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This paper suggests that relational database-driven systems in the library or information center should be valued not only for the improvements to customer service they can provide, but also for the rich store of data held in these systems which can be queried and used in collection analysis. MyLibrary@NCState is an open source, relational database-driven system that allows users to customize their access to a library's electronic resources and current awareness services. Its backend MySQL database can be queried to show, for example, which electronic journals appear on the most user pages, which bibliographic databases or reference shelf items have been selected the most within a particular range of dates, and which resources are underused. Libraries and information centers can then use these data as a starting point to locate resources for cancellation or those resources needing additional marketing efforts. Results from queries of MyLibrary@NCState's MySQL database as of March 28, 2001 are presented and discussed.

#### Headings:

Internet -- College and university libraries.

Web portals.

Use studies -- Information systems.

Database management systems

MYLIBRARY AS A COLLECTION ANALYSIS TOOL

by  
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## **Introduction**

Since their inception, libraries have experimented with various means of providing patrons with effective access to information. At present, the growth of digitized information has granted unparalleled opportunities for information seeking and distance learning, but at the same time, has increased the likelihood of information overload or “infoglut.” As a means of combating this overwhelming abundance of information, several academic libraries have developed customizable, user-driven interfaces to their electronic resources. The hope is that students, faculty, staff and others affiliated with the university will be able to fulfill their information needs more efficiently and successfully, thus improving the libraries’ service.

Numerous academic libraries have launched customization services and many others have applications in a testing phase. Those with services in production include, but are not limited to, Virginia Commonwealth University (VCU), Cornell University, University of Washington (UW), University of Utah (Health Sciences), California Polytechnic State University, University of Texas Southwestern Medical Center Library and New York University School of Medicine (NYU). One of the pioneers in this area is North Carolina State University Libraries’ MyLibrary@NCState.

NCSU launched its MyLibrary@NCState service in February 1999 as part of their overarching goal of expanding “user access to digital services and resources by creating responsive, open information architecture for public use”(NCSU Libraries, 1999). MyLibrary@NCState allows anyone affiliated with the university - with a Unity

or EOS account - to customize features available on the library's web site. For example, a user's MyLibrary page has links to his/her preferred electronic journals, indexes and databases, World Wide Web links; a quick search feature for fast and direct access to search engines such as Google as well as the library's catalog, as well as several current awareness features, Message from my Librarian and Current Awareness Manager (CAM). Message from my Librarian provides discipline-specific announcements about library additions, interesting web sites, upcoming events, etc. With CAM, users select Library of Congress call number ranges that reflect their area(s) of interest and are then notified by email or via a link on their MyLibrary page when new books, serials, and online databases in that range are added to the library's collections. The MyLibrary@NCState source code is freely available and version 2.50 was released at the beginning of the year. This latest version allows the user to customize the page display and view an entire list of resources in a particular resource type—for example, a link to a listing of all electronic journals—among other things. Those not affiliated with North Carolina State University can view and experiment with MyLibrary@NCState using guest access at <http://my.lib.ncsu.edu/>. The MyLibrary source code can be downloaded from <http://hegel.lib.ncsu.edu/development/mylibrary/>.

Customization efforts of academic libraries arose from the need to create easier access to growing electronic collections. Users can not only limit the resources appearing on their pages to their areas of interest, but also ease their navigation on the web. Dan Ream and Jimmy Ghaphery from VCU explain,

One of the most attractive outcomes of a user created interface is that the number of clicks to a variety of library databases and services is minimized. No longer would the user need to follow one distinct path of several clicks to get to a specific database, then use a completely different pathway and set of clicks to

another section of the library web site. All of the relevant library information would be on one page (Ream & Ghaphery, 2000, p. 186).

Customization is seen as one way to provide more efficient use of the information available via the library's web site. In addition, users are better able to take advantage of the growing amount of digital information as it is presented in an easily digestible format. Another benefit that some librarians considering implementing the service may overlook is the ability to conduct unobtrusive research on MyLibrary resources and user preferences by querying the system's backend database. A major strength of MyLibrary@NCState's design is the fact that the information that powers this service is stored in a relational database. Librarians can conduct a variety of queries against this database to discover not only the number of users and number of accesses, but also which resources users have on their page and where they go once they log on. Accordingly, libraries and other institutions considering instituting a MyLibrary type service, especially one based on the source code freely available from NCSU Libraries, should factor into their decision not only the benefit of increased accessibility to electronic resources and current awareness features for their users, but also the added benefit of a rich store of information that can be analyzed to contribute to the library's collection evaluation and marketing methodologies. While recent articles have begun to note the utility of personalization systems in libraries for the purposes of collection evaluation, it is the goal of this paper to provide detailed results from SQL queries in order to demonstrate the limitless analysis possibilities that the MyLibrary@NCState system provides, as well as some indication of the types of users attracted to personalization services.

## Literature Review

The literature related to this topic discusses the following:

- MyLibrary Initiatives
- Customization/Personalization/Portals
- Collections evaluation methodologies: usage statistics, comparability, privacy concerns, discipline-specific data
- Relational Database Management Systems

### MyLibrary Initiatives

Eric Lease Morgan, the Network Technologies Development Librarian at NCSU and a key developer of MyLibrary@NCState, has written various documents on the system; some have appeared in popular library-related journals while others serve primarily as “how to” documents that outline the basic features of MyLibrary and advise those considering downloading and implementing the system. Two of these descriptive documents available on the World Wide Web, “MyLibrary Development To Do List” and “Issues to be Addressed by MyLibrary Adopters,” comment specifically on the lack of established tools for evaluating MyLibrary. They suggest that querying the MySQL database, conducting transaction log analysis on the web server and surveying users are possible methodologies to use (Morgan, 1999). Articles were published in 1999 in Computers in Libraries, Library Journal and American Libraries that introduced the MyLibrary concept. The common theme across these articles is selling the MyLibrary idea as an excellent customer service. Ken Winter, for example, uses such terms as “proactive service,” “user-centered,” and “innovative” to describe various features (Winter, 1999). None of these earlier articles, however, discusses the benefits of

retrieving and analyzing the data from the system's database to contribute to the evaluation of the library's collection.

The December 2000 issue of Information Technology and Libraries is a special issue devoted primarily to "User-Customizable Library Portals". The included articles provide valuable insight into the implementation and maintenance of MyLibrary systems, the effect on library staff and organizational culture, lessons learned and future directions. One article in particular touches on the utility of analyzing usage of these systems for collection evaluation. Keith Morgan and Tripp Reade explain,

So the subscribers are ministered to in MyLibrary@NCState, but there are tools aplenty for content providers as well. The very fact of this service's existence and use enables librarians to study the preferences of subscribers, to scan the overall user population for marketing opportunities, and moreover, to make collection management decisions. As the ratio of MyLibrary@NCState subscribers to potential subscribers ... approaches 1:1 (the ideal goal), the value of all this information will increase. The service thus functions as a *quid pro quo* device, scratching the backs of librarians, subscribers, and administrators alike (Morgan & Reade, 2000, p.195).

The authors go on to explain that while data gleaned from MyLibrary@NCState is fairly specific to that institution, the "... ability to engage in productive user modeling, marketing, and collection development is quite open to generalization" (Morgan & Reade, 2000, p.196). In his editorial as guest editor of this same issue, Eric Morgan reiterates the dual benefit of MyLibrary-type applications, saying, "... since customizable interfaces to library resources are essentially database applications with web front-ends, these interfaces not only provide the opportunity to improve the patron's library experience, but these interfaces also provide librarians with tools to practice librarianship better, namely public service and collection analysis" (Morgan, 2000, p. 166). Anne Gambles, a developer of a MyLibrary-type system in England, agrees with the

conclusions of these librarians from NCSU. In her system, she explains, “Every action performed in PIE [HeadLine Personal Information Environment] is automatically recorded. Management information can easily be generated. For instance, PIE logs show how many times each resource is accessed (and this can be broken down by department/individual user). This data can assist with collection development decisions ... and with effective marketing of resources” (Gambles, 2000, p. 203).

#### Customization/Personalization/Portals

Articles related to customization appeared in popular periodicals such as PC Magazine, Information Today, Computerworld and Internet World throughout 1999. In a similar fashion to articles about MyLibrary, authors in these magazines describe commercial customization efforts as innovative, user-centered, and service-oriented. In addition, however, they comment that commercial web sites rely heavily on professional web site analysis and reporting tools to spot trends and refine marketing strategies (Lidsky, 1999, p. 105). These commercial reports prove the benefit of using data analysis from customization systems to refine an organization’s strategies and objectives. Libraries can, therefore, also analyze data from MyLibrary to measure its effectiveness as a collection analysis tool.

#### Collection evaluation methodologies

With the exponentially growing numbers of licensed and purchased electronic resources at most academic libraries, new measures need to be put into place to evaluate these resources, to determine whether or not users are actually using them, and to

determine if they are serving users' needs. Philip J. Calvert, an author on collection evaluation techniques, cautions that new web-based information resources are "... difficult to place ... within our existing mental map of library effectiveness" (Calvert, 1997, p. 130-131). John Carlo Bertot who has written numerous articles on usage statistics along with Charles McLure, concurs. "The number of patrons entering libraries as well as circulation statistics are declining, yet there is increased investment in information technology and a qualitative notion that libraries are providing more services and are busier than ever. Thus, new statistical measures are needed" (Nisonger, 2000, p. 302). While determining library effectiveness in a digital age is extremely challenging, scholars argue that standard collection evaluation methodologies, such as end-user assessments, usage statistics and citation studies, can be used to contribute to the evaluation of electronic resources. Data gleaned from MyLibrary can provide important and useful information along with other measures to evaluate electronic resources. Don Boyden from IAC/Gale Group summarizes that usage statistics ... "can be used in collection development, purchasing decisions, allocation of training resources, and consortial bill-backs to members" (Nisonger, 2000, p. 301).

### Usage statistics

MyLibrary@NCState's backend database has the ability to store information regarding not only what its users have on their pages, but also which resources users select once they log on. As a result, the database can be queried to determine trends of selections or "clicks" within the system across disciplines. Librarians and others attempting to evaluate the use of their electronic resources can use these data in addition

to vendor-supplied statistics, or in place of these statistics if unavailable. Deanna Marcum, president of the Council on Library and Information Resources explains, “Unfortunately it has been difficult, if not impossible, for librarians to obtain meaningful usage data from publishers of electronic journals” (Luther, 2000, v.). Statistics also show that over half of publishers providing electronic resources are unable to provide any sort of usage data (Luther, 2000, p. 1). Clearly, libraries and information centers have struggled to receive data from electronic resource providers that can be used for collection analysis purposes. Marcum continues, “Vendors fear that implementing a data collection function is costly and others fear that librarians will cancel subscriptions if they learn that usage is low” (Luther, 2000, v.). Other professionals warn that statistics from vendors are often inaccurate and cannot be taken as an exclusive measurement (Jaque, 2000, p. 421). Until all vendors are able to provide insightful data to their customers, data from MyLibrary can serve as a worthwhile replacement. Even for those information centers that receive usable vendor data, MyLibrary can provide data that is easy to retrieve at any date or time, and can easily store these data indefinitely.

