use, and are planning now as if that will be the case. There are numerous well-qualified national and international organizations addressing this issue, including JSTOR, the Research Library Group and OCLC which have announced an agreement to cooperate to plan the infrastructure for digital archiving, and Bell and Howell's Digital Vault project. It does not seem reasonable to deny our current students and faculty a far superior collection in order to be in a position to acquire and store print journals that will be used infrequently in the future.

IV. Impact on Library Staffing

The migration to an electronic journal model has affected staff and costs in every department in the Library except (for now) the Archives. Some of the changes, e.g. less checking-in, binding and shelving journals, were expected. Others, e.g. the complexity of the selection/purchase process and the amount of time necessary to compile meaningful electronic journal statistics, were not. The following discussion describes the major changes and impacts on the Library, along with the related issues

Selection/Acquisitions

To state the obvious, we are shifting funds from print subscriptions to electronic subscriptions. The Drexel Library was fortunate in receiving a substantial budget increase for FY99, when this change process began, and so the total funds allocated for journal purchase are now larger than expenditures for the print journal collection in 1998.

Making purchase decisions has become increasingly complex, consuming far more time than previously. In the print-only environment, the process usually began in the summer and ended in early fall. The steps followed a predictable path:

- Receipt of an annual renewal list from a journal vendor.
- Evaluation of titles based upon a handful of factors: primarily cost, use, cost per use, citation impact factor, where indexed, and faculty feedback. The extent of this evaluation depended upon the total cost of the journals in the renewal list. In times of large journal price increases and a stagnant library budget, the evaluation was intense, and titles were cut. If the total bill for current subscriptions was affordable, usually only a few titles were deleted and a few added in response to program changes and faculty requests.
- Returning the renewal list with changes marked.
- Receipt and payment of the invoice.

In the current electronic journal environment, selection and acquisition occur throughout the year. All of the steps outlined above still take place for the print collection. But we are now purchasing more of our electronic journals in packages from aggregators, publishers and consortia than as single titles. These packages and individual e-journal titles become available throughout the year and the purchase decision must take into account many additional factors:

- Overall relevance to University programs.
- Overlap with current electronic titles. Many of the aggregator packages contain the same titles so that it is possible to end up with as many as four sources for one journal title.
- Quality of images.
- Completeness of the articles. (Sometimes tables, figures, or images are not included.)
- Completeness of journal (e.g., availability of job ads, book reviews, obituaries).
- Requirements of the license that may restrict certain uses (e.g., ILL) or user groups (e.g. persons using the library who are not members of the university). Evaluating and negotiating licenses is one of the new time-consuming activities.
- Presentation, reliability, and frequency of "useful" use statistics.
- Availability of back files.
- Whether linking from specific databases to which the Library subscribes is enabled.
- Whether the journal(s) are or will be part of the CrossRef system for linking from article references to the full-text of the article if the library owns the referenced article.
- Whether the publisher allows access by IP range or requires users to also register and enter an ID and/or password every time they access a journal.
- Whether to subscribe to an e-journal or e-journal collection through an aggregator service such as OCLC's Electronic Collections Online (ECO) or SwetsNet which provides access to journals from many different publishers, or with access from the publisher only.

This list is probably not inclusive, but serves to explicate the complexity. Even determining cost is not simple in the e-journal world. Cost may be based upon user group FTE, the Carnegie classification of a university, the type of library, the number of consortia members in a "deal," the number of concurrent accesses specified, simply a commitment to continue the print, electronic only with a discount from print, electronic only with a premium from print - or some combination of these factors. Some of the most complex, but also most cost-effective, "deals" are those in which **all** members of a consortium have electronic access to **all** the journals that **any** member subscribes to.

