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When deciding what to include in their online public access catalogs, libraries struggle with how to handle open access, freely available electronic scholarly resources. One component that has been missing from the discussion is a use study that examines the access of freely available electronic journals that are not managed by large publishers or vendors. An examination of the use of freely available open access journals through the library catalog may offer more insight into this discussion. This paper is an empirical study comparing usage statistics gathered at the University of North Carolina at Chapel Hill's University Library. Evidence suggests that paid-for journals receive more use, but that freely available journals are still accessed.

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Freely Available and Paid-For Electronic Journals: A Comparative Study of Use

by
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Introduction

Technology has dismantled the traditional notion of the library as a building filled with books. A recent *Wall Street Journal* article discussed the evolution of the library, noting that Valparaiso University's new library building has 80,000 fewer books than the original one; Marquette University's library, built in 2003, is actually an "information commons" with only 5% of the books of the original library (Conkey 2006).

These physical changes reflect the changes in academic libraries' approaches to how they provide information. As Hur-Li Lee has pointed out, the internet and rise of electronically available information have not only changed how library users *can* access information, it has changed how they *expect* to (Lee 2000). The implications of these changes are evident in the decisions libraries make regarding what electronic resources to direct their users to.

In examining how the academic library maintains its place as a center for information, electronic journals, and access to them, are becoming more important. As Abby Smith, director of programs for the Council on Library and Information Resources wrote in her introduction to the 2004 study *The Nonsubscription Side of Periodicals*: "Digital technology is changing the way in which students and faculty seek information, even in traditionally print-intensive disciplines such as history and literary

studies.”¹

Whether an item is electronic or not, by including it within the library catalog, the library has decided that an item is worth spending financial resources on. In addition to purchasing costs (if any) to acquire material, by including items in the catalog, the library has to spend money on staff to accomplish the work of processing, creating catalog records, and alerting staff to the addition of new materials in the catalog. Once admitted to the catalog, both physical and electronic materials require maintenance and storage space (though of different natures), contributing to the library costs for overhead, upkeep, and trained staff.

When it comes to electronic journals, libraries find themselves in an interesting place. Traditionally, acquiring and cataloging e-journals has not been controversial. The majority of e-journals are electronic versions of print journals which reside within the physical walls of the library. The physical nature of print objects makes them easier to define as part of the collection: they are within the library building. In turn, the materials and their presence in the library building, conform to the traditional organizational structure of the library catalog. Electronic versions of print journals can be easily handled as simply another representation of the physical volume that can be cataloged in a familiar way.

But in the past several years, publishers, academics, scholarly associations and independent scholars have begun to create electronic-only journals, which have no print counterparts. Within this new publishing model, the open access movement amongst scholars has taken hold, and many academics are disseminating their scholarship (or

¹ Smith, Abby in Schonfeld et al. (2004). p. vii.

versions of their work) in electronic environments. Now these freely available open access journals are taking their places in library catalogs; is it a good use of the library's resources to include them?

With a preponderance of studies pointing to the impact of open access publications in scholarly research,² what kinds of decisions will academic libraries need to make to ensure that the freely available open access resources are accessible to their users? With this study, I propose to investigate the academic library's interest in including freely available electronic journals in their online catalog. In making this study, I hope to come to a conclusion about the popularity of freely available journals as resources for members of an academic community and the function the academic library's catalog plays in promoting the use of these resources.

If librarians can come to some conclusion about the users' preference for these materials, the library can make more informed decisions when it comes to allocating its resources. Costs such as overhead, staff time, and subscription costs can be re-examined if the librarians have some evidence regarding which type of resource is being used. This study will attempt to provide some of this evidence by demonstrating what kinds of electronic journals are used by library patrons. It will also contribute to the larger discussion centering on the place of open access and freely available information in library catalogs. Additionally, it will add to librarians' understanding of how libraries might examine other business models for operating--for example, as information centers--as they compete with Google for users' attention.

² See, for example, S. Lawrence's 2001 and Kristin Antelman's 2004 studies, which provide evidence that open access titles are cited more often than their non-open access counterparts.

What a library's interest is, of course, depends upon the individual institution, but broadly speaking, libraries exist to provide their patrons with information, freely. The catalog is the method by which the library communicates these resources and their formats to its users. Furthermore, to successfully serve their communities, libraries must pay attention not only to what kinds of information their patrons want and need, but to the formats they prefer to use to access this information. For example, an academic math library would naturally strive to acquire the books, serials, and resources the math faculty and students want. Similarly, if the math faculty wants to access these materials electronically, the library should do its utmost to facilitate the users' preferences.³

If the librarian profession embraces the open access model, this will mean dedicating resources to ensure the management of electronic resources that are outside of the traditional realm.⁴ Free journals which are created outside of the vendor and big-publisher arena add another layer to the open access movement; they are not only available without traditional copyright restrictions, they cost nothing for the user to access. Though these journals may be free of subscription costs, they will require the same upkeep and attention libraries provide to paid-for journals, presenting librarians with a unique challenge: will users access these free journals and make it worth the library costs to maintain them?

³ The American Library Association website's advocacy section emphasizes the mission of libraries: no citizen should be prevented from accessing information; libraries exist to provide the users of their communities with free access to information. See <http://www.ala.org/ala/issues/gettingstarted.htm>.

⁴ A discussion of blogs and wikis is outside the scope of this paper. However, they are important and influential electronic sources for information; libraries are just now beginning to grapple with how to handle pointing to them. This is an area rich for future research.

This paper will not be concerned with judging the concept or publication methods of freely available journals. It will address a host of practical problems that the librarian must be aware of before adopting free electronic journals as resources.

After defining open access publishing and discussing why scholars are using it, I will make a distinction between open access and free electronic journals. I will then examine what studies have been done to evaluate the impact of open access publishing in scholarly work, demonstrating that both citation analysis and usage studies show that library users refer to electronically available open access titles more often than their print counterparts or similar print titles. An important part of this discussion is the purpose of the library catalog; I will review how electronic resources have changed the nature of the online catalog and what questions free resources bring to collection development.

Finally, I will offer a comparative analysis of the use of freely available electronic journals and subscription electronic journals. My study will be distinct from previous ones which have measured electronic journal use. Other studies have used citation analysis to track the use of open-access articles or compared use between print and electronic versions of the same journals. This study is a usage statistic analysis of freely available, open access journals not managed by large publishers or aggregators. I will use the University Library of the University of North Carolina at Chapel Hill as a case study. Gathering use statistics from a program created by Andy Ingham at the University Library, I will count the number of times a freely available electronic journal has been accessed through the library catalog during a one-year period, from September 1, 2005 to August 31, 2006. I will then compare this number with the number of times

paid-for journals of similar scope and content have been accessed during the same time period.