As a result of the difficulty of receiving usable usage data from electronic resource publishers, several associations have developed guidelines to assist these vendors in providing the type of data needed by most libraries and information centers, including the International Coalition of Library Consortia (ICOLC), the Association of Research Libraries (ARL), The National Information Standards Organization (NISO), the National Commission on Library and Information Services, and the European Commission. The ICOLC guidelines, for example, request that vendors provide the following statistics on at least a monthly basis and maintain 24 months of historical data:

1. Number of queries
2. Number of menu selections (usually alphabetical or subject-based menus)
3. Number of sessions (logins)
4. Number of turn-aways, if appropriate (i.e. number of users not allowed to login because the number of concurrent users was already maximized)
5. Number of items examined, i.e. the number of citations displayed (for abstract and index databases), number of table of content or abstracts displayed, number of articles viewed, printed, marked, downloaded or emailed

While the data from MyLibrary could never replace the usage statistics outlined in such guidelines, they can provide additional feedback or fill in gaps where vendor-provided information is lacking or nonexistent.

### Comparability

Deanna Marcum has also commented on the difficulty of comparing usage statistics from different vendors, stating, "... there is no agreement on how to produce data that can be compared and analyzed. It has been exceedingly difficult for librarians to now what to ask for when something as basic as the term 'use' can have many meanings" (Luther, 2000, v.). MyLibrary allows librarians to develop any number of reports based on SQL SELECT statements. Although the data may not be as rich as those provided by vendors, an institution could develop its own business rules on library use and analyze and compare data from MyLibrary across resources based on these self-defined rules. In this manner, "use" is much easier to define and measure.

Professionals familiar with the issues surrounding the evaluation of electronic resources suggest that usage statistics also “need to facilitate benchmarking and peer comparison”(Nisonger, 2000, p.302). As the source code from MyLibrary@NCState is freely available, users implementing systems based on this code and maintaining the same data elements or field names will be able to compare their institutions with others having the MyLibrary system. Institutions with similar collections could especially benefit from this feature, keeping in mind that numerous things affect usage and usage is not predictable across institutions. Researchers have found that instruction, marketing, and the length of time a particular resource has been available all affect usage rates (Townley & Murray, 1999, p. 38). Accordingly, libraries comparing usage based on MyLibrary data should factor these circumstances into their evaluations. Of course, this stress on putting statistics in context is important for all usage statistics, not just data from MyLibrary (Luther, 2000, p. 3).

### Privacy

As vendors are able to track users for statistical purposes, they are also able, of course, to use these same data for internal marketing and sales goals. This fact had some librarians and information professionals concerned about their patrons’ privacy. Institutions working with electronic resource vendors often sign confidentiality agreements and other documents in an attempt to ensure privacy will be maintained. With MyLibrary, all data is created and stored within the library or information center. While security measures are needed in this context and the data should be accessible on

an authorized basis, information professionals will not have to worry about vendors selling these data to third parties or trusting an outside entity to maintain confidentiality.

### Discipline-specific data

With conventional usage statistics, even the detailed statistics available from vendors, librarians must rely on IP Addresses to determine – possibly – a user’s academic department or area of interest. With MyLibrary@NCState, a user’s discipline is connected to every step he or she makes within the system. Usage can be tracked based on disciplines – powerful information waiting to be extracted from the backend database.

### Relational Database Management Systems

In an article on data mining, columnist Kim Guenther espouses the benefits of storing data in relational database management systems. She explains, “Relational database management systems ... [maintain] data in a structured environment. This facilitates more powerful searching, sophisticated statistical analysis, and more options for reporting” (Guenther, 2000, p. 62). As some organizations have difficulty culling any useful data from their integrated library systems (ILS), MyLibrary’s MySQL relational database is an easy-to-use alternative in some instances. While MyLibrary cannot account for print circulation statistics, interlibrary loans and other data tracked by an ILS, it can provide insight into some user preferences in the print collection. Librarians can query the database, for example, to view which call number ranges are popular in the Current Awareness Manager feature.

In addition to providing an effective counterpart to vendor-supplied data, MyLibrary is superior to other in-house statistical gathering measures as well in several ways. Libraries often rely on log analysis to determine website usage. Vendors often rely on this same tool when expected to supply usage data. Log analysis, however, is not without fault. Tracking users via IP addresses can be inaccurate as a result of caching and dynamic IP address assignments. Bauer concludes that log files are invaluable to “measure traffic and demand loads on a computer server and they work well for this purpose. When server log files are used to try to measure how people use a site, they don't work quite as well” (Bauer, 2000). With its discipline-specific rich store of information, MyLibrary is a more effective in-house collection analysis tool than log analysis.

Included at the end of this paper are a variety of SQL SELECT statements the MyLibrary administrators can use to begin an evaluation of their system. Limitless additional queries can be developed and tested, and then run periodically as long as the system is in use. In this manner, the relational database management system that supports MyLibrary can save much time in the evaluation process. This timesaving feature is especially important at present, as collection developers have less and less time for evaluation (Jaque, 2000, p. 421).

## **Methodology**

NCSU Libraries maintains a copy of the MyLibrary MySQL database on a UNIX server in the Digital Library Initiatives Department. Those working with MyLibrary

periodically “dump” data from the live system onto this UNIX server for testing and querying purposes. The results in this paper reflect MyLibrary@NCState data as of March 28, 2001 at approximately 5:00 p.m.

In order to retrieve data from the backend MyLibrary@NCState MySQL database, numerous SQL SELECT statements were run using the mysql client, a command-line interface that accompanies the MySQL database management system. Each statement was tested directly in the mysql client and then, if correct, was saved as a .sql file. Then, at the command prompt, a command was given to run the query and output the data to a text file. An example is shown below.

```
$ mysql mylibrary < query.sql > query.txt
```

In most cases, the text files were then imported into Microsoft Excel for easier sorting and graphing. All of the SQL SELECT statements used to collect data for this paper are listed in the Appendix.

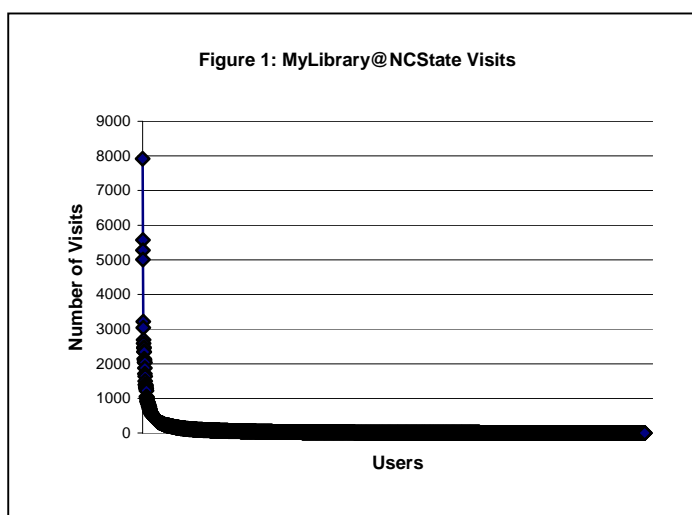
While the methodology for this paper is one approach to querying the MyLibrary database, MySQL does provide open source Open DataBase Connectivity (ODBC) drivers. ODBC is a standard Application Programming Interface (API) that allows different database management systems and applications to communicate with each other and share data. An ODBC driver can be used to connect the MySQL database to an ODBC compliant front-end such as Microsoft Access that provides an easy to use graphical user interface for queries, forms and reports. Instructions on establishing a connection between MySQL and Microsoft Access via ODBC are available in MySQL documentation, in a manual written and compiled by Eric Lease Morgan on MyLibrary (Morgan, 2001), as well as in web-based articles (Gilmore, 2001).

## Results

Results from queries run against MyLibrary@NCState's MySQL database are included in this section and are divided into the following categories: Users, Electronic Journals, Bibliographic Databases, Quick Searches, Library Links, University Links, Reference Shelf Items, and My Web Sites. These results provide only a glimpse of the types of reports that can be generated from the MyLibrary database. Additional SQL statements that may not have been used in this paper are available in the manual written by Eric Lease Morgan (Morgan, 2001).

### Users

As of March 28, 2001, there were 3698 MyLibrary@NCState accounts, approximately 11 percent of the potential population of faculty, students, staff and library affiliates. As shown in Figure 1, there are over 30 account holders that have used MyLibrary over 1000 times since July 1999, but the majority have used it only a handful of times. In addition, the top 6 users in terms of total visits are library staff at NCSU Libraries.

