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Win Shih

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Understanding Patron Needs and Resource Usage in the Networked Academy: Problems and Opportunities

Win Shih, Head of Systems and Databases, Denison Memorial Library
University of Colorado at Denver and Health Sciences Center

INTRODUCTION

The rapid development of digital library has created many opportunities and challenges for libraries. In a networked academy of higher learning, librarians are striving to serve their now less-visible, but more diverse, more informed, technology savvy, and more demanding patron base with ever-expanding virtual resources. Methodically and systematically monitoring and studying usage statistics, thereby laying a foundation for efficient management of digital resources, adept customer service, responsive resource allocation, and a reliable IT infrastructure.

In 2006, Denison Memorial Library of University of Colorado at Denver and Health Sciences Center (http://denison.uchsc.edu) conducted a year-long library usage study to collect detailed utilization statistics. The purposes of this study, implemented by means of online survey research methods, included, but were not limited to:

- Fulfilling requirements set by the University and the federal government concerning how the library is actually being used. Survey conclusions will be studied in order to determine future library funding and planning. The previous survey was conducted in 1998.

- Understanding by whom, where, and why digital resources are now being accessed. Already by virtue of this study we are gainfully improving understanding about exactly who our patrons are, where they are conducting their research, along with their information needs and information-seeking behaviors.

- Investigating how and why our patrons use “brick-and-mortar” versus remote-online resources. In