Ultimately, this study seeks to follow Hur-Li Lee's example and examine the nature of the academic library's online catalog. As the borders of the library blur, how should libraries point to free electronic resources?

Distinguishing Between Open Access and Free Journals

While "open access" is a concept which is still evolving, it essentially allows for the electronic dissemination of original scholarly work outside of the traditional publishing model. The traditional model usually requires that an author sign over the legal publication rights to publish his or her material to the publisher. The open access model promotes a publishing scenario in which the author does not give up the copyright. This model allows authors to publish in their articles in other venues and in different versions, and gives users the ability to access and reprint articles.

The best methods for promoting open access scholarship are generally agreed to be dissemination of work through open digital repositories and electronic journals, as these are produced and publicized within academic communities (Bailey, 2005). Even so, flexibility among publishers has developed. Elsevier, the largest, and therefore arguably the most powerful, publisher of science, technology and math titles, allows authors to retain rights to "preprints" of their articles and other modified versions of their published material in online environments. Elsevier also allows authors the right to post the article on the author's personal website or the website of their institution, as long as a link to the journal homepage or the digital object identifier (DOI) of the article

is present.⁵ Outside of the realm of science and technology, however, traditional publishing models persist.

While legal constraints have been eased in some arenas, the author still has the right to charge for access to his or her work, and publishers still charge for subscriptions, thus “open access” does not mean “free.” This paper is interested in the small but growing area of journals which are electronically produced and do not charge fees of any kind to the user.

Literature Review

To date, the relatively new but highly productive literature which attempts to measure the impact open access publishing is having on scholarship and academic libraries has not focused on free resources. However, they do point to the preference users have toward electronic publications and open access electronic journals.

Many studies of open access journals rely on citation analysis to measure their popularity and make statements about their impact. Another approach to measuring use is employing usage statistics; the studies in this area have examined print versus electronic journals or compared vendor-created and “home-grown” statistics. None have compared usage statistics between paid-for and free electronic journals.

Supporters of citation analysis argue that it offers scholars a chance to measure the impact an article has had in the field. Steve Lawrence’s 2001 study analyzed citation rates for almost 120,000 articles in the computer science field and related fields, finding that “the mean number of citations to offline articles is 2.74, and the mean number of

⁵ Elsevier Author Gateway, “Getting Published. Copyright Information.” Retrieved September 20, 2006 from <http://authors.elsevier.com>.

citations to online articles is 7.03, an increase of 157%.” Kristin Antelman’s 2004 study spanned four disciplines, philosophy, political science, electrical and electronic engineering, and mathematics, and also used citation analysis to demonstrate that when an author’s work is open access, it has a greater chance of being cited in scholarly research Susan Herring’s 2002 citation analysis showed that over 55% of articles cited electronic resources; she further argued that electronic resources encouraged interdisciplinary study and cross-discipline use of resources.

Usage statistic studies can provide academic libraries with useful information which they can in turn apply to their own environments. There are two methods for compiling user statistics: a library can obtain them from the vendor or through locally created software programs. The drawback of obtaining them from a vendor (if they offer to provide statistics, and not all do), as pointed out by Joanna Duy and Liwen Vaughan (2003), is that the vendor is very invested in providing the library with high usage rates. However, locally created counter programs are not foolproof: they may not count individual article hits or may over-count due to indexing “bots” sent out by search engines.

Tim Bucknall’s 2005 study at the University of North Carolina, Greensboro library examined how users access journal articles; using a locally created program the library found that when a title was listed individually in the public catalog, it was more likely to be accessed than if it were listed only in the subscribed-to database.

Both methods of measuring use have drawbacks. In terms of its contribution to the field of study, an article’s citation rate does not necessarily indicate its relevancy. In terms of its access, an electronic version of an article might be read, or at the least

clicked on, many more times than it is cited in an article. Therefore, usage statistics could arguably be a better indicator of an article's stature as a resource. However, most homegrown and vendor-produced usage statistics do not measure the hits of an article; rather they measure the hits a journal title receives. Tim Brody, Steven Harnad and Leslie Carr's 2006 publication studies the relationship between online use of electronic journals and their rate of citation. Examining physics literature during the 2001-2004 period, the authors compared the number of web downloads of an article with the number of citations it later received to demonstrate that there is a significant and strong correlation between an article's online presence and the likelihood that it will be cited.

One component that has been missing from the discussion of open access is a use study that examines the access of freely available journals that are not managed by large publishers or vendors. An examination of the use of freely available open access journals through the library catalog may offer more insight into this discussion.

The Purpose of the Online Catalog

This study of use is seated within a larger discussion regarding the purpose of the library's online catalog. The online public access catalog serves the library in its role as information provider by representing to the library's user what resources the library can provide. There is a debate about whether or not library catalogs should include freely available, open access electronic journals. Sarah Thomas sums up the opposing viewpoints in her 2000 paper, "The Catalog as Portal to the Internet":

"Should the catalog encompass all items that are considered part of a library's collection, even if those items are not physically held by the library? Should it even serve as a general gateway to the entire Web?"

Proponents of the catalog and of libraries believe strongly that the catalog has enduring value and that it can evolve to be a useful tool for Web access, whereas critics do not foresee any role for the library catalog as a research tool for networked information.”

Traditionally, the catalog, whether in card or electronic form, acted as a representation of the resources collected within the library building. Even so, the notion that a library’s resources were restricted to a physical space was challenged before the internet era; interlibrary loan arrangements allowed libraries and their users access to resources outside of their own collections (Lee, 2000). Traditional interlibrary loan, however, dealt with familiar print materials. Furthermore, even if the items didn’t exist in one’s own library catalog, they existed in one elsewhere, and therefore had been likely been evaluated and approved by another collection development librarian.⁶

As both Lee and Thomas emphasize, the rise of the web as a source for information expands the boundaries of where the profession turns to select resources. The academic library might be able to direct users to web resources created within its parent institutions, such as digital libraries or repositories, but the majority of web-based resources that a library features will not have been created within its community. How, then, should the library present these information sources to users, if the catalog is meant to represent a collection?

