

Electronic Journal Availability Study

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Abstract

Research Question and Outcome: What percentage of articles valuable to UNC faculty, students, and staff are readily available and accessible online? For those found to be unavailable or inaccessible, what are the reasons? Knowing the relative extent of access problems will allow HSL to make informed decisions regarding best use of limited library resources to improve online access to electronic journals.

Significance: In 2004, the HSL participated in a service quality survey, LibQual+, designed and implemented nationally by the Association of Research Libraries. The results indicate that online access to electronic journals does not meet the expectations of UNC faculty, students, and staff. This problem is one of the top two problems identified for HSL and other libraries across the country. Accessing needed knowledge resources is vital to the success of UNC faculty, staff, and students in fulfilling the University's mission. Findings will be useful to other libraries that need to address the same issues. The study extends classic availability studies focusing on print materials into the online environment.

Setting: The University of North Carolina at Chapel Hill serves the Health Information needs of the campus and is the primary library for faculty, students, and staff at UNC Hospitals, and the schools of dentistry, medicine, nursing, pharmacy, and public health.

Methodology: A set of 400 citations was developed as a sample of what might be valuable to students, researchers, faculty, and staff in UNC-CH Health Affairs. Citations were selected from course reserve reading lists and articles authored by, and references cited in articles authored by, persons affiliated with UNC Chapel Hill. The research assistant searched for each of the articles in the sample, and recorded and analyzed findings. Reasons for failures to access articles were determined.

Results: 78% of the 400 articles selected are available online. The two most significant reasons that 88 of 400 are not available are 1) HSL does not have licensed access to the electronic journal title, or 2) HSL coverage for the title begins later than the year the article was published. The research assistant was denied access to 6 articles, and 3 citations were problematic.

Conclusions: The probability of online availability can most easily be increased by continuing to expand access to more journal titles and to greater coverage for journal titles already subscribed.

Introduction

Libraries are challenged to demonstrate our success in providing ready access to the information resources valued by the communities we serve. The Association of Research Libraries (2007) is working toward developing new measures and assessment initiatives for libraries, and in working toward a framework for academic library and institutional outcomes, Fraser & McClure (2002) categorize access to electronic resources (E-Metrics) as one of the questions libraries strive to answer at an outcomes level. Academic library users expect online access to journal articles they need in their work and study, any time, from any place. Availability and accessibility are core measures of the library's success in meeting this expectation, and libraries strive for 100% satisfaction. In the context of this paper, availability of electronic journals is defined as whether or not one can get online access to the full text of a desired journal article by any method. Accessibility of an article refers to the convenience and ease of getting to the full text online. It is generally observed that journal literature is the most important library resource in the biomedical community.

Evidence of significance of availability can be found at academic libraries, academic health sciences libraries, and at UNC Chapel Hill. Steve Hiller, Director of Assessment and Planning at the University of Washington, reports that top priorities for faculty and graduate students are providing online access to more journal titles and to journal backfiles; maintaining quality of print collections is becoming less of a priority for those same constituents, based on responses to UW's 2004 triennial survey. Online access is particularly important to biomedical scientists. Jim Self, Director of Management Information Services at the University of Virginia Libraries reports a steady rise in the reported need for electronic journals since their baseline surveys in 1992. Tenopir (1999) answers the question whether to cancel print journal subscriptions in favor of online access with a qualified "yes." Sally Rogers (2001) reported on the increasing use and acceptance of electronic journals at Ohio State University from 1998 – 2000, with a corresponding decrease in the use of print journals. Results of a pilot study at

Eskind Biomedical Library at Vanderbilt University (Sathe, Grady and Guise, 2002) show preferences for electronic formats among students, fellows, and residents. Burrows (2006) reviews the patterns of electronic journal usage in health sciences libraries during the past decade.

Sandra DeGroote and Jo Dorsch (2001) at the Library of the Health Sciences - Peoria, University of Illinois at Chicago, also found increasing use of electronic journals and a concurrent decrease in print journal use. Their survey (2003) showed that 71% of respondents preferred online over print journals. Convenience and full-text availability appear to play roles in selecting online resources. The findings of this study suggest that databases without links to full text, and online journal collections without links from bibliographic databases, will have lower use. Wulff and Nixon (2004) report that electronic journal articles are accessed much more often than print.