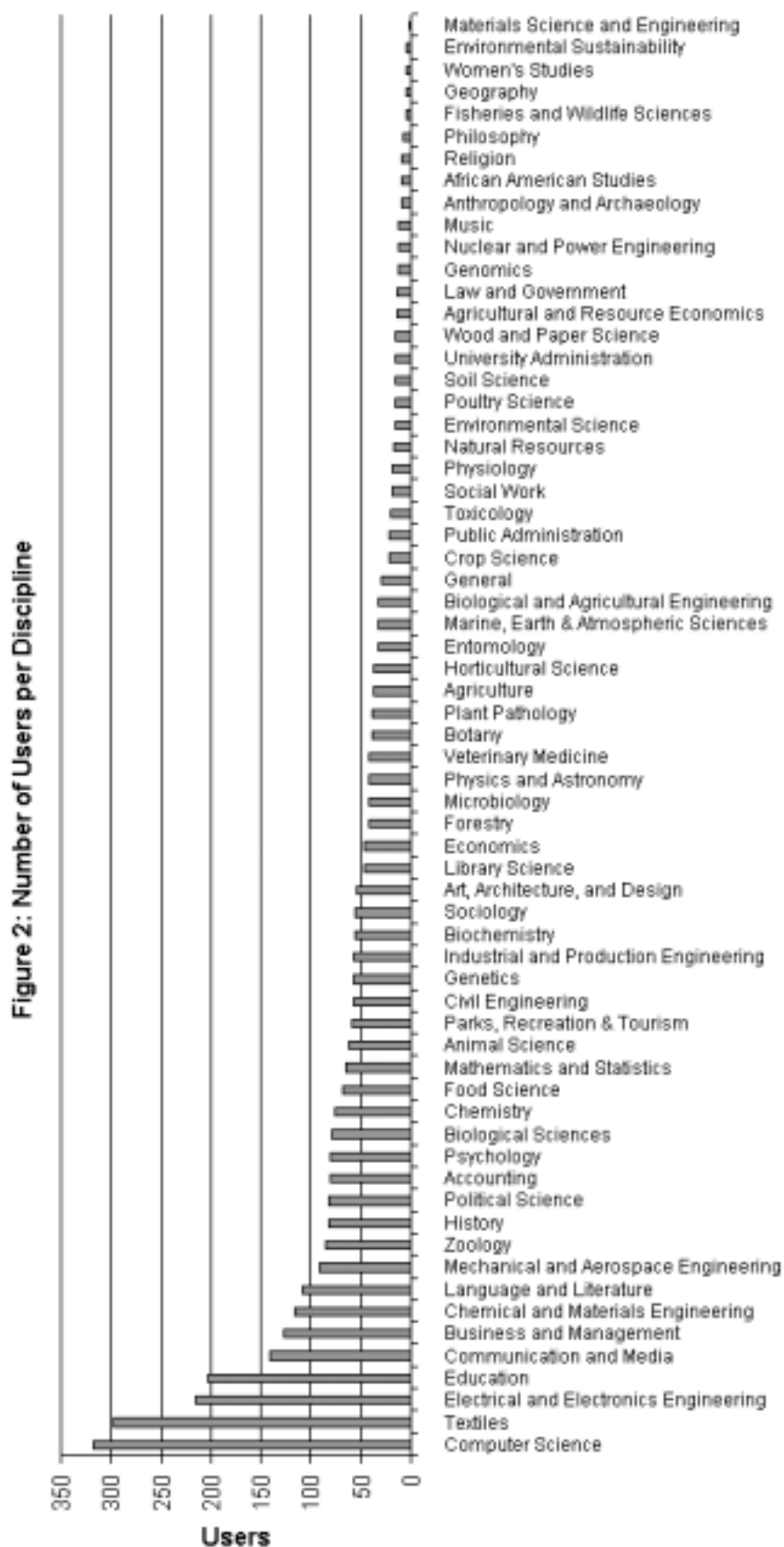


Accordingly, librarians considering implementing this type of system may want to consider that most likely only a select group of users will use it on regular basis. As Debra Ketchell confirms, “While performing a valuable service in aggregating an individual or category view of the library, early implementers of MyLibrary projects indicate only 5 to 10 percent of their site usage is through a custom view; and that only a small core of custom users regularly accesses their MyLibrary account” (Ketchell, 2000, p. 176).

MyLibrary does store information on a user’s rank -- whether they are at an undergraduate level, a graduate student, faculty or staff. Users need not provide this information on establishing a MyLibrary@NCState account, however, and most do not go to the “customize profile” section of the page at a later date to correct their default “freshman” status. Accordingly, unless done manually by matching up the 3698 account holder names and email addresses with those in NC State’s online directory, it is impossible to determine the breakdown of MyLibrary@NCState users by rank. Those considering implementing the system may want to request rank information upon establishing an account or connecting their MyLibrary system somehow to their university’s registrar or other system to get these data. Implementers will have to weigh their desire to get and maintain these data accurately with privacy concerns that may develop as a result.

### Users and Disciplines

When users establish an account with MyLibrary@NCState they must select a preferred discipline, from a list of 65. The breakdown number of patrons per discipline is shown in Figure 2.



According to NCSU enrollment numbers, as of Spring 2001 there are 820 students in the School of Textiles, 1193 in Computer Science and 1015 in Computer Engineering, 820 in Electrical Engineering, 843 in Communication, 1813 in Business Management, 99 in Foreign Language and Literature and 460 in English, and 1251 in Education-related disciplines. These data seem to indicate that the Textiles library strategy of including MyLibrary@NCState as part of new student's orientation to that branch library has shown solid results, with the highest percentage of MyLibrary users (36%) relative to its population. One can also query the database to determine the average number of total visits per discipline. In this regard, Textiles users have an average of 39 total visits versus 18 for Computer Science. Genomics has the highest average with 788 total visits, so on average, the 13 users associated with this discipline use log on to their pages quite often. Libraries considering an implementation of MyLibrary will have to determine which type of criteria to use to determine their system's success and marketing goals. Weighing the total number of accounts as well as the total number of repeat visitors should both be used to achieve a more accurate evaluation. See Figure 3 for a graphing of disciplines based on average number of total visits per user. One will note that many of the less popular disciplines average quite a high number of total visits.

### Electronic Journals

As of March 28, 2001 there were 1058 electronic journals in MyLibrary@NCState. The breakdown of the 50 most popular, based on the number of user pages on which they appear, is included in Figure 4.

**Figure 3: Average Total Visits per Discipline  
by MyLibrary@NCState Users**

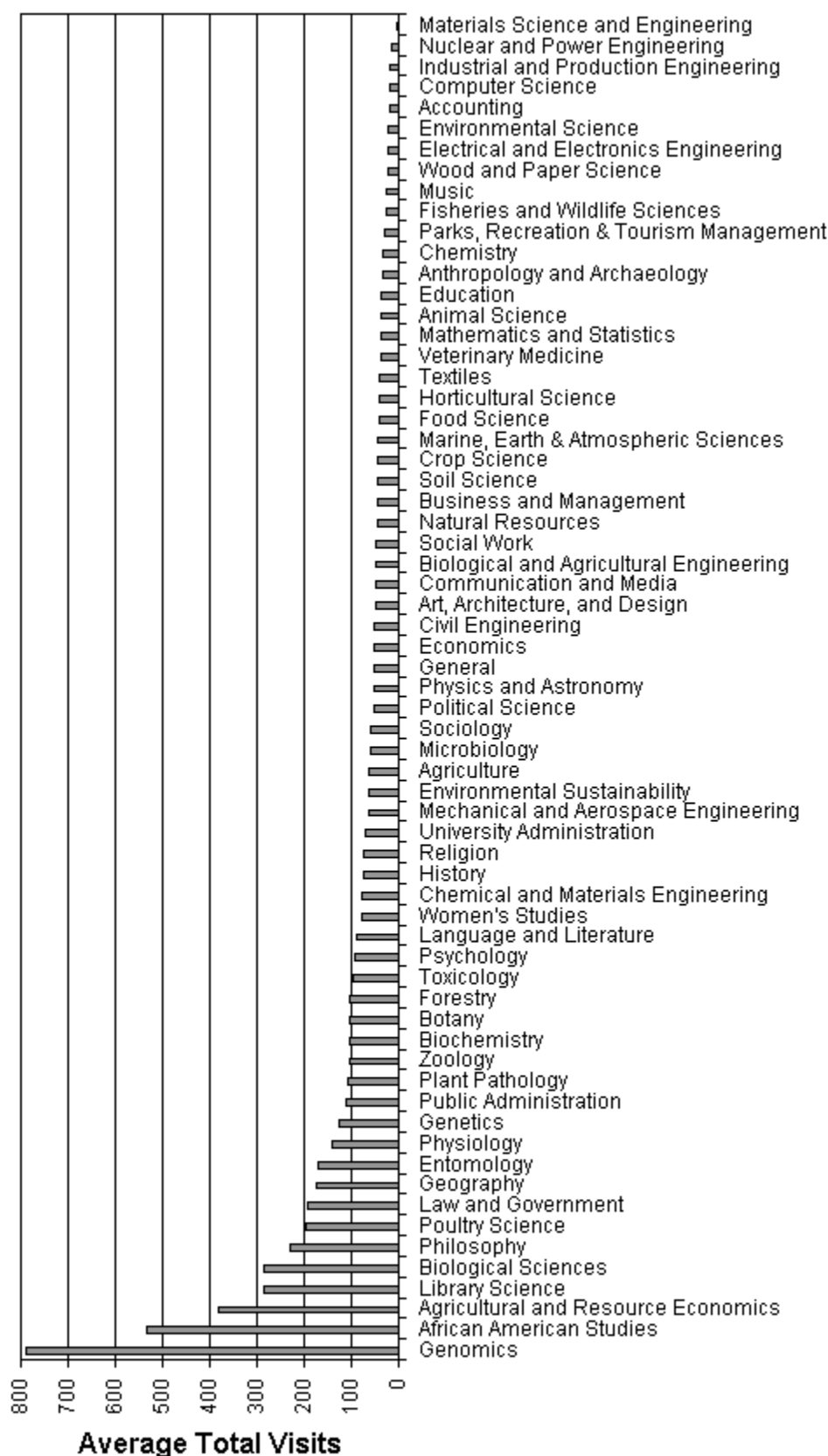
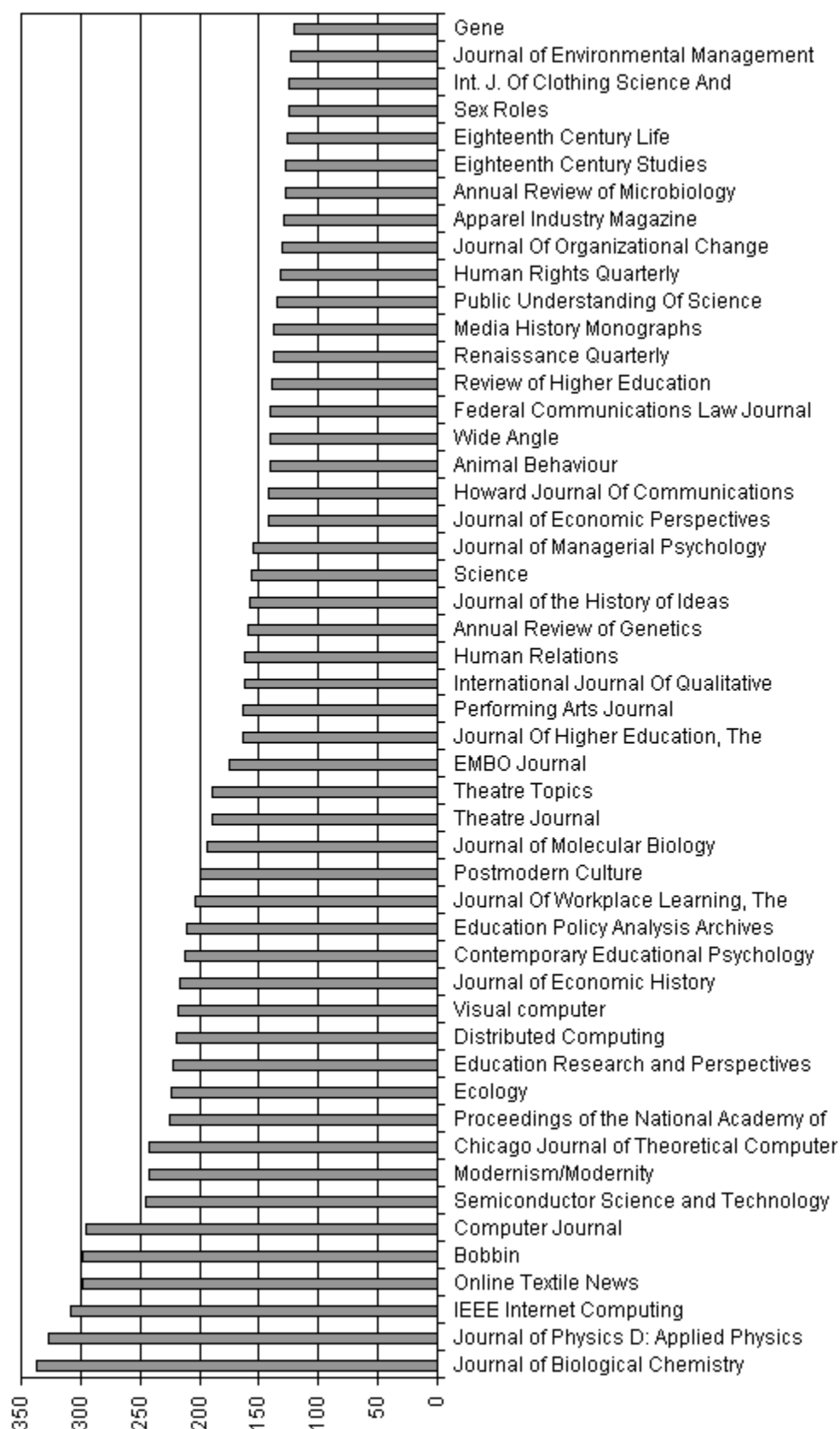