In addressing this, it is important to keep in mind that the catalog represents materials gathered for a specific community of users. In the era before the internet offered easy access to an abundance of free information, librarians would still provide free printed materials, evaluating these resources with not only shelf space but their

⁶ The practice of electronic interlibrary loan, using programs such as ILLiad, further pushes the notion of “ownership.” See Kriz, Harry M. (2000).

users' needs in mind. The same practice should apply to free electronic resources: the user community and its needs must be a factor in developing the collection.

To include electronic resources in the library catalog is to give them a place in the library collection. Thus, to argue for the placement of electronic materials in the catalog, subscribed or free, is to acknowledge that the catalog is not simply a representation of the items within the library building. It is a representation of materials that have been evaluated and scrutinized using the same standards for inclusion as traditional materials. In short, if the catalog is going to include free web materials, libraries must know their users' needs.

In an emphatic response to Thomas's paper, Brian E.C. Schottlaender (2000) highlights the arguments against expanding the definition of the online catalog to include internet gateway. Schottlaender notes that the catalog is a "metadata constellation," which encapsulates particular objects. This constellation can be connected with other constellations (for example, portals to the internet such as Google) but should not be expanded: "To ask catalogs to serve as portals to the Web is asking too much of them." Rather, Schottlaender argues that by linking to resources outside of the library's bibliographic control, the catalog is no longer a catalog, and that professionals should not call it one; the online catalog should only include the materials purchased by the library.

This perspective emphasizes the unstable aspects that small, non-publisher produced electronic journals can carry. For example, an academic might have the highest of hopes when she decides to create a new journal of social studies. This journal is accessible at a URL associated with her department at the university where she

works. But after the first issue is created and publicized to interested users, she gets tenure at a new college, and takes the journal with her to a new URL. How will she ensure that the new URL is communicated in a timely manner? The existence of persistent URL's and digital object identifiers does not mean they have been widely incorporated into web publishing practice. Websites change, disappear, and alter. Librarians have no control over this. Therefore, when selecting a web resource to point to, a librarian must make the judgment based on the likelihood that it will be stable. Unfortunately, it is unlikely that once a librarian presents a resource she or he will revisit it to ensure that it still exists where it is, or that its content hasn't significantly changed.

This is only one way in which freely available, non-aggregated journals can be difficult for a library to manage. Journals created with the best of intentions for longevity often end up producing one issue, or lose their place on the web altogether. For paid and free electronic journals available through aggregators, libraries can rely on vendors and publishers to maintain up-to-date location information. It is the job of publishing companies to ensure access, and they have the staff and capabilities to do so. When a library decides to catalog a freely available, non-aggregator electronic journal, they must be aware that the resources are less likely to be managed efficiently.

In one approach to solving this dilemma, libraries have created alternate methods to communicate with users about useful web resources. Libraries create pathfinders and subject guides to recommend resources which exist outside of the

library's control to users.⁷ The decision to include a free e-journal in the online catalog, however, might be traced to an institution's collection development policy.

The University Library at the University of North Carolina at Chapel Hill (hereafter, UNC) outlines its acquisitions priorities in two documents: the collection development overview (<http://www.lib.unc.edu/cdd/about.html>) and the 2005 Library Directions report (<http://www.lib.unc.edu/Plan20051118.pdf>). While the collection development overview does not specifically comment upon electronic journals or serials, the *Library Directions* report of 2005 does offer insight into the library's position. Specifically, under the section "Core Issues: Collections" the library outlines a set of goals, one of which is: "Maximize the buying power of acquisitions funds and seek new sources of funding." To this end, the library notes it will "move aggressively to acquire high quality electronic content that is a good cost value" (Michalak, 2005). One aspect not discussed in this context is use, which implies that the library considers it important to create access to information regardless of how often it will be accessed.

It is useful to compare the UNC statement with the university libraries of North Carolina State University (NCSU) and Duke University collection development policies. Two of the other universities in the local Triangle Research Libraries Network (TRLN) consortium, both Duke and NCSU have posted information regarding their collection development policies on their websites. NCSU's published collection development statement is brief and general, noting that they acquire titles which support

⁷ The research literature discussing online pathfinders focuses on content analysis and design; further study of use of online pathfinders needs to be done. See Dahl, Candice (2001).

the University's core subject areas and strengths.⁸ Duke libraries and departments each have their own collection development policies, posted on their individual websites. The collection development policy of the reference department, for example, outlines the materials collected and subjects supported.⁹ Again, similar to UNC, the two university libraries do not have a published statement that pertains directly to their decision to collect freely available electronic resources.

UNC's University Library began to catalog some free electronic journals in 2002. This move reflects the philosophy outlined in the *Library Directions* report. To access the library collections, users are encouraged to use the library's web interface, located at www.lib.unc.edu. This is the homepage for the libraries. The library allows users to access electronic journals through two methods, making no distinction between freely available and paid for journals. First, the user can search the library catalog, the prominent search feature located at the top of the homepage. The second method is by searching for a title using the library's "E-journal Finder."

This design is not unusual among university libraries. Comparable institutions such as NCSU's library and Duke University's library homepages also offer two methods for retrieving electronic journals. A user can do a search for a journal through the online catalog or through a "Journal" search (see Appendix 1). Searches on NCSU and Duke's catalog indicate that, unlike UNC, NCSU does not offer access to freely available electronic journals through their library catalogs: only through the journal

⁸ *North Carolina State University Libraries, About Collection Management*. (n.d.). Retrieved September 9, 2006 from <http://www.lib.ncsu.edu/collectionmanagement/aboutcm.html>.

⁹ *The Perkins Library General Reference Collection*. (2005). Retrieved September 9, 2006 from <http://www.lib.duke.edu/collect/perkref.htm>.

search. This allows libraries to present resources without altering the traditional concept of the catalog. However, the University of North Carolina's University Library and Duke University Library have decided to stretch the notion of the catalog, and include freely available electronic resources in their online catalog systems.

In terms of freely available electronic journals, several issues surround the decision to make these items available through an academic library catalog: collection policy, cost, control and use. In the case of the University library, as noted earlier, there is no explicit collection development policy regarding free electronic journals. However, the practice regarding freely available electronic journals is analogous to the selection of gifts for the collection. Both types of resources are evaluated and vetted by subject specialists before a decision is made to collect them. In other cases, where the collection policy may not address the issue, libraries can choose to remain open to free electronic resources that are evaluated and selected in a manner similar to paid-for resources.