Another challenge is keeping current with the availability of electronic journals. More are "published" online every week. Not infrequently we have discovered many months after the fact that an electronic journal is available to us free-of-charge because we subscribe to the print version. We are investing significant staff resources to keep current with all e-journal offerings from vendors, publishers and consortia within the scope of our collection and are initiating negotiations for pricing and packages tailored to our needs. We seek out electronic equivalents of current print holdings and replace the print with the electronic version of the title unless the title meets the exception criteria. Almost all exceptions occur when the content of the electronic version lacks important sections found in the print publication (e.g., advertisements in business and fashion magazines)

or when the journal is browsed frequently (e.g., *Scientific American* or *Newsweek*). In two to three years we expect that print journals at Drexel will be limited to a browsing collection of between 100 and 200 titles.

The Citadel Library developed a database in Microsoft Access to organize all the information needed to manage a print journal collection. (6) While this appears to be a logical approach, developing and populating such a database for electronic journals is a major project by itself. Some serials vendors see providing services to assist libraries with e-journals acquisitions that address many of the problems just noted. Harrassowitz, for example, offers the "Millennium Service" that in addition to the usual serials vendor services, promises information on pricing options, help in negotiating licenses and processing the proper forms, intervention with publishers when problems occur, clarification of consortium pricing, management reports, notification of publishers or journals databases vendors - such as OCLC when a library has paid for an ECO title, and announcements of the availability of new electronic journals.

Fortunately, e-journals offer a tremendous opportunity for improving library service. The advantages clearly outweigh the disadvantages. Not only are e-journals received enthusiastically by our users, but the increased effort to acquire and manage the e-journal collection is offset by cost benefits. On a per title basis the e-journal dollar has superior purchasing power. In early 2000 our print only journal subscriptions cost an average of about \$150 per title while e-journals were estimated to be \$65 per title.⁴ This difference is all the more remarkable when one considers that nearly all the electronic journals come, even when a subscription is first entered, with several years of back files. The increased value of electronic journals is even more apparent on a per use basis because electronic journals are used more frequently than print journals.

Infrastructure

While space and shelving are the most important infrastructure requirements for the print format, networks, computer hardware/software and systems staff are required to provide access to electronic resources. Fortunately for libraries, these items are rapidly becoming key components to a well-functioning operation in all academic institutions, as they are essential for so many other reasons

None of the Drexel Library systems are used for electronic journals exclusively since we provide access to the entire web, databases, electronic mail, a library management system with a web-based catalog, office productivity software and other applications. Tellingly, however, the Library Webmaster devotes about 30 percent of his time to managing electronic journal access during this start-up period. Initially, he created over 200 static web pages listing e-journals by title and by subject. When it became clear that maintaining 200 continually changing static HTML pages was a major burden, the Webmaster developed an e-journal maintenance database using MySQL and PERL scripts to manage the lists and create the web pages dynamically. We are now in the process of cataloging the e-journals, and determining whether it will be necessary to maintain this database long-term. See **Collection Management /Technical Services** below.

⁴ One could argue that the e-journals are inherently smaller, less expensive publications. While we have not studied the "quality" of the two journal sets we do not believe there is a substantial difference.

Another area impacted by the transition to use of electronic resources is photocopying and printing. Users photocopy print journal articles. They print e-journal articles or e-mail them to themselves from the Library to retrieve later at home or in their dorm rooms. We have begun to see a drop in photocopy use that we attribute to greater use of e-journals. Revenue from printing compensates for loss of photocopy revenue. Eventually, the number of copiers needed by the Library may decrease.

Administration/Management

Library directors have always paid attention to journal purchase decisions. Journal collections represent a substantial cost, and a very sizeable fraction of the library budget, and faculty often feel passionately about specific titles. Electronic journals raise new issues which call for the director's involvement to an even greater extent. Activities that are new or escalated for a director who makes a major commitment to electronic journals include:

- communicating awareness of the e-journal collection to users,
- obtaining institutional funding and support,
 - joining consortia and other "buying clubs,"
 - contract negotiation and review,
 - setting and revising strategies for e-resource acquisition,
 - building a library staff with the appropriate skills, and
 - managing the change.