Figure 4: Number of Users With a Particular Electronic Journal on Their Page



As users must select a discipline with which to be associated when creating a MyLibrary account, each discipline comes with a predefined set of default resources selected by MyLibrary@NCState content developers. Journal of Biological Chemistry, appearing on 337 pages is a default electronic journal for 3 disciplines: Biochemistry, Toxicology and Veterinary Medicine. These disciplines have a total of 118 patrons, so 119 patrons outside of these disciplines added this journal to their pages. Modernism/Modernity, the eighth most popular journal, appearing on 243 pages, is a default electronic journal for 4 disciplines: General, Philosophy, History and Language and Literature. The total number of patrons in these disciplines is 228, so 15 MyLibrary patrons have added this journal to their pages. Content developers do tweak the default electronic journals occasionally, as, at one point, Journal of Biological Chemistry was a default journal for the Microbiology and Physiology disciplines as well. This may also have contributed to the high number of pages on which this journal appears.

As of March 28, 2001, 53% of the 1058 available electronic journals appear on 20 or fewer pages, with approximately 8% of the 1058 appearing on no pages at all. Why MyLibrary@NCState users put some journals on their pages as opposed to others could possibly be explained more clearly through focus groups or surveys, as well as factoring in which journals are default listings for the various disciplines. Users may exclude certain journals because they have not heard of them, or do not find them useful or easy to use. Or it could simply be attributed to the fact that like print collections, a majority of the available resources do not circulate. While these figures cannot be used as a sole determinant of which electronic journals to renew and which to cancel, they are at least able to provide a solid starting point from which to evaluate the collection.

From a marketing perspective, how can users be informed about the 1058 available journals without contributing further to their information overload? It seems that libraries must strive to achieve a delicate balance between information overload and the advertising of available resources.

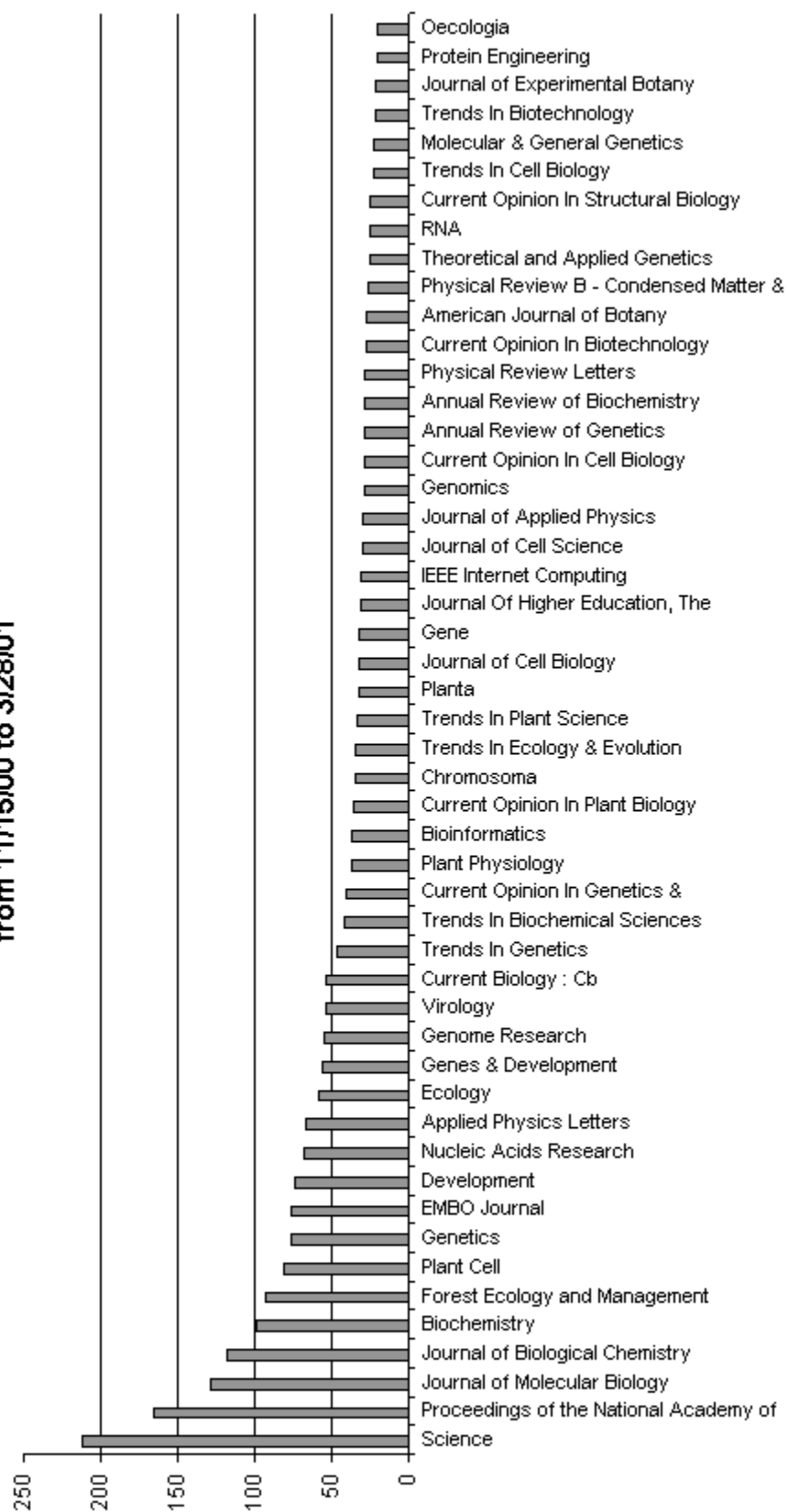
#### Electronic Journal 'Statistics'

One of the newer and more exciting features of MyLibrary@NCState is the system's ability to track where users go once they log into their pages. In other words, one can find out which resources users actually select or click on from their MyLibrary pages. These data are maintained in a table called 'statistics' and provide an interesting comparison to the data regarding which resources users have on their page. For example, while Journal of Biological Chemistry is the most popular resource based on number of pages on which it appears, the journal Science has actually been selected more. From the period of November 15, 2000 when the statistics feature was activated to March 28, 2001 at close of business, Science was selected 212 times versus 118 for the Journal of Biological Chemistry. Science appears on 157 MyLibrary pages compared to 337 for the Journal of Biological Chemistry. Certainly, one cannot look at either of these statistics without considering the other.

The most popular journals after Journal of Biological Chemistry based on number of pages on which they appear, are not the most popular based on the number of times they have been selected within MyLibrary from November 15, 2000 to March 28, 2001. Journal of Physics D: Applied Physics has been selected only three times, IEEE Internet Computing 31 times, Online Textile News 16 times, Bobbin 11 times, and Computer

Journal 6 times. The 50 most popular electronic journals based on the number of times selected within MyLibrary are graphed in Figure 5.

**Figure 5: Number of Electronic Journal Selections within MyLibrary@NCState  
from 11/15/00 to 3/28/01**



### Electronic Journal Statistics by Discipline

Another useful query on the statistics table is to track the number of electronic journal selections by user discipline. Providing data based on discipline is a unique and potentially extremely useful tool. Usage data via log analysis or from vendors can, at most, provide IP Addresses, which librarians can use to determine academic departments in some instances. Data from MyLibrary, however, tracks everything users do via discipline. This information can help librarians to determine the popularity of resources across disciplines. For example, the Science selections reported on previously were made by users in the following disciplines as noted in Table 1.

<b>Number of Selections made by users in that Discipline</b>	<b>Discipline</b>
11	Biochemistry
45	Biological Sciences
16	Botany
5	Chemical and Materials Engineering
4	Chemistry
4	Civil Engineering
3	Crop Science
3	Entomology
1	Food Science
2	Forestry
43	Genetics
27	Genomics
2	Horticultural Science
7	Microbiology
1	Natural Resources
	Parks, Recreation & Tourism Management
1	
7	Physics and Astronomy
1	Physiology
3	Plant Pathology
1	Poultry Science

2	Toxicology
23	Zoology
212	Total

Another interesting breakdown is for the Journal of Biological Chemistry, as shown in Table 2.

<b>Number of Selections made by users in that Discipline</b>	<b>Discipline</b>
3	Accounting
64	Biochemistry
10	Biological Sciences
9	Botany
2	Chemistry
13	Genetics
6	Microbiology
6	Plant Pathology
3	Toxicology
2	Veterinary Medicine
118	Total

While these numbers for the time period of November 15, 2000 to March 28, 2001 could be considered somewhat low and could possibly reflect the selections of a single user, if and when users of MyLibrary become more active, the usefulness of these numbers will increase. Librarians and information professionals responsible for evaluating electronic collections may find themselves able to predict easily the most popular resources. With MyLibrary they will also be able to gain detailed information on the lesser-used resources and, in so doing, will be able to make more enlightened evaluations.