Regarding cost, open access journals and subscribed-to journals compete for the time and attention of staff. Subscribed-to journals receive a majority of staff attention, because the library pays such a great deal for them; freely available electronic journals are generally lower priorities for processing and adding to the catalog. The costs of subscription journals may be high, but libraries benefit by relinquishing responsibility for the stable maintenance and storage of electronic materials to the publishers; the issue of archiving the electronic versions, however, has not been resolved.¹⁰ Outside of subscription and access costs, one study estimates that the annual "non-subscription"

¹⁰ Schonfeld et al. p. 16.

costs (staff resources, maintenance, and utilities) related to electronic journals in academic research libraries ranges from \$7.28 per title to \$47.04 (still substantially lower than the \$29.37 to \$313.89 range for print periodicals).¹¹

In bibliographic terms, as Schottlaender points out, the catalog traditionally operates as a collection of metadata used to control the library's objects, and is created using standards that librarians have agreed upon. Once the library allows non-traditional objects into the catalog, to some degree, that metadata is no longer under librarian control. Whether or not the free materials *should* be treated in the same way, of course, is a decision that is made in the library's collection development policy. But once the library has made the decision to include free resources, one method to address the metadata question is for the library to create catalog records for the freely available resource using the same standards as paid-for resources. This catalog record creation—even if it is less-labor intensive copy cataloging as opposed to original cataloging—will contribute to the library's cost.

There is a movement outside of the library system to create indexes of open access titles; the most popular is the Directory of Open Access Journals (www.doaj.com). The DOAJ's stated aim is to “increase the visibility and ease of use of open access scientific and scholarly journals thereby promoting their increased usage and impact.... The Directory aims to be comprehensive and cover all open access scientific and scholarly journals that use a quality control system to guarantee the

¹¹ Schonfeld et al. p. 22.

content.”¹² However, studies have demonstrated that the DOAJ falls short of its goal. Sally Morris’s 2006 study examined 1,443 journals managed through the DOAJ, and found not only that holdings information was often incorrect, approximately 5% were not accessible, did not offer full content, or were not actually journals. Furthermore, the DOAJ does not include journals that are open access and deemed vital to scholarly communities they serve; Robin Peek (2005) has pointed out that the criteria of the DOAJ leaves out one of the most respected and read electronic publications dealing with open access issues, *D-Lib* magazine. Though we cannot rely upon the DOAJ to be a definitive source of open access titles, its existence demonstrates the information community’s desire to manage this growing community of resources.

The last factor in the decision to make freely available electronic available through the online catalog is the use of the items. As research studies demonstrate, open access titles are used, even preferred. Will the free resources be used and consulted? If so, how can we measure their use?

Methodology

In tracking and comparing the use of freely available electronic journals with their paid-for counterparts, this study will contribute to the growing literature on open access journals while offering some concrete numbers for librarians to consider when weighing how to allocate their resources. Using a library-created usage measurement program, I have counted the number of “hits” relevant journals receive to ascertain and

¹² *Directory of Open Access Journals, About.* (n.d.) Retrieved September 10, 2006 from <http://www.doaj.org/articles/about>.

compare use between free and paid-for journals. I then draw conclusions about these resources' use to make recommendations regarding the allocation of library resources.

The free journals that I examine in this study are all available without charge over the internet and are open access.

I measured and compared the use of ten freely available and subscribed-to electronic journals using the MySQL database created by Andy Ingham of the UNC University library to track the number of "hits" a journal receives via the libraries interface (see Appendix 2). All access through the library catalog goes through a proxy server; an Apache log is used to compile all the hits. The "hits" are clicks from the University library website's catalog to the journal. For example, users who access a freely available journal through a Google search will not be recorded, but if they access this free journal through the UNC library catalog, the hit will be recorded. Because these are open access journals, they are open to being indexed by search engine bots and spiders, web-crawling software programs that index sites for companies such as Google. As I counted the hits of the open access journals, I disregarded "hits" ascertained to come from bots or spiders. I then compared this count with accesses recorded for relevant paid-for journals I identified; these accesses are gathered in the same University library database, using the same method. Paid-for journals, however, are not indexed by search engine bots, and therefore did not need to be examined to remove bot or spider hits.

The library adds dozens of freely available electronic journals to its catalog every year. For the purposes of this study, I was interested in examining journals in the humanities to gauge their use; as Antelman and others have noted, the social sciences

have lagged behind the “hard” sciences in their creation and acceptance of open access publishing. The journals I chose were meant to represent an array of fields. I also strove to choose titles that appeared to produce materials on a regular (at least an annual) basis, offered the full text of articles, had been selected by a member of the collection development department, and were affiliated with an academic department, scholarly society, or cultural institution.

I then sought ten paid-for print counterparts with which to compare the free journals. While it is impossible to find identical publications, comparable journals were found. To qualify as a “comparable” journal, the paid-for journal had to meet certain criteria. Primarily, the paid-for journal’s scholarly scope should be similar in subject matter and approach; for example, a free contemporary art journal should be compared to a paid-for contemporary art journal, not to an art journal that focuses on classical or renaissance art. The paid-for journals, like the free ones, should provide the full text of articles. Audience was another criterion in the selection process: if the free journal’s audience is geared towards a specific group in the scholarly community, such as graduate students, the paid-for journal should be as well. Other evaluative measures employed included matching the frequency of publication and number of articles per journal. Once these criteria were established, I located comparable journals by reviewing the library subject guides, reading citations, and doing LC Subject searches in the library catalog.

Results

The first chart shows the number of hits recorded by the library's statistic-gathering program, and the hits the journal actually received. The first column includes all hits counted by the program; the second column reflects the count after hits from indexing bots and spiders have been discounted. This is an important consideration, as libraries rely on usage statistics, in part, to allocate funds for budgets. The UNC program identified some bots automatically; for many others I used the tool provided by the American Registry for Internet Numbers known as "whois" (<http://www.arin.net/whois/>), which provides owner names of IP numbers (see Appendix 3 for an example of how a bot was identified). The remainder of addresses can be categorized as legitimate "hits" as they were from within the UNC IP ranges or when the IP address indicated that the hit was coming from a subscription internet provider service. (Due to privacy concerns, I cannot reproduce the list of IP addresses that accessed titles examined here.)