User services experience at the UNC Health Sciences Library shows that users frequently ask for help in getting access to the full text of an article. Participants in the HSL's 2006 usability studies report that they often use articles only if they are available electronically and, if a citation they wish to access is not represented by a quick link to full text, they will look for full text using PubMed's related articles feature rather than search for the article by first locating the journal title in the online catalog.

Availability studies

To study problems library users have finding needed resources, availability studies were developed, notably by Paul Kantor, Ph.D. He used patron requests and branching analysis to show specific reasons why known items were not available or could not be found by patrons. His methods were tested at four research libraries and published by the Association of Research Libraries in *Objective Performance Measures for Academic Research Libraries* in 1984. Most of the published library availability studies looked at patrons' book requests, but four academic libraries that studied journal and article requests reported probabilities of journal availability ranging from 39% to 81% (Ohio State University, 1980; Bachman-Derthick & Spurlock, 1989; Roberts, 1989; Shaw-Kokot & de la Varre, 2001).

UNC-CH print journal availability study

In 1997, the UNC Health Sciences Library conducted a print journal availability study in response to the following observations: users increasingly were indicating that they had problems finding journals and users were increasingly submitting interlibrary loan requests for items the library owned and identified in the library online catalog. Journals are the Health Sciences Library's most used resource, and in 1997, even though some electronic journals were accessible online, print journals still made up the majority of the collection. The HSL adapted the availability study conducted at the University of New Mexico (Bachman-Derthick & Spurloch, 1989), and, over a semester, asked every user entering the Library during selected hours to tell us whether they found the journal articles they were seeking at this visit. Library staff then searched for those items users had not found and determined the specific reasons for those failures. The 1997 study showed that 81% (1,663 of 2,056) of the journal articles users were seeking were in fact found by the users themselves. Not surprisingly, factors contributing to user successes finding articles were high probabilities that items were owned, that items were shelved correctly, that journal titles and their locations were accurately described in library catalogs, and that users possessed an ability to locate shelved items. The factors that contributed to journal availability failures included selection and retention of titles, signage, confusing messages in the online catalog, re-shelving and binding schedules, and use of materials for photocopying. Knowing these reasons why users failed to find a journal helped the UNC Health Sciences Library prioritize its efforts to improve access to its print journal collection. Library orientations and guides were changed to emphasize tips for finding journals. The findings were also useful in planning for the Library's renovation.

Electronic Journal Availability Study

The perception that we needed to add to our print journal availability study an electronic journal availability study was created primarily by the results of the library's efforts to assess service quality by means of the LibQual survey.

In 2002, and again in 2004, the UNC Health Sciences Library participated in LibQual surveys administered by the Association of Research Libraries, along with several dozen other University and health sciences libraries in the U.S. and elsewhere. LibQual is an instrument for solicited users' opinions of service quality. Users are asked to assess aspects of library services relative to their own notions of desired and minimum expectations of service. Through this

survey, libraries can learn how closely they match user expectations of service, or, more problematically, whether their provision of service falls below users' minimum expectations of service.

In our library, we scored below the minimum expectations of our users on only one question in 2002: Making electronic resources accessible from my home or office. For some user groups, but not overall, we also scored below minimum expectations on this question: having comprehensive electronic resources. Naturally, these gaps between our users' expectations and their perceptions of our service concerned us, and we worked to increase the number of electronic resources available and to improve the technical means of access to them.

However, our 2004 LibQual results showed not only a negative service gap for the accessibility-from-home-and-office question – and for two new related questions (Do you have the electronic information sources you need?, and, Do you have the print and/or the electronic journal collections you need for your work?) – but also that these gaps had increased, in spite of our improvements. The perceived service gaps were greatest for our faculty users. From our users' perspectives, apparently we had not improved in these areas even though our electronic journal offerings had increased by 84% percent between the two surveys and our navigational paths to electronic resources on web access tools had been improved based on usability studies.

It is well known that user expectation ratings are influenced by many factors, ranging from guiding principles in the 24/7 retail environment (100% or greater satisfaction guaranteed) to increases in tuition and fees and the value one expects for the price paid. However, even though we knew we were increasing and improving our users' access to electronic resources, these user perceptions were important to us.