### Bibliographic Databases

As of March 28, 2001 there were 244 Bibliographic databases in MyLibrary. See Figure 6 for a breakdown of the 40 most popular based on number of pages on which they appear. Uncover is the most popular database in this instance. If all separate listings of Web of Science were listed together –Science Citation Index, Web of Science, Social Sciences Citation Index, Arts and Humanities Citation Index, however, it would be considered the most popular database appearing 3798 times on user pages (either on different pages or on the same page), versus 2081 for Uncover. Uncover is a default database for 15 different disciplines, in which there are 1160 patrons. Web of Science, in its four different entries, is also a default database for a variety of different disciplines. Of the 244 available databases in MyLibrary, 13%, or 31, appear on no MyLibrary user pages and 40% appear on 10 or fewer pages.

### Bibliographic Database Statistics

The statistics for bibliographic databases, again which resources users select once logged in, provide intriguing comparable data. Uncover, for instance, has been selected only 99 times during the period from November 15, 2000 to March 28, 2001, while Web of Science has been selected 764 times, Web of Science's Social Sciences Citation Index 167 times, Web of Science's Science Citation Index 774 times, and Web of Science's Arts and Humanities Index 9 times. A breakdown of the 40 most popular bibliographic databases based on number of selections follows in Figure 7.

Figure 6: Number of Users with a Particular Bibliographic Database on their Page

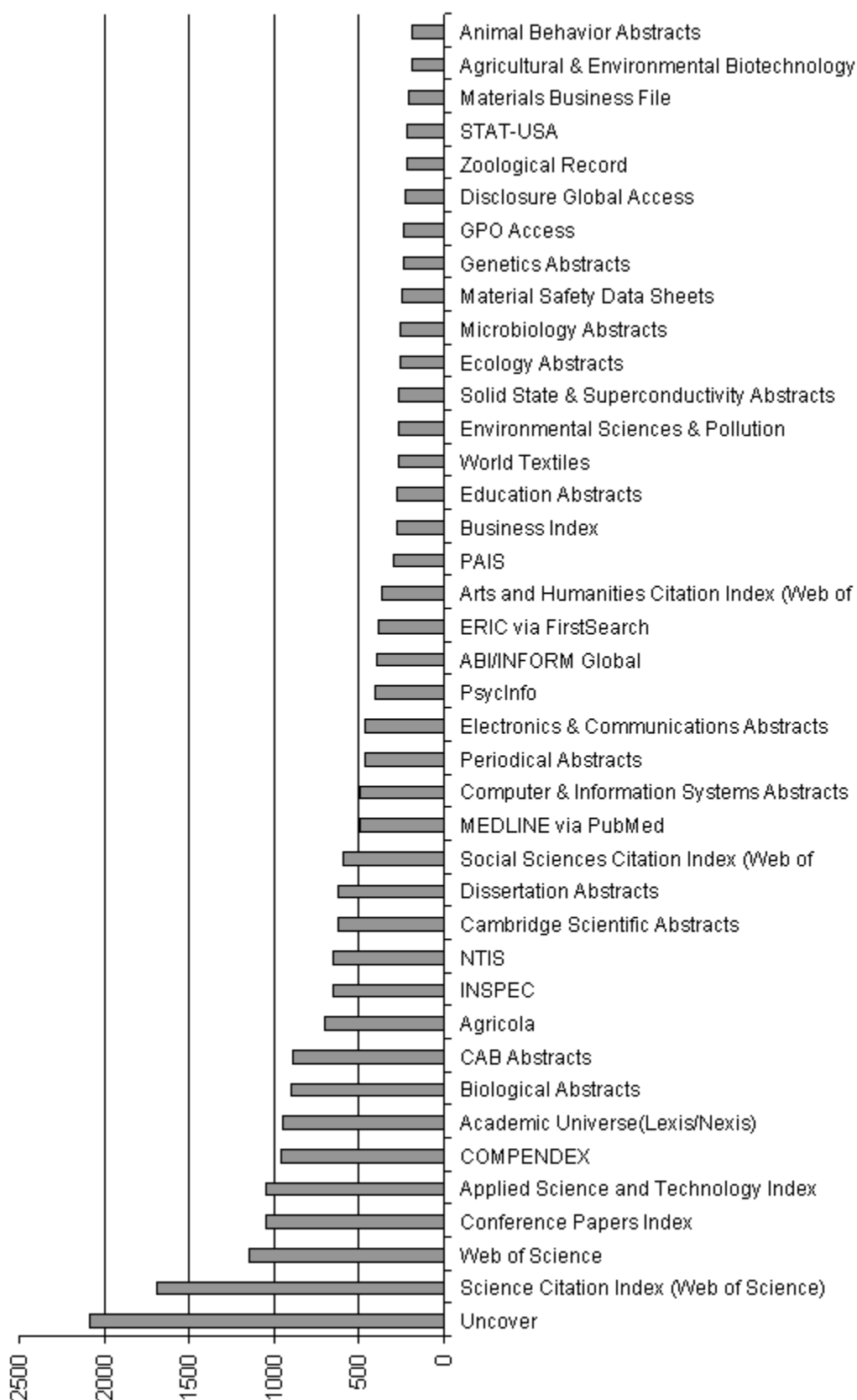
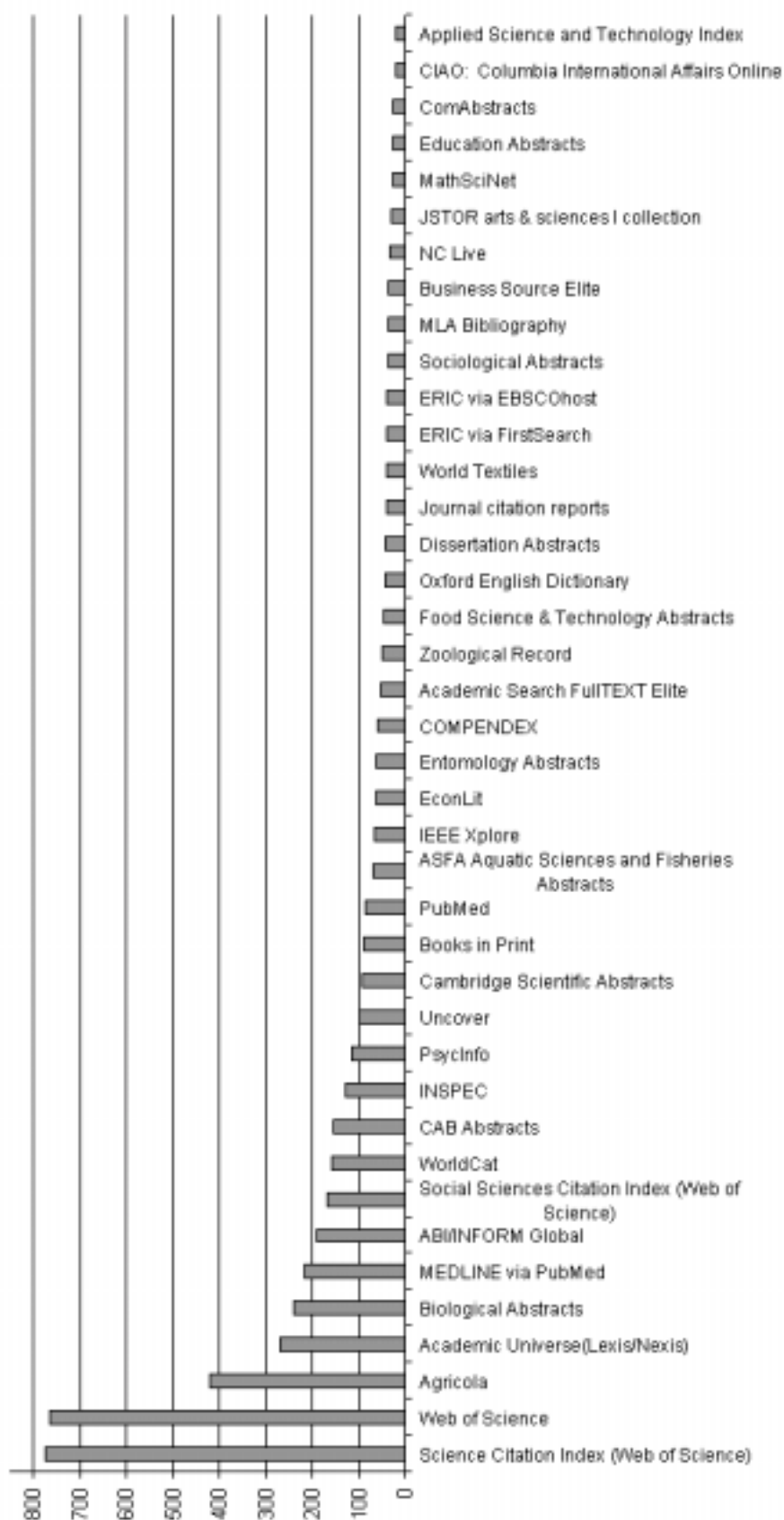


Figure 7: Bibliographic Database Selections within MyLibrary@NCState  
from 11/15/00 to 3/28/01



Why is Uncover not being used in MyLibrary as much as its appearance on MyLibrary pages indicates it should be? Does the average MyLibrary account holder use it outside of MyLibrary, or does Uncover's email feature automatically reduce the number of times a user will need to go to the site? Answering these questions may be determined through qualitative methodologies not included in this paper. Additional tools within MyLibrary, however, can provide further insight. With Uncover, a query on the "Message from my Librarian" category provided intriguing and somewhat discouraging news.

#### Message from my librarian

Informal email surveys of users of MyLibrary@NCState have shown that, on average, users find Message from my Librarian to be the least useful feature on their pages (Ciccone, 2001). One query, in particular, conducted on this feature seems to support this sentiment. One of the MyLibrary content developers posted a message regarding the database Uncover, briefly covering its features and services. For the two weeks prior to this message posting there were sixteen selections of this database within MyLibrary@NCState. For the day of the message posting and the two weeks following, there were a total of 15 selections of this database within MyLibrary@NCState.