As the results indicate, it is important that the difference in measured hits be noted. The statistics collected without accounting for bot and spider hits indicate that journals were accessed on average two to fifteen times as often as they actually were. The largest gap between recorded hits and actual non-spider or bot hits is seen with the *Journal of Libertarian Studies*. Though the statistics indicate it was accessed 88 times, an examination of the IP addresses which accessed the site demonstrates that only 20 of those hits were from real users. The actual use rate was 22.7% of what the program reports as a hit. The largest measured gap in terms of percentage is seen with *EJKM: Electronic Journal of Knowledge Management*. The journal received 3 actual users hits; that is only 6.5% of the 46 hits recorded by the library program. If the library relied on

the simple statistics rather than examining the originating IP address of the hit, the use statistics would be severely inflated.

Title	Hits with indexing bots	Hits without indexing bots
Axess	24	12
Behavior and Philosophy	21	13
EJKM: Electronic Journal of Knowledge Management	36	12
Electronic Journal of Analytic Philosophy	46	3
Fempower	55	31
Journal of Contemporary Art	32	9
Journal of Libertarian Studies	88	20
Journal of MultiDisciplinary Evaluation	18	7
Journal of Social Science Education	37	20
MIT Electronic Journal of Middle East Studies	47	19
Oxford Journal of Anthropology	35	20

Figure 1: Hits of electronic journals with and without bots and spiders.

Once an accurate count of the actual hits had been made, I sought paid-for titles which were comparable to the freely available electronic journals in content, publication frequency and audience.

Titles that are identified as “paid-for” are electronic journals that are purchased by the university and made accessible by one of two methods: either by direct subscription, or through an aggregated subscription service. The subscription services are purchased by the library, and in addition to offering the journal content, provide a variety of different search interfaces. These services are commonly referred to as “aggregations.” The services “aggregate” (collect) electronic journals from several different publishers and place them in one area for search (Born 1999). These aggregations are often organized thematically. The most common provider of paid-for content in this study is Ebsco; Ebsco offers aggregated services using the

“EbscoHOST” moniker, providing collections of published information under names such as “Academic Search Elite” or “MasterFILE Premier.” Other providers include Springer, Thompson-Gale and Wiley. The content of these aggregations can often overlap.

Users of the library select which aggregator they want to view the title through after they have clicked on the title in the catalog. In examining the hits paid-for titles receive, it is important to note that while they are entered in the catalog only one time, they are available through many different aggregators. The different aggregators may offer varying coverage dates for the same journal; the difference in coverage will likely influence the decision a user makes when selecting a version of the journal to view.

The number of aggregations through which a journal is available did not appear to impact the number of hits it received. For example, if we look at the individual titles, we can see that two paid-for journals in particular account for the majority of the hits: *Violence against Women* and *Art Bulletin*. *Violence against Women* is available through only one subscription service, Sage Publications. *Art Bulletin*, on the other hand, is available through eight different aggregations: JSTOR, Academic Search Premier, Expanded Academic ASAP, MAS Ultra: School Edition, Academic Search Elite via EBSCOHost, MasterFILE Premier via EBSCOHost, Infotrac OneFile, and Art Full Text via Wilson Web.

Figure 2 illustrates the hits received by each free journal and its paid-for counterparts. Figure 3 provides percentages of total use for each pair of compared titles.

Free Electronic Journal	Hits	Paid-for Electronic Journal	Hits
Acess	12	Scandinavian Review	1
Behavior and Philosophy	13	Complexity	13
EJKM: Electronic Journal of Knowledge Management	12	Journal of Knowledge Management	15
Electronic Journal of Analytic Philosophy	3	Erkenntnis (International Journal of Analytic Philosophy)	30
Fempower	31	Violence against Women	120
Journal of Contemporary Art	9	Art Bulletin	152
Journal of Libertarian Studies	20	Reason	13
Journal of MultiDisciplinary Evaluation	7	American Journal of Evaluation	52
Journal of Social Science Education	20	International Journal of Social Education	10
MIT Electronic Journal of Middle East Studies	19	Middle Eastern Studies	27
Oxford Journal of Anthropology	20	Assemblage	1
TOTAL	166		434

Figure 2: Hits on free journals versus hits on comparable paid-for journals

Free Electronic Journal	Percent of total hits	Paid-for Electronic Journal	Percent of total hits
Acess	92%	Scandinavian Review	8%
Behavior and Philosophy	50%	Complexity	50%
EJKM: Electronic Journal of Knowledge Management	44%	Journal of Knowledge Management	56%
Electronic Journal of Analytic Philosophy	9%	Erkenntnis (International Journal of Analytic Philosophy)	91%
Fempower	21%	Violence against Women	79%
Journal of Contemporary Art	6%	Art Bulletin	94%
Journal of Libertarian Studies	61%	Reason	39%
Journal of MultiDisciplinary Evaluation	12%	American Journal of Evaluation	88%
Journal of Social Science Education	67%	International Journal of Social Education	33%
MIT Electronic Journal of Middle East Studies	41%	Middle Eastern Studies	59%
Oxford Journal of Anthropology	95%	Assemblage	5%
TOTAL	28%		72%

Figure 3: Hits on free journals versus hits on comparable paid-for journals in percentage terms

In reviewing the total hits for the two groups of journals, the results point to a user preference for paid-for titles. Paid-for journals received total of 434 hits while their free counterparts received only 166 hits: paid-for journals were accessed through the catalog 2.6 times as often as free journals.

Four of the ten free journals (40%) received more hits than their paid-for counterparts; one free journal received the same number of hits as its paid-for equivalent.

On average, when free journals were accessed more often, they were accessed 24 times in the time period. However, when paid-for journals were the preferred source, the average number of hits of the paid-for electronic journals accessed jumped to 79.2, over three times as often as the preferred free journals.

In cases where the paid-for journals are accessed more often, the users' preference might indicate a number of things. We can see that in philosophy, art, international studies, women's studies and interdisciplinary studies users sought the paid-for titles. This could point to the fact that free journals have not reached a level of acceptance in their scholarly communities. It could also highlight a lack of visibility of the publication; potential users may approach the library catalog with publications in mind, not knowing that the free electronic journal exists. The free e-journals in this study were added to the catalog in 2005, while the paid-for journals had been in the catalog for much longer. Besides this, indexes, a major resource discovery tool for users, probably do not include these free electronic journals. If users are identifying their journals by search indexes, these free titles likely are not there.

In the instances where free e-journals are accessed more often, we could conclude these publications are visible and well-known. The relatively high rate of use could also highlight that the scholarly communities of libertarian studies, education and anthropology are more open to free electronic publishing. The high use rate could also

be a reflection of the culture in which these journals are produced; there may be a bias towards independent publication and scholarship produced outside the traditional realm.