The transition from print to electronic journals has had a large impact on the workload of the Drexel Library's administration. It is always more difficult and time-consuming to manage change than maintain the status quo. Divided between the Dean and Associate Dean, the amount of time spent managing and overseeing this transition is estimated to be .5 FTE. This figure includes major ongoing efforts to restructure workflow and reorganize staff positions to respond to the changes we are implementing.

Collection Management/Technical Services

In the Technical Services Department, the transition to e-journals has had a direct impact on the day-to-day work of each staff member. Changes in workflow and procedures are dramatic. It is clear that the significant decrease in print titles has directly decreased workload for tasks such as checking in print issues, claiming non-arrivals, replacing missing pages, and preparing and receiving bindery shipments. Bindery fees are also reduced.

Offsetting the decrease in activity levels related to the print format is a very large increased workload for both the serials acquisitions (described above) and management functions. We postponed cataloging e-journals because of the changing nature and quick growth of the collection, and the intent to migrate our library management system. But like many libraries we believe in "one stop shopping" for our users who should be able to view print and electronic serials holdings together. The logical place for this is the Library catalog. And this means that catalogers will not only have to deal with a collection far more volatile than any they have managed previously, they will have to maintain links from the cataloging records to full-text. We intend to buy as many of these serials records as possible from the OCLC WorldCat Collection Sets series, because these titles change very quickly. Because the titles change very quickly, we have not yet decided to take on the work of cataloging titles in aggregator databases. At least two libraries have created attractive "workarounds" for this problem. (8,9) If we can

solve it we will be able to eliminate dual record-keeping by discontinuing the web database that we use now to create HTML pages for the e-journals.

But for now maintaining the database that now creates our e-journal lists is a major task. The transient nature of this collection means that links break, coverage changes and sometimes the electronic journals themselves are available through a new distributor. An advantage of electronic distribution that leads to extra work is that we are not tightly linked to calendar year only subscriptions; so journals are added continuously and sometimes cancelled during the year.

We have created a new position, Electronic Resources Librarian (ERL), to provide a focal point for integrated development of all electronic resources. This position crosses traditional departmental functions including management, systems, technical services and reference. The person in this position shares the responsibility of keeping up-to-date on the availability of new electronic resources with the Information Services (IS) Librarians who do collection development. She initiates contacts with vendors to negotiate favorable pricing and packaging and arranges trials for each new service considered for purchase. She also reviews licenses and contracts and spends some effort negotiating appropriate amendments and corrections to these documents. The ERL also interacts with consortia for purchase of electronic resources and evaluates the cost/benefits of going with a particular group offer. Once the purchase decision is made, IP information is communicated to vendors and content changes are made on our web site. She also collaborates closely with the Webmaster in designing the e-journal database; she keeps this database up-to-date. She provides lists of our e-journals to database producers so that they may establish links to the journal articles. Finally, gathering and organizing use statistics for electronic resources is a major aspect of her responsibilities.

In regard to serials acquisitions, we no longer have one renewal list with all the titles to which we have access. For calendar year 2000 we placed all subscriptions with our serials vendor; this solved some problems but created others. The 2001 renewal list displays a single entry for some collections rather than listing the journals in the collection by individual title. It lists some titles that we receive only in electronic format, some print only titles, some in both formats and some titles that we must continue to be eligible for a consortium "deal." But tagging these differences is inconsistent and very incomplete. Aggregators' titles and titles we have access to because other members of a consortium subscribe to them are not on the list. Moreover, troubleshooting a broken link or establishing that we have eligibility to access a title is burdened by the fact that so many parties are involved: the Library, the serials vendor, the consortium and the publisher. We are now considering subscribing to large packages directly from the publisher when possible.