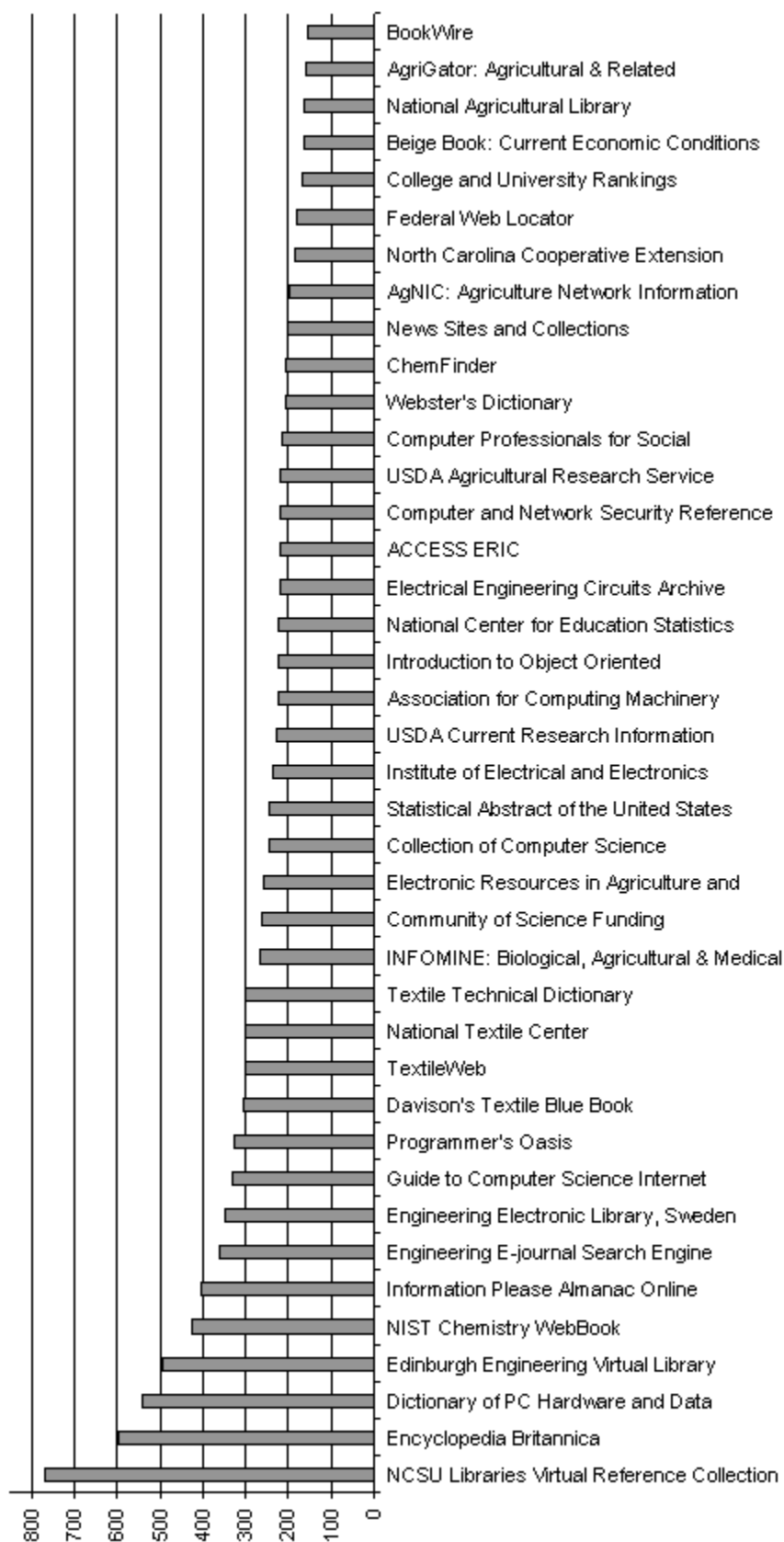
Accordingly, users of the system just do not seem to read these messages. In fact, early usability tests of the system relayed that users tend to see this section as an advertisement taking up too much real estate on the page (Beebe, 2000). A challenge for librarians and others considering implementing this system is how to make this feature a more effective marketing tool in their organization.

### Reference Shelf Items

Reference Shelf Items are web sites or free services available via the World Wide Web that have been reviewed by MyLibrary@NCState content developers and then added to the system. The original intention of the Reference category was to provide links to Web resources that were “ready-reference in nature,” such as dictionaries, thesauri, etc. Numerous resources have been added to this category, however, because a content developer deemed them to be useful, and they did not fit in any of the other available categories (Morgan, 2001, p.43). Accordingly, the Reference Shelf in MyLibrary@NCState contains links to sites that serve as subject-specific gateways to homepages for societies and associations. Of course, these are sites that serve an extremely useful purpose and do appeal to MyLibrary users. The Edinburgh Engineering Virtual Library (EEVL), for example, appears on 493 pages and the American Mathematical Society (AMS) appears 37 pages. Users not willing to browse through the entire list of items available to add to their pages may bypass something relevant, as is the case with most of the other categories.

There were 547 available Reference Shelf Items as of March 28, 2001. Of those 48, or approximately 9%, appear on no MyLibrary pages, while 194, or approximately 35%, appear on 10 or fewer pages. The most popular Reference Shelf Item is the NCSU Libraries Virtual Reference Collection appearing on 769 pages, followed by Encyclopedia Britannica, Dictionary of PC Hardware and Data Communications Terms, Edinburgh Engineering Virtual Library (EEVL), and NIST Chemistry WebBook appearing on 595, 539, 493 and 423 pages respectively. Figure 8 provides a more complete breakdown of the 40 most popular Reference Shelf Items.

Figure 8: Number of Pages with each Reference Shelf Item



As far as Reference Shelf Item statistics are concerned, NCSU Libraries Virtual Reference Collection has been selected the most in this category, with 79 selections. Following closely behind are ACCESS ERIC, Encyclopedia Britannica, Electronic Resources in Agriculture and Life Sciences and National Textile Center with 44, 40, 24, and 22 selections respectively. The breakdown of selections for the NCSU Libraries Virtual Reference Collection is spread across 22 different disciplines, from Accounting to Veterinary Medicine. Similarly, the 40 selections for Encyclopedia Britannica are spread across 15 different disciplines. Figure 9 provides additional numbers for Reference Shelf Item selections.

#### Library Links

As of March 28, 2001 there were 41 Library Links, links to library services and information, available in MyLibrary@NCState. The most popular link based on number of pages on which it appears is the Book or Journal Purchase Request Form, appearing on 1870 pages. This item has been selected 59 times during the November to March time span, while the NCSU Libraries catalog, appearing on 1194 pages, has been selected 975 times during that same time period. Interestingly, the NCSU Libraries Catalog can also be searched via the Quick Searches category. In that category it has been selected a total of 2322 times during the November to March time period. See Figure 10 for a graph showing all of the Library Links and the number of pages on which they appear. Figure 11 displays the Library Links in order of most selected.