One title, *Behavior and Philosophy*, was unique in that it was available in the catalog both as a free online resource and as part of an aggregated package.¹³ Its path as a free journal received 13 hits, while the path through the aggregator, Academic Search Premier, received only 5. The free interface offers the user direct access to the journal and its homepage, while the paid-for version available through the aggregator offers a listing of volumes and a search tool. In this case, we might conclude that users prefer the sense of “authority” of going straight to the source of information, rather than through an intermediary. Another factor may be the interface; the free version of *Behavior and Philosophy* also offers information about the publication’s organization, The Cambridge Center for Behavioral Studies, as well as announcements of upcoming meetings, employment services, and other information that may be relevant to users of the resource. The paid-for version offers a path to the articles, but little supplemental information that might appeal to a user.

Limitations of Study

The construction of the library interface means that only clicks on a resource via the catalog are counted. There is no method to distinguish whether a user found the journal through the “Ejournal finder” or through the catalog search. However, every electronic journal in the “Ejournal finder” is added to the library catalog. Furthermore, paid-for journals, being part of aggregations, can be accessed when doing a search in

¹³ The charts provided in figures 2 and 3 do not include the paid-for counterpart of this journal.

the subscription's database. A user may not be aware of the publication's existence before doing a keyword or subject search in an aggregation database.

Other limitations on what can be measured exist. For example, it is not possible to retrieve statistics from UNC's Information and Technology Services to measure if a campus user accessed a free electronic journal through methods other than the library's interface. This information would have added an interesting element on patron resource discovery and the library's role in it. In general, it might serve a library's interest to coordinate with its university's information technology services to track what types of information included in the library catalog users are accessing through other venues.

The hits the database can collect are susceptible to overcounts and undercounts. If a user attempts to access a journal, but cannot due to the system being down or other technical problems, the click is still counted as an access. Because of the nature of the proxy server the library uses to ensure access to subscribed-to resources, if a user has bookmarked a resource, a click via the bookmark does not count. The time a user spends on a resource is not recorded; data regarding time spent on a resource could indicate how useful it is for the user.

In some cases, it was difficult to find a similar title. For example, the *Oxford Journal of Anthropology* is a publication of scholarly research conducted by students at Emory University in Atlanta, Georgia. Firstly, it would not make sense to try to compare this journal, which has been publishing since 2005, with a journal like *American Anthropology*, which has been publishing since 1888 and has an established reputation. Secondly, journals for student work are very common in anthropology departments, but electronic versions of these journals are not, nor are electronic versions

which require subscriptions. I could only find one anthropology journal subscription which UNC subscribes to that is for student work; *Assemblage* is the journal of the graduate students at Sheffield University in the United Kingdom.

Areas for Further Study

This study only scratches the surface of how users access free e-journals. Given the time constraints of the project, the number of journals for which statistics could be reasonably collected is limited. A larger study could encompass a wider range of journals and topics, and examine use based on distinct areas of scholarship, such as art history or philosophy, rather than the under the general category of social sciences.

This study did not measure article access, only journal access. A comparative examination of use between articles in free electronic journals and those in subscribed-to journals would provide a deeper understanding of the types of information users seek through the catalog.

One of the most time-consuming aspects of the statistics gathering and analysis was the identification and removal of indexing bots and spiders. A tool that would automatically identify and remove the hits created by bots would allow libraries to harvest their usage statistics in a more efficient manner.

It would also be useful to explore the different contexts in which these free electronic journals are produced (within an academic department, a cultural institution or another type of organization), how they market themselves to their community, and what kinds of unique challenges they face when competing with established electronic journals.

Conclusion

While this study does not offer broad statements on user preferences for free or paid for journals, the one definitive conclusion we can make is that freely available electronic journals **are** accessed through the library catalog, and at times, more often than the paid-for counterpart. If users are accessing this information, the library is fulfilling its mission in offering relevant resources to its user community. Thus, if the resource is evaluated and selected in the same manner as paid resources, and if the library decides in their collection development policy to point to free resources, the evidence of their use should strongly influence libraries decision to include them in their catalog.

At the heart of this study is the notion of the catalog, and how it is defined. As libraries strive to include a new world of resources for their users, they understandably would like to offer these resources using a tool that has proven effectiveness: the catalog. In grappling with this question, many professionals are finding it difficult to let go of the traditional notion of the catalog that served our libraries adequately in the print era. Pathfinders and other resource discovery tools produced by libraries as alternative methods to adding free web material to the catalog allow libraries to cling to the traditional notion of the catalog. One question that still needs to be answered: why is it so difficult to allow the purpose of the catalog to evolve? Further analyses of **what** the traditional catalog represents to librarians, and discussions of why the community at large is reluctant to change it, need to happen.

In one sense, by cataloging free electronic resources, the University library is breaking with tradition. In another sense, however, it upholding tradition: it continues to strive to complete the difficult task of offering users the resources they need in the manner they want. Over time, with the continued development of free electronic resources, this issue will not be easily resolved, and eventually, and the library profession as a whole will need to come to terms with new conceptualizations of the catalog.

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Appendices

Appendix 1. The home pages for University of North Carolina at Chapel Hill Libraries, North Carolina State University Libraries, and Duke University Libraries.