LibQual respondents were invited to make open-ended comments about services and fully one-third of the total comments addressed electronic resource issues. While many comments were positive about our resource holdings, nearly one-half of them expressed a desire for additional holdings that users thought were missing from our collection. Fewer comments addressed technical issues of access.

In 2004, the HSL appointed an online access task force to investigate further the reasons for these perceptions. It was charged with studying existing data to clarify problem areas, identifying key performance measures that could be used to track performance over time, and recommending ways to improve online access, particularly for users not in the library building.

The task force decided that a first step toward better understanding of the scope and extent of the problems revealed by the LibQual results was to undertake an e-journal availability study.

The task force was unable to find a way to replicate in the digital environment the classic print availability studies. Asking on-site users to report their success finding specific known electronic journal articles they were seeking and then determining the reasons for failure within a short time thereafter did not seem feasible, aside from the problem that on-site users probably are no longer representative of all users attempting to access our e-journal holdings. Thus we decided not to study user behavior as they were searching for electronic availability of known item articles. In other words, we decided not to ask users entering the library and searching for electronic articles texts to do so as we observed, recorded their experiences, and followed up on their failures. We also had no reliable way to mine search logs of remote library users to find what actual articles they were looking for. Given these decisions, we devised other means to identify articles valuable to UNC faculty, researchers, and students. Our research question thus became: What percentage of articles valuable to UNC faculty, students, and staff are readily available online? For those found to be unavailable or inaccessible, what are the reasons?

Determining the relative extent of availability and access problems will help HSL to make informed decisions regarding the best use of limited library resources to improve online access to electronic journals. Another goal of the study was to establish baseline data for tracking changes over time.

Methodology

The first challenge this study faced was how to identify articles ‘thought to be valuable’ to, and representative of, articles HSL’s primary users were attempting to access online. When doing the print availability study, it was reasonable to assume that the citations users brought to the library for retrieval were representative of citations generally important to users. In 1997, the library’s print collection was the only means of accessing these articles for most campus users. With online journal access, it did not seem reasonable to assume that citations brought by users to the physical library were representative of citations valuable to users in general, since many online searches for articles are performed outside the library. We decided not to interrupt library users by observing their experiences accessing journal citations while in the library, and there was no reliable method to tap web and database logs to identify searches and retrievals at

the individual article level. Instead, we identified sets of citations created by portions of our user population, and made the assumption that these sets have some importance to users. Thus our citation sets represent 100 articles authored by UNC faculty, 100 articles cited within UNC-authored articles, 150 articles selected by instructors for electronic course reserve reading lists, and 50 articles cited within the clinical queries published as the Family Practice Information Network (FPIN). The citation sets encompass authors and cited references from the five professional schools in Health Affairs served by the HSL and encompass articles that we think support the clinical, research, and teaching/learning activities of our users.

A RefWorks database was used to collect the citations from each of our citation datasets. Article citation elements consisted of author or authors, title, full journal title, journal abbreviation, volume, and beginning page number. Then Microsoft Excel was used to track search results and combine and sort data for analysis

Six citation sets were created. The first five contained 50 article citations; the last, E-Reserves, contained 150 article citations.

- DENTAL, to represent the article interests of School of Dentistry faculty, staff, and students. Fifty articles authored by UNC School of Dentistry faculty were retrieved from the ISI Science Citation Databases (using the search string ‘Dent SAME “chapel hill”’ in the address field). The fifth linked journal articles citation in each article reference list of the first 50 retrievals were selected for our set.
- FAMILY PRACTICE INFORMATION NETWORK (FPIN), to capture the interests of family practice clinicians and broad interests of the School of Medicine faculty, staff, and students. Participating in the FPIN activities, especially by writing and reviewing of Clinical Inquiries for the Journal of Family Practice and the American Family Physician, is important on the UNC-CH health affairs campus. From a PubMed search for FPIN articles (in PubMed, search “clinical inquiries [ti] AND(“Am Fam Physician” [Journal] OR “J Fam Pract”)), the first article references from the first fifty citations were selected for our citation set.