Figure 9: Reference Shelf Item Selections from 11/15/00 to 3/28/01

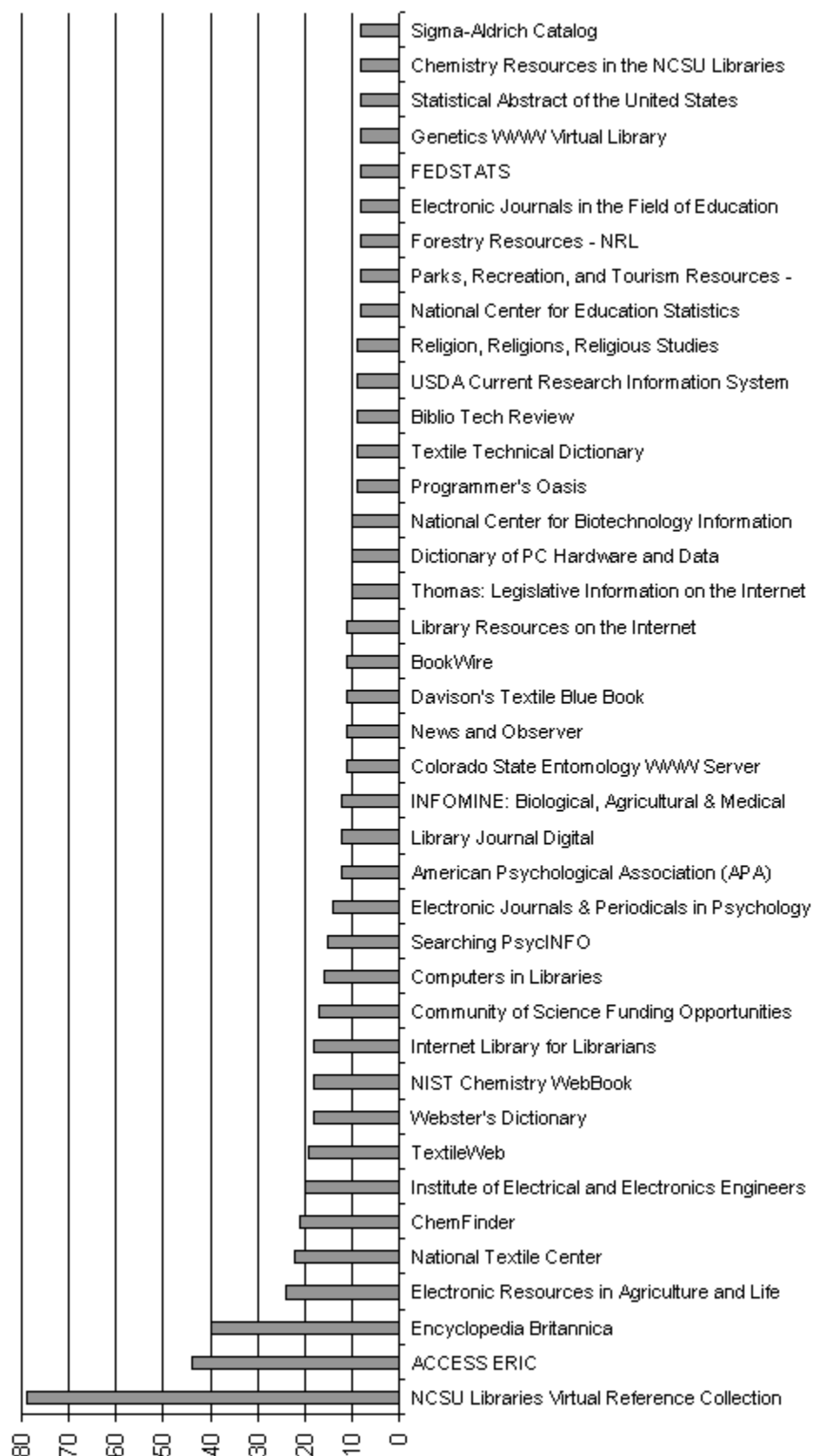


Figure 10: Number of Pages with each Library Link

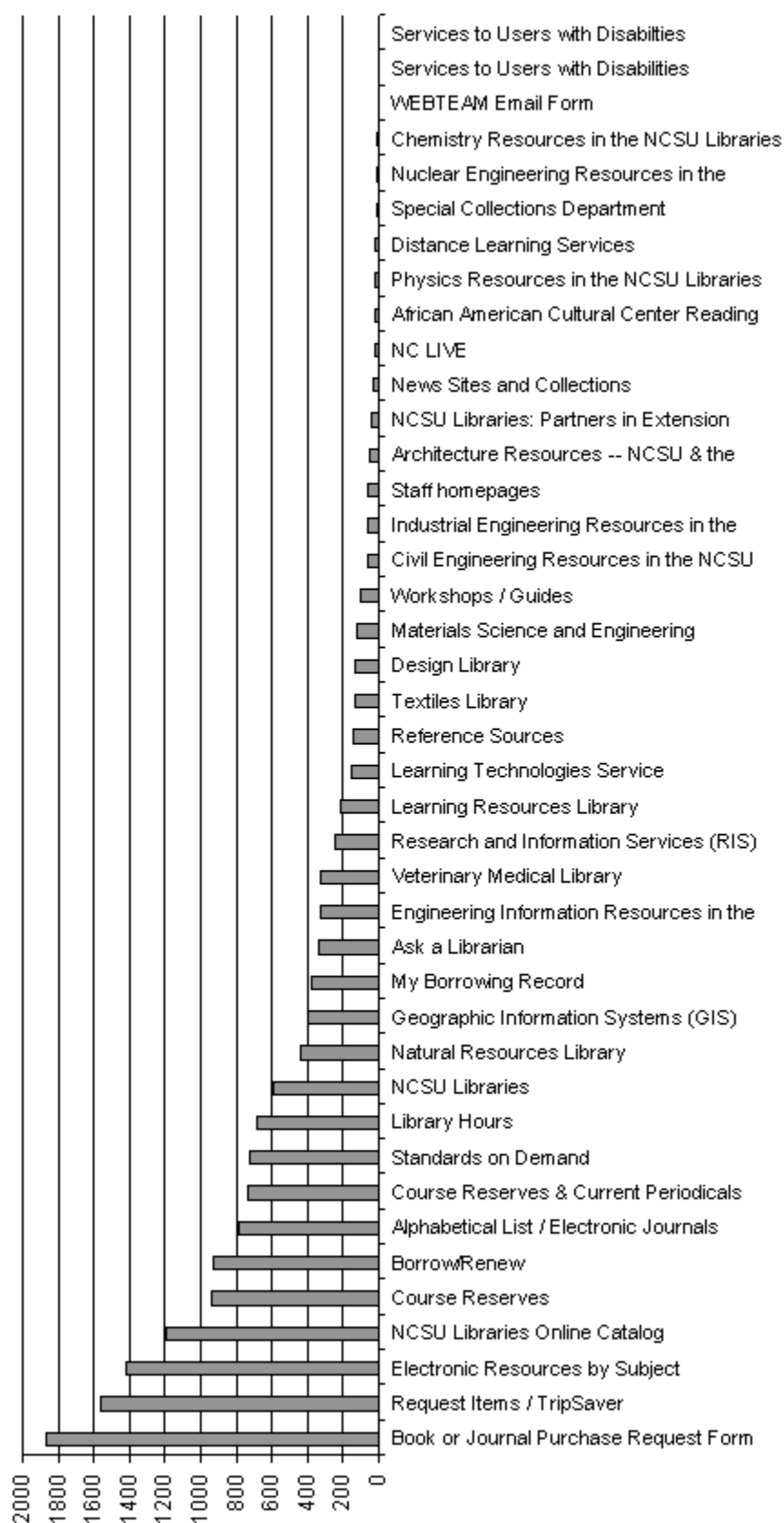
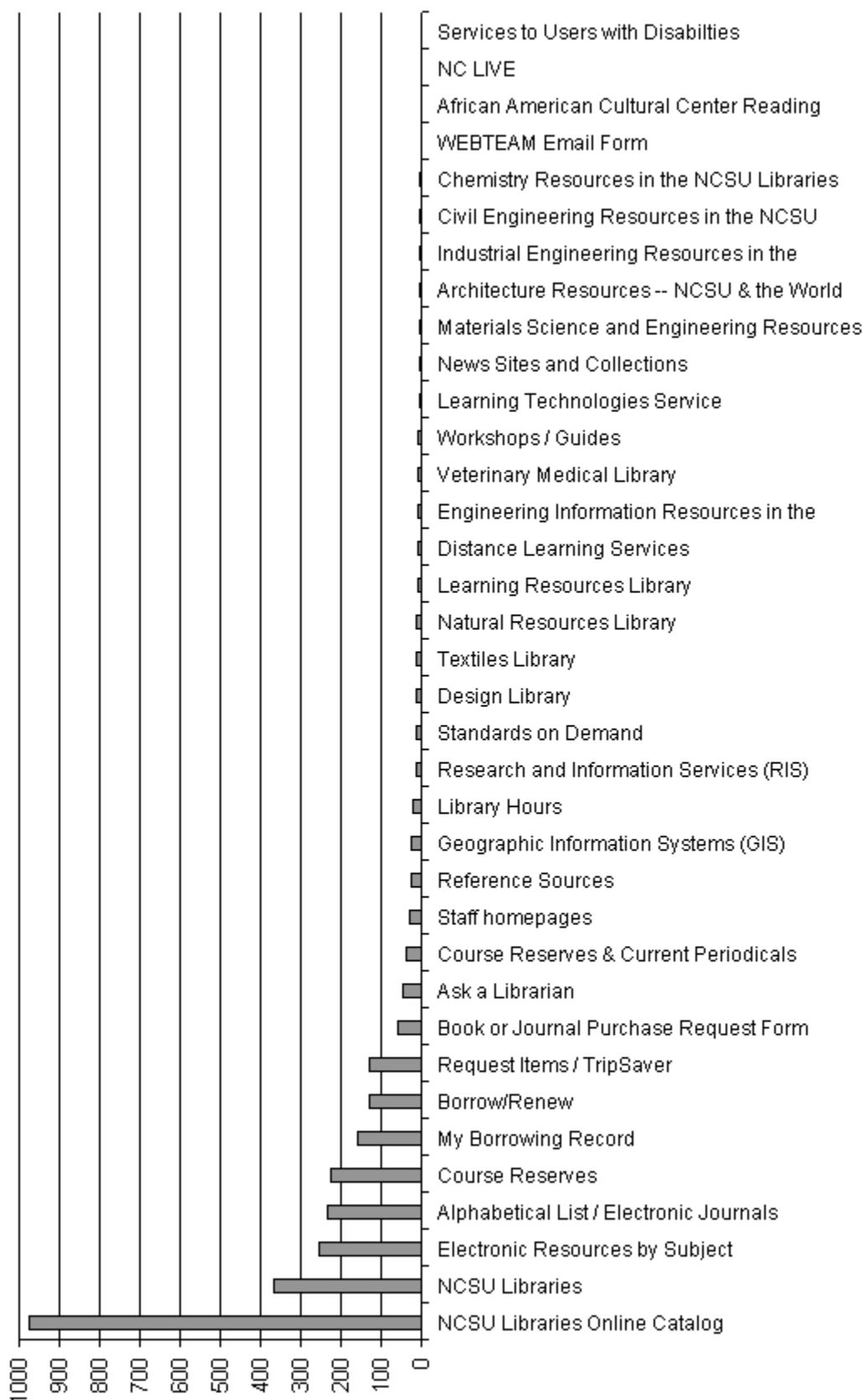


Figure 11: Library Link Selections From 11/15/00 to 3/28/01



### Quick Searches

As time passes and more account holders use MyLibrary more often, as one hopes they will do, the data from Quick Searches could be analyzed to yield some very rich information, not only about user preferences within MyLibrary@NCState, but also about searching patterns and topics of interest. Every time a user conducts a Quick Search using one of the twelve available options, the system records his or her search term. Librarian could possibly analyze these data periodically to determine common areas of interest at that time period, or perhaps to address particular searching strategies during an upcoming bibliographic instruction course. A brief glance over the search terms shows that MyLibrary users exhibit similar behavior to other searchers, using just one or two search terms a majority of the time.

How the twelve Quick Searches are used is shown in Table 3.

Quick Search Option	Number of Times Selected
Roget's Thesaurus	3
NCCU Libraries catalog	11
NC State WWW server	18
UNC-CH Libraries catalog	48
Duke Libraries catalog	50
Internet (Google)	53
Internet (AltaVista)	55
NCSU Libraries WWW server	83
Encyclopedia	139
Dictionary	357
NCSU Libraries catalog	2322

It is somewhat surprising that the "Internet" search engines have not been used more in the November to March time period. One may point this to the fact that users see

MyLibrary@NCState as a library system and not necessarily a portal or gateway to all of the information accessible via the World Wide Web.

### My Web Sites

The My Web Sites category within MyLibrary allows users to insert their favorite URLs into the system so that they are easily accessible from their MyLibrary page. These URL additions are more than bookmarks, as a user's MyLibrary page can be accessed from any computer. Querying this section of the database, one can see that some users have added links to search engines, even though some of these are accessible via Quick Searches. The features available within MyLibrary are constantly in flux, however, and these search engines may have been added to a user's page prior to their being accessible via Quick Searches. 22 users actively added a link to Google in their web sites section, 37 added Yahoo!, 5 added Excite, 8 added AltaVista, 3 added Ask Jeeves, and 2 added Go, also known as Infoseek. Other popular personal web site links include 24 to NC State's home page even though this is available in the University Links category, and another 21 links to pages one or more levels down from the home page. Elsevier's Science Direct is a very popular addition, with 152 links added to this site with various sublevels bookmarked. Science Magazine, also available via the Electronic Journals section, has 62. There are 1726 unique URLs from users' MyLibrary pages, although numerous ones are the same website with a slight difference in the URL's structure, such as a "/" at the end versus no "/". The statistics table does not track which personal web sites a user selects within MyLibrary.

### Summary Selection Data

On a final note, one can also use the statistics feature to see which categories are used the most. From November 15, 2000 to March 28, 2001, the number of times a link was selected per category is listed in Table 4.

Category	Number of Times Category Selected
Bibliographic Databases	5510
Electronic Journals	4569
Quick Searches	2857
Library Links	3139
Reference Shelf Items	1300
University Links	793

These selections almost correspond exactly to the category preferences of users responding to an informal email survey conducted in January 2001 (Ciccone, 2001). NCSU Libraries conducted this survey to determine which resource categories most users would prefer to have listed at the top of their MyLibrary pages. While the current version, 2.2.6, provides only one page layout, a new feature added to the latest version of MyLibrary, 2.50, allows users to select the layout of their page from a list of pre-coded “templates.” Accordingly, while all users at present must scroll down to view electronic journals and bibliographic databases, with the latest version they will have the option to select a page layout that lists these resources at the top of their pages. In the email survey, the categories in overall order of preference were Bibliographic Databases,

Electronic Journals, Quick Searches, Reference Shelf, Library Links, My Web Sites, Current Awareness Manager, University Links, My Librarians, and Message from my Librarian. Interestingly, users in general found Library Links to be less useful than Reference Shelf items in a qualitative survey, even though they have used resources from this category over twice as often.