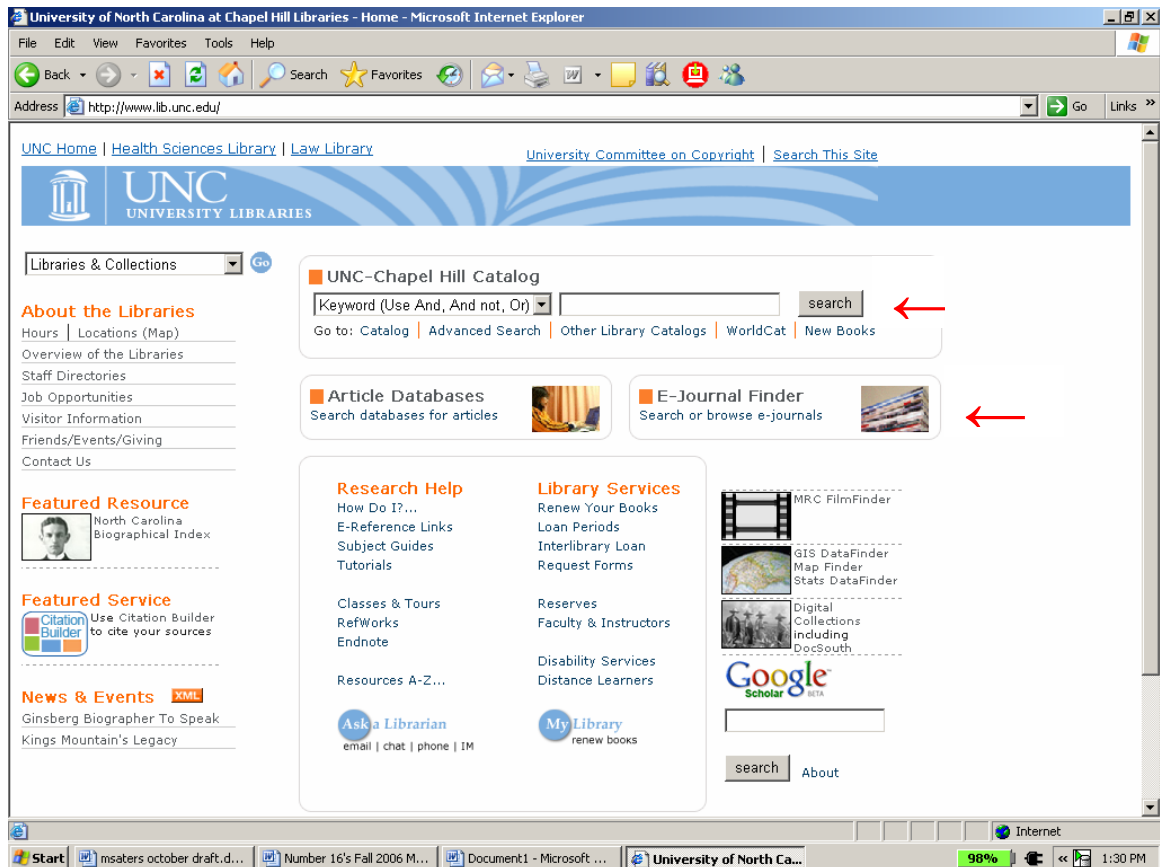


Figure 1: UNC Universities Library homepage (www.lib.unc.edu). Searches can be performed through traditional catalog or through e-journal finder

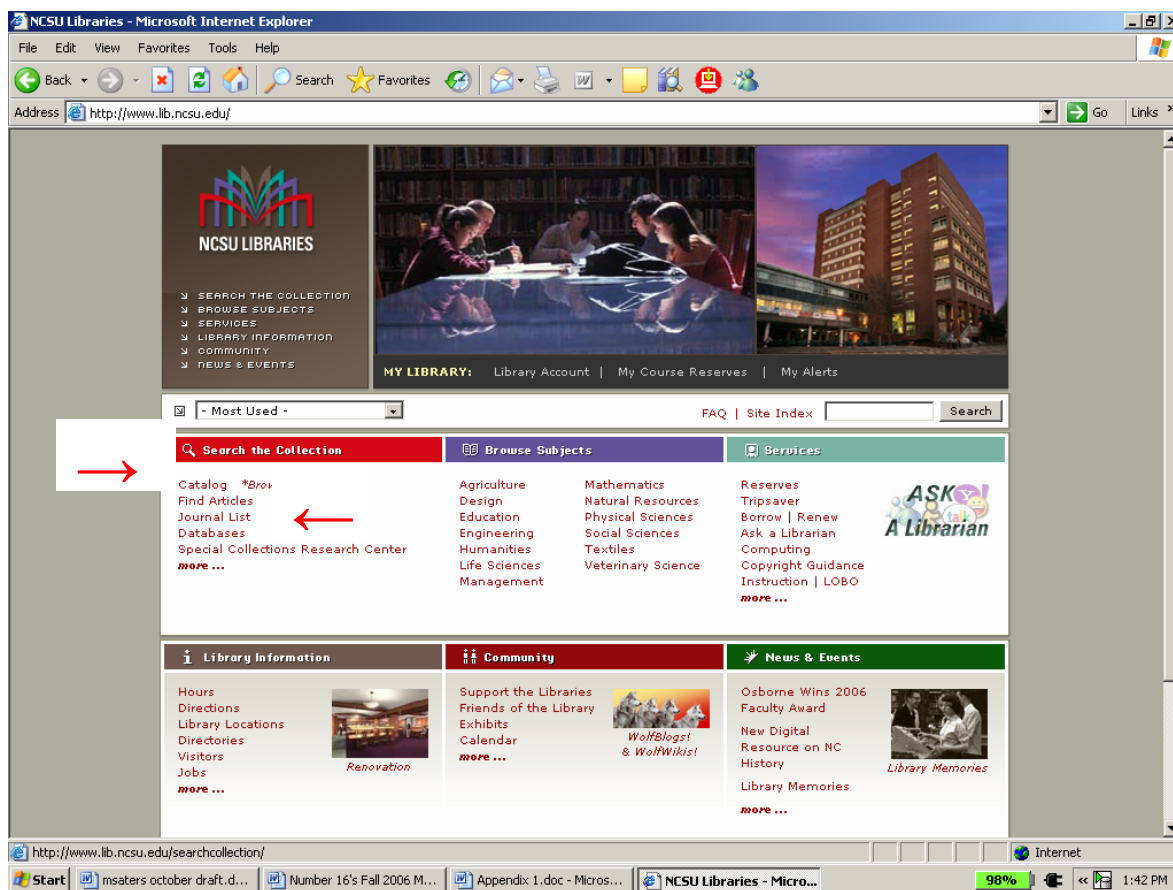


Figure 2: NCSU Universities Library homepage (www.lib.ncsu.edu). Search traditional catalog or through journal list.



Figure 3: Duke Universities Library homepage (www.library.duke.edu). Search traditional catalog or through journal list.

Appendix 2: UNC Libraries Ejournal Statistics Search Interface

The screenshot shows a web browser window titled "EID/EJ statistics - Microsoft Internet Explorer". The address bar displays the URL: https://intranet.lib.unc.edu:82/stats/index.php?resource_type=EJOURNAL. The main content area contains the following text and form elements:

Please enter your search terms (or, [download a standard report from the archive.](#))

Be aware that this INTERACTIVE SEARCHING will only return those accesses during the most recent 12 full months in addition to the current month (up until midnight last night). Coverage for the [STANDARD REPORTS](#) goes back to January 1, 2002.