- CANCER SET, to represent the interests of clinicians and researchers. Faculty research profiles (available at <http://cancer.med.unc.edu/research/profiles.asp>) from the UNC-CH Lineberger Comprehensive Cancer Center were examined for listed articles. The most recent full citation on a profile was selected from the first 50 researcher profiles that included a revision date.
- PHARMACY SET, to represent article interest of faculty and students at the School of Pharmacy. From curriculum vitae and other publications data on the School of Pharmacy website (available at http://www.pharmacy.unc.edu/faculty-research/faculty-directory/facultydirectory_view), the most recent journal article citation was selected from each online CV. To reach our desired number of 50 citations, the second most recent citation listed on a CV was also selected on a second pass through the CVs.
- PUBMEDCENTRAL is the free digital archive of biomedical and life sciences journal literature created by the National Institutes of Health. This archive was searched for articles authored by UNC-CH faculty and staff. The first journal article reference from the first 50 articles retrieved formed our citation set. (Search PMC for “chapel hill” [ad], with publication date limits of 2006/01/01 to 2006/12/31.)
- E-RESERVES - We considered Health Affairs course e-reserves lists to be a source of articles ‘valuable’ to teaching faculty and students. The HSL provides e-reserves services for many of these courses. In order to represent users in the Schools of Public Health and Nursing, and the Allied Health programs administered through the School of Medicine, course reserve pages created for the Spring 2007 semester representing these areas and that did not require a password were accessed to extract journal article citations. To balance favoring authors from the beginning of the alphabet in the selection routine for the Cancer Center set, authors' last names closest to the end of the alphabet were selected first from each e-reserve course list. The resulting distribution of samples taken from E-Reserves was 60 from Public Health course, 60 from Nursing courses, and 30 from the Allied Health and Clinical Sciences programs courses.

We acknowledge that our criteria for selecting sources of citations and for selecting the particular citations from within those sources are arbitrary. We cannot make a statistical case for how representative these articles are of those ‘valuable-to-our-users.’ We can only assert as a logical argument that articles authored by UNC-CH faculty and researchers, articles cited by those authors, and articles identified as important for student learning are likely valuable to our users.

After collecting all 400 citations, the next task was to determine the availability for each. Because HSL’s user services experience is that many users begin their search for desired articles in PubMed, our steps to determine availability begin there. The Health Sciences Library webpage presents a prominent link to PubMed. It also presents a prominent link called ‘Find Electronic Journals,’ which takes users to a search page for the campus EJ database, where all UNC-Ch provided electronic journals can be searched by title or browsed alphabetically and by subject. We believe that most electronic journal access on our campus navigated through our library web sites use these two methods. Our web site usage statistics support this notion, as these two links on our home page are hit most often.

The following outlines the steps taken in our process to determine article availability.

1. Search each article in PubMed.
2. If the article is found in PubMed, and the article is Linked-Out to UNC-CH full text, and the link works, then that article is said to be available.
3. If there is a PubMed link, but the link does not work, or there is not a LinkOut, the journal is searched in the library’s online EJ database. If the library provides online access to that journal, it, along with the volume and date online coverage, will be listed there. If the full text article of our citation can be accessed through this method, the article is said to be available. When doing this step, observations are made about any potentially confusing aspects of the e-journal access from within the EJ database.
4. If the article is not found to be available either by using PubMed or by using the HSL EJ database, further attempts to locate the article through other bibliographic database and Internet searches are made. If full text of the article is found, the article is said to be available, whether or not the HSL had specifically provided access to it through selection.

5. For all fulltext articles found through PubMed, the journal containing the article is also searched using the HSL EJ database, to make sure that navigation to the fulltext can be made either way.
6. If an article is not found to be available, the reason for its unavailability is determined.
7. For each article found to be unavailable, its availability in print in UNC-CH's print journal holdings is determined.

Results

Of the 400 total citations, 88, or 22% were found to be unavailable. The specific results for each citation set are provided in Table 1.

We found only four reasons for lack of availability: the library does not have a subscription to the journal (44%; n=39); the library's online coverage of the journal begins later than the date of the article (46%; n=40); access to subscribed content was denied (7%; n=6), and citation was suspicious (3%; n=3).

The date range of the entire set of 400 citations is 1954-2006. Thirty percent (n=118) are dated before 2000; of those, 59 (50%) were not available as an HSL resource. The remaining 282 (70%) are dated 2000 or later; of those, 29 (10%) were not available as an HSL resource.