Another vexing issue for Technical Services staff is handling print issues we do not wish to receive because we have access to the electronic counterpart. Presumably because this represents an exception to standard procedures for the publisher, we have experienced considerable difficulty stopping these print subscriptions. A few are re-routed by our serials vendor to their missing issues bank. Staff must recognize the remainder as issues we do not wish to retain and either dispose of them or send them to the missing issue bank.

Circulation/Stack Maintenance/Statistics

Obviously, shelving activities are noticeably affected when fewer journals are stored in the Library. Bound journal re-shelving has been reduced by 25 percent and re-shelving of current journal issues is down 30 percent over the past two years. At Drexel, collection of print journal re-shelving statistics is only partly automated. Shelves track use by title as they shelve bound volumes and current issues. Fewer journals to shelve also translate to less time collecting statistics.

In theory, it is easier to collect use statistics and richer, more accurate demographic and search information for electronic journal usage because data collection can be automated and expanded. In reality, at the present time, obtaining useful and comparable title-by-title use data for electronic journals is difficult and labor intensive to compile in a way that is helpful for making selection decisions. Activity measures, and particularly, consistent activity measures across journal vendor services, are frustratingly difficult to come by. Mercer (10) describes the difficulties encountered in trying to collect and analyze the vendor information so as to use it for service evaluation and decision-making. Among the statistics reported are session length, number of searches, journal title hits, article hits, page hits, types of pages hit, top XX titles accessed each month, "turnaways," form and type of articles downloaded, and number of unique IP addresses using a service or journal title. The International Coalition of Library Consortia (ICOLC) has developed useful guidelines for statistical measures of web-based resources. (11) As mentioned above, the responsibility for collecting, compiling and organizing e-journal statistics belongs to the Electronic Resources Librarian.

Reserve Collection

Circulation of reserve materials, which had been steady at about 30,000 items per year, dropped by 35 percent during the 1999/2000 academic year. Since we will not be implementing an electronic reserve system until the fall 2000, this change can likely be ascribed to the availability of electronic resources. What portion of the e-resources used are electronic journals, and which are other web resources is an open question. Faculty placed 30 percent fewer items on reserve this year, and many developed their own course-related web pages. We expect this trend to continue for the print reserve format, particularly when a full electronic reserve module is implemented later this year.

Document Delivery/Interlibrary Loan

Our expectation was that with the implementation of electronic journals we would see a significant decrease in user requests for journal articles via our Document Delivery/ Interlibrary (DD/ILL) Loan Department services. There is no evidence so far that this decrease in "borrowing" photocopies of journal articles from other libraries is occurring. The document delivery service, which provides copies of articles from the Drexel Library collections free-of-charge to faculty and distant learners, delivered about 1,000 articles from the electronic journal collection in 1999/2000. The majority of these articles are for faculty who presumably are not aware of the ready accessibility of e-journals, or who either cannot or choose not to retrieve the articles themselves. At the moment, the net impact of the electronic journals seems to be negligible on both the DD/ILL department. Some changes in procedures have been implemented over the past two years to support the process of providing copies of electronic articles to faculty. Our prediction is that ultimately we will see a decrease in net requests for this service as our users become increasingly self-sufficient and as the Library's electronic content continues to expand.

Information Services/Reference

At Drexel the Information Services staff are responsible for materials selection in addition to the usual functions of answering questions, teaching classes, and performing public relations functions such as promoting the availability of services. In practice they are involved in several stages of the "life cycle" of electronic journals at Drexel. They share responsibility for identifying candidates for purchase, evaluating potential purchases, helping students and faculty use the e-journals effectively, incorporating information about them in their classes, and helping publicize them to their constituencies.

Some interesting trends are occurring at the reference desk. Questions in the "electronic lookup" category increased this year by about 15 percent, and it seems that more of the transactions that do occur turn into "teaching" opportunities. "Machine assists" have more than doubled, and questions answered using print resources remained about the same. On the whole, staff observe that students using the web-enabled computers in the "hub" near the reference desk, are relatively self-sufficient. There are simply more students in the Library using the computers. Now, when classes are in session, the 27 workstations located near the reference desk are always fully occupied. At some point in the next two years, we will most likely double the capacity of this area.

IS staff are also spending more time on instruction and outreach activities required to make faculty and students more aware of the Library's resources and services. Workshops and teaching sessions have increased. Vendor presentations are more frequent. IS Librarians engage expanded public relations by personal visits and presentations, email updates to departments, exhibits and other activities. In March 2000, the Library inaugurated a monthly online newsletter that routinely features articles about specific electronic services. Another effort that has also expanded is the preparation of both online and printed documentation to help users understand how to use electronic journals.

V. Discussion

Drexel is probably farther along in the transition to an all electronic journal collection than most academic libraries in the United States. A late 1997/1998 survey of ARL and non-ARL academic libraries found that just 29 and 33.5 percent, respectively, had cancelled print journals in favor of electronic access in the previous 12 months. (12) Fifty-one percent of the ARL libraries and 40 percent of the non-ARL libraries had not cancelled print subscriptions in favor of electronic **and** declared that they will not in the future. Their reluctance was attributed to the enormous change required in academia to relinquish print.

This description of the Drexel experience should be useful to others because our transition is indicative of what most academic libraries will eventually experience. There are accredited academic institutions that are functioning with completely digital libraries, i.e., they never had a print library. Examples are Jones International University (13) and the University of Phoenix. (14) Other libraries have created large electronic journal collections - e.g., the University of California system (15) and most, if not all, large research libraries - but they are **maintaining large print collections** concurrently. The approach Drexel is implementing - **substituting** electronic for print - will be the typical

scenario in most academic libraries because it will be necessary to make electronic collections affordable.

When we embarked on this transition, we expected the savings in staff time needed to managing the print collection. What we did not anticipate was the very substantial amount of staff time that would be required to manage the electronic journal collection. Moreover, the e-journal related activities require professional level skills whereas many of the savings are in clerical activities such as checking in and shelving journals. Preliminary data indicate that staff costs have increased significantly as a result of this change.

Drexel's per title subscription costs are lower for electronic journals. While this is a function of our selection process and the particular "deals" we have been able to obtain, we suspect that the majority of academic libraries will have the same experience, particularly if they purchase a large number of titles through aggregator collections. And we can expect both the staff and subscription costs to continue to change over the next few years. We are still at the beginning of this transition, in a start-up phase. Librarians, publishers, consortia, and vendors are all struggling with enormous change, and trying to determine how best to take advantage of the opportunities while at the same time avoid the pitfalls.

It is important to remember that e-journals have many added value features that justify their purchase even if they were about the same price as print. Probably the most important is that they are accessible anytime and anywhere a valid user has an Internet connection. Moreover, they also have the potential to take advantage of the linking capabilities of the web: linking from A&I databases to the e-article and from the article's references to the full-text of the associated article. E-articles have the potential to incorporate multi-media, link to background material, and point to related information automatically.

This article describes the impact of the transition to electronic journals on the Library. But the most important factor is the impact on our users. Some librarians are concerned that users will find the e-journals difficult or time-consuming to use. This has not been Drexel's experience. Informal feedback has been extremely positive. Users like the convenience of anytime, anywhere access; and they are "voting with their fingertips." Use of electronic journals is much higher than use of our print journal collection. Moreover, electronic scholarly resources of all types, if not absolutely essential, are a real boon for distance education programs.

Presented here is a "from the trenches" picture of a library trying to provide the best possible service to its current users in what are fluid and chaotic circumstances. This discussion has not dealt substantively with the larger problems in scholarly communication and publishing that many organizations and scholars are debating, and increasingly, providing solutions for. Examples are the work of ICOLC (16), JISC (17), Chodorow (18), SPARC (19) and JSTOR (5). These efforts are promising and will contribute to better long-term solutions.

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