Starting:
Month Day Year

Ending:
Month Day Year

Vendor name:

OR

EJOURNAL titles that begin with:

Please select the type of resource you'd like to see statistics for:

Be aware that this INTERACTIVE SEARCHING will only return those accesses during the most recent 12 full months in addition to the current month (up until midnight last night).

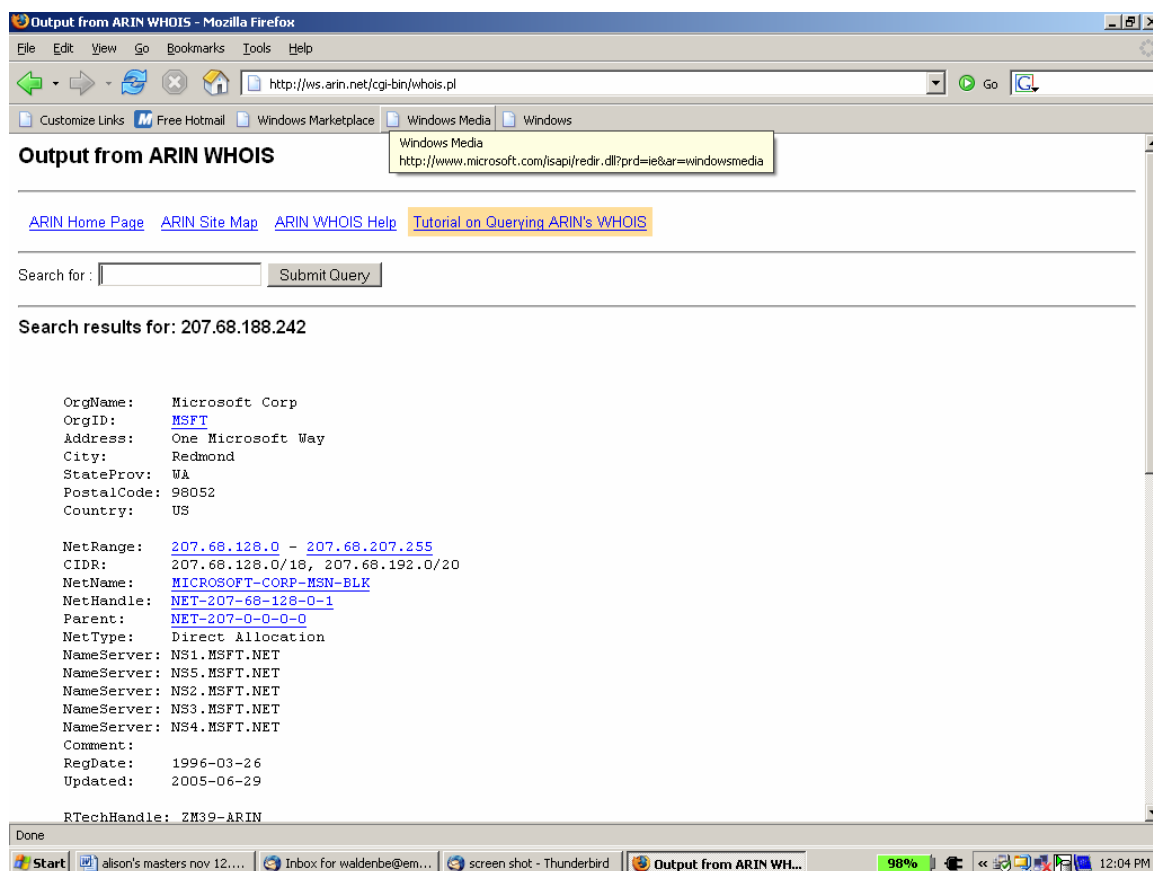
The browser's status bar at the bottom shows the taskbar with several open applications: "Start", "[archives] Job: Women a...", "EID/EJ statistics - Mic...", "Innovative Millennium", and "Millennium Acquisitions". The system clock indicates the time is 1:52 PM.

Figure 1. Initial Search Screen

EJOURNAL	Access(es) between 9/1/2005 and 8/31/2006
A B I X on CD-ROM [Business & Company Resource Center] via Gale	28
A B I X on CD-ROM [Infotrac OneFile]	15
Ä-konomicheskie novosti Rossii i Sodruzhestva [Universal Database of Newswires (UDB-NEWS)] via Eastview	73
Ä-tnograficheskoe obozrenie (Institut Ä—tnologii i antropologii im. N.N. Miklukho-Maklaï, ï,ja) [Universal Database of Russian Social Sciences and Humanities Publications (UDB RSS&HP)] via Eastview	68
A. magazine [Ethnic NewsWatch]	84
A.A.N.A. journal [Health Source: Nursing/Academic Edition] via EBSCOHost - NCLive	177
A.A.N.A. journal [Academic Search Premier] via EBSCOHost - NCLive	40
A.A.N.A. journal [CINAHL with Full Text] via EBSCOHost - NCLive	26
A.A.N.A. journal [Academic Search Elite] via EBSCOHost - NCLive	37
A.I.B.S. bulletin [JSTOR] via JSTOR	49
A.M. Best Newswire [Business & Company Resource Center] via Gale	28
A.M. Best Newswire [Infotrac OneFile]	12
A.M.E. church review [International Index to Black Periodicals Full Text] via ProQuest Company	121
A&D Watch [Factiva] via ProQuest Company	54
A&G Information Services [Business & Company Resource Center] via Gale	24
A&G Information Services [Infotrac General Reference Center Gold]	2
A&G Information Services [Infotrac OneFile]	9
A&G Information Services: Comtex [Factiva] via ProQuest Company	58
Ä%ire-Ireland (St. Paul) [Project Muse]	61
AAACN Viewpoint [CINAHL with Full Text] via EBSCOHost - NCLive	55
AAAS report ... research & development [Infotrac General Reference Center Gold]	2
AAAS report ... research & development [Business & Company Resource Center] via Gale	20

Figure 2: Results Screen

Appendix 3: Example of ARIN WHOIS Display



This screen shows the results when an IP address not identified as a “bot” by the UNC system is entered into ARIN WHOIS. In this instance, the IP address “207.68.188.242” was recorded as accessing the freely available online journal Axxess. Upon entering the IP address into ARIN WHOIS, we see that it came from Microsoft’s Headquarters, and can deduce that it is an indexing bot.