## **Conclusion**

Querying relational database management systems is an efficient and relatively easy process to retrieve data for analysis and evaluation in a variety of settings. Within a library or information system, MyLibrary's backend relational database can provide invaluable data for collection developers and others responsible for the evaluation of resources, particularly electronic. As Diaz explains, "We need to be flexible enough to realize that librarians serving very specific segments of users know those segments best and know what is going to be the most effective is communicating with that population" (Diaz 43). The data presented in this paper provide some insight into the types of *discipline-specific* evaluation that can be done using relatively simple SQL SELECT statements. Evaluators can use MyLibrary to track which electronic resources appear on the most pages, which resources - including library services - are selected the most within MyLibrary, as well as which resources are not being used at all, all within discipline-specific parameters.

Based on the results provided in this paper, for example, collection developers can determine those electronic journals that have not been used within MyLibrary and/or do not appear on any user pages. These journals, upon further investigation, may become

strong candidates for cancellation in times of budget crisis. In the specific case of NCSU Libraries, they have had to cancel a number of journal subscriptions, as the state legislature did not allocate enough funds to allow for journal price inflation (NCSU 1999). MyLibrary data can serve as a strong starting point for identifying appropriate electronic journals for cancellation. As more users establish MyLibrary accounts and access their pages more regularly, these data will increase in value and usefulness.

In addition to collection analysis for renewal and cancellation purposes, MyLibrary data can also advise librarians on those resources needing additional marketing efforts by collection managers and reference librarians. For example, a librarian supporting Computer Science or a related discipline may feel strongly that users are missing valuable research published in Theory of Computer Systems. This journal has been selected within MyLibrary@NCState only once from mid-November 2000 to March 28, 2001. An email message to users from appropriate disciplines highlighting significant research from this journal, may aid in fulfilling the information needs of a variety of users.

While there is enthusiasm for the benefits of personalization in the academic library, some do advise caution. Debra Ketchell from the University of Washington explains, “While personalization is predicted to grow rapidly, current percentages of ‘my’ account users is low. [Jakob] Nielsen warns that ... personalization must be extremely easy to use or users will not take the time” (Ketchell, 2000, p. 178). If the average institution implementing a MyLibrary system succeeds in signing on only a small percentage of its potential population – MyLibrary@NCState currently has 11 percent of its potential population - the quality of data will never reach its true potential. If a library

system were to make its MyLibrary system the default web entry point for access to all of its resources and web pages, it would be able to gather "selection" or tracking data on a much larger population, and in a much easier and more reliable fashion than via log analysis.

The data provided in this paper provides only a glimpse of the types of reports available via MyLibrary and its backend database. As more libraries implement this system without too many modifications, reports will then be available for comparisons across institutions, keeping in mind the other factors that affect usage statistics. For example, why do MyLibrary users from X University use a particular resource ten times more often than Y University, even though they have similar programs and roughly the same number of MyLibrary users? Is University Y providing access to the resource via an outdated, unfriendly interface, not realizing that a simple hyperlink change is needed? Such comparisons should aid institutions in benefiting fully from the resources on which they expend considerable portions of their budgets. Libraries considering an implementation of this system should not overlook the strength of MyLibrary as a collection analysis tool, especially given electronic publishers' current inability to provide meaningful usage statistics.

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## Appendix

SQL SELECT statements.

*List the average number of total visits per discipline.*

```
SELECT AVG(total_visits), discipline_name
FROM patrons, disciplines where patrons.discipline_id = disciplines.discipline_id
GROUP BY discipline_name;
```

*List the number of patrons in each discipline, in alphabetical order by discipline.*

```
SELECT count(p.patron_id) as 'Count', d.discipline_name
FROM patrons p, disciplines d
WHERE p.discipline_id = d.discipline_id
GROUP BY d.discipline_name
ORDER BY d.discipline_name;
```

### Electronic Journals

*List all electronic journals and the number of patron pages they appear on, including those that do not appear on any.*

```
SELECT e.etext_name, COUNT(i.etext_id) as "Number of patrons"
FROM etexts e LEFT JOIN items4etexts i
ON e.etext_id = i.etext_id
GROUP by e.etext_id
ORDER BY "Number of patrons";
```

*List the number of selections for each electronic journal, grouped by journal name*

```
SELECT COUNT(s.statistic_id) as 'numberofclicks', e.etext_name
FROM statistics s, etexts e
WHERE section_code = 'E' AND
s.resource_id = e.etext_id
GROUP BY e.etext_name
ORDER BY 'numberofclicks';
```

*List the number of selections for each electronic journal, grouped by journal name and user discipline*

```
SELECT COUNT(s.statistic_id), e.etext_name, d.discipline_name from
patrons p, statistics s, disciplines d, etexts e
WHERE p.patron_id =s.patron_id AND
p.discipline_id = d.discipline_id
AND e.etext_id =s.resource_id
AND s.section_code = 'E'
GROUP BY e.etext_name, d.discipline_name;
```

*List the default disciplines for each electronic journal*

```
SELECT etext_name, discipline_name
FROM etexts e, defaultEtexts f, disciplines d
WHERE e.etext_id = f.etext_id AND
```

```
f.discipline_id = d.discipline_id
ORDER BY etext_name;
```

### Bibliographic Databases

*List all bibliographic databases and the number of patron pages they appear on, including those that do not appear on any.*

```
SELECT b.bib_database_name, COUNT(i.bib_database_id) as "Number of patrons"
FROM bib_databases b LEFT JOIN items4bibdatabases i
ON b.bib_database_id = i.bib_database_id
GROUP by b.bib_database_id
ORDER BY "Number of patrons" desc;
```

*This will order the list in descending order, i.e. most popular first.*

*List the default disciplines for each bibliographic database*

```
SELECT b.bib_database_name, d.discipline_name
FROM bib_databases b, defaultBibdatabases f, disciplines d
WHERE b.bib_database_id = f.bib_database_id AND
f.discipline_id = d.discipline_id
ORDER BY b.bib_database_name;
```

*List the number of selections for each bibliographic database, grouped by database name*

```
SELECT COUNT(s.statistic_id) as 'numberofclicks', b.bib_database_name
FROM statistics s, bib_databases b
WHERE s.section_code = 'B' AND s.resource_id = b.bib_database_id
GROUP BY b.bib_database_name
ORDER BY 'numberofclicks';
```

*List the number of selections for each bibliographic database, grouped by user discipline*

```
SELECT COUNT(s.statistic_id), b.bib_database_name, d.discipline_name
FROM patrons p, statistics s, disciplines d, bib_databases b
WHERE p.patron_id = s.patron_id AND
p.discipline_id = d.discipline_id AND
b.bib_database_id = s.resource_id AND
s.section_code = 'B'
GROUP BY b.bib_database_name, d.discipline_name;
```

### Reference Shelf Items

*List all reference shelf items and the number of patron pages they appear on, including those that do not appear on any.*

```
SELECT r.reference_name, COUNT(i.reference_id) as "Number of patrons"
FROM reference r LEFT JOIN items4references i
ON r.reference_id = i.reference_id
GROUP by r.reference_id
ORDER BY "Number of patrons";
```

*List the default reference shelf items for each discipline*

```
SELECT reference_name, discipline_name
FROM reference r, defaultReferences f, disciplines d
WHERE r.reference_id = f.reference_id AND
f.discipline_id = d.discipline_id
ORDER BY reference_name;
```

*List the number of selections for each reference shelf item*

```
SELECT COUNT(s.statistic_id) as 'numberofclicks', r.reference_name
FROM statistics s, reference r where section_code = 'R' AND
s.resource_id = r.reference_id
GROUP BY r.reference_name
ORDER BY 'numberofclicks';
```

*List the number of selections for each reference shelf item, grouped by reference shelf item and user discipline*

```
SELECT COUNT(s.statistic_id), r.reference_name, d.discipline_name
FROM patrons p, statistics s, disciplines d, reference r
WHERE p.patron_id = s.patron_id AND
p.discipline_id = d.discipline_id AND
r.reference_id = s.resource_id AND
s.section_code = 'R'
GROUP BY r.reference_name, d.discipline_name;
```

### Library Links

*List all library links and the number of patron pages they appear on, including those that do not appear on any.*

```
SELECT l.libraries_name, COUNT(i.libraries_id) as "Number of patrons"
FROM libraries l LEFT JOIN items4libraries i
ON l.libraries_id = i.libraries_id
GROUP by l.libraries_id
ORDER BY "Number of patrons";
```

*List the number of selections for each library link, grouped by library link*

```
SELECT COUNT(s.statistic_id) as 'numberofclicks', l.libraries_name
FROM statistics s, libraries l
WHERE section_code = 'L' AND
s.resource_id = l.libraries_id
GROUP BY l.libraries_name
ORDER BY 'numberofclicks';
```

*List the number of selections for each library link grouped by library link and user discipline*

```
SELECT COUNT(s.statistic_id), l.libraries_name, d.discipline_name
FROM patrons p, statistics s, disciplines d, libraries l
WHERE p.patron_id = s.patron_id AND
```

```
p.discipline_id = d.discipline_id AND
l.libraries_id = s.resource_id AND
s.section_code = 'L'
GROUP BY l.libraries_name, d.discipline_name;
```

#### Quick Searches

*List the number of quick search selections, grouped by quick search*

```
SELECT COUNT(s.statistic_id) as 'numberofclicks', q.qsearch_name
FROM statistics s, qsearches q
WHERE section_code = 'Q' AND
s.resource_id = q.qsearch_id
GROUP BY q.qsearch_name
ORDER BY 'numberofclicks';
```

*List the number of quick search selections, grouped by quick search and user discipline*

```
SELECT COUNT(s.statistic_id), q.qsearch_name, d.discipline_name
FROM patrons p, statistics s, disciplines d, qsearches q
WHERE p.patron_id = s.patron_id AND
p.discipline_id = d.discipline_id AND
q.qsearch_id = s.resource_id AND
s.section_code = 'Q'
GROUP BY q.qsearch_name, d.discipline_name;
```

#### Personal Websites

*List all personal web sites and the number of pages on which they appear.*

```
SELECT COUNT(link_id), link_url
FROM personallinks
GROUP BY link_url;
```

#### Resource Categories

*List the total number of selections per resource category*

```
SELECT COUNT(statistic_id), section_code
FROM statistics
GROUP BY section_code;
```