Of the 88 unavailable articles, 64 (73%) are available in print at UNC-CH. Thus, of the 400 total citations, 376, or 94%, are available either online or in print.

Only forty-four of the 400 citations were not indexed in PubMed; 22 of these were not available online. Of the 356 that were in PubMed, 102 did not have a PubMed LinkOut; 64 of these were not available online. Eight link-outs did not work when the associated article was first searched; four of these worked at a later search.

For the 39 articles found to be unavailable because the HSL has no electronic subscription to the journal, 14 are not available at all via electronic access from any publisher or vendor. These 39 articles are found in 34 different journal titles.

For the 40 articles found to be unavailable because the HSL electronic coverage for the journal began later, the publishers for 26 of them do not provide online access for the date of the citation; 9 do provide access for the dates of the articles, but HSL has not acquired that coverage. These 40 articles are found in 33 different journal titles.

Discussion

The results suggest that our users are perhaps not finding one out of every five articles they seek in electronic format. This result is slightly worse than that of our print availability study in 1997. This, and the problems we know some of our users experienced navigating to our resources from off-campus computers prior to our improved EZ proxy service, could certainly account for our low LibQual scores. At the time of the LibQual survey, the library subscribed to fewer electronic journals. It is likely that an even greater number of articles would have been unavailable then is the case now. With our increased electronic journal holdings, and our proxy service that makes off-campus access to our licensed electronic resources easier, we hope that user satisfaction with their access from home or office to resources they need has improved. We look forward to the results of future LibQual or similar surveys.

We are somewhat surprised at the limited number of reasons for failed availability. In most cases, it is a matter of acquisitions. Subscribing to more of the journals our users are seeking and acquiring where available more coverage of those journals to which we already subscribe would address most of the availability failures. We expected more problems with broken links and navigational failures within journal websites, i.e. failures of accessibility. Questions put to our AskLib service over the years had often been from users having difficulties with just such problems, although these kinds of problem reports had decreased lately. It is encouraging to discover that these difficulties are becoming fewer as technologies for managing and resolving linking failures have improved.

It is not surprising that most of the unavailable articles were published before 2000. Of the 88 unavailable articles, 67% (n=59) were older articles. Often, this older content is not yet available electronically from the publisher for the library to acquire.

Limitations

This study only looked at the question of availability. How easy it is to navigate to an available resource and what difficulties a user may experience searching a journal title or article are accessibility questions left to other kinds of studies. User questions at service desks and to AskLib show that users experience problems with authentication when using off-campus

computers, with browser configurations for EZ Proxy, with confusing aspects of website presentations, with our EJ database notations and directions, and with our sometimes multiple alternate paths to get to full-text. All of these in the user's mind may translate into a problem of resource availability. Usability studies and problem reports help us determine the nature and extent of some of these problems.

Characteristics of the searcher of online resources are also factors related to accessibility rather than availability. Our citation searches were conducted by a researcher who has earned a masters degree in library science and who has public service experience at UNC HSL. Her experience and persistence are not likely typical of most users. However, on the question of availability, these characteristics are not relevant. This study only asks whether an article has been made available.

Our citation searches were conducted early in the calendar year when changes in links and finding tools may not yet accurately reflect changes in licensed subscriptions and holdings.

Conclusion

The results of this study confirm that there are remaining gaps in meeting 100% of our users needs for electronic access to journals. Increased journal electronic holdings and coverage will address some of those gaps. Availability does not translate into accessibility and further user studies are needed to identify and address access difficulties to available resources. This study helps us to separate the two.

Table 1:

Citation Set	Total	Available	Not Available	Reasons
DENTAL	50	36	14	7 – no EJ subscription 6 – coverage later 1 – denied access
FPIN	50	37	13	6 – no EJ subscription 6 – coverage later 1 – suspicious citation
CANCER	50	46	4	3 – no EJ subscription 1 – coverage later
PHARMACY	50	45	5	4 – no EJ subscription 1 – coverage later
PUBMEDCentral	50	38	12	2 – no EJ subscription 8 – coverage later 2 – denied access
E-RESERVES	150	110	40	17 – no EJ subscription 18 – coverage later 3 – denied access 2 – suspicious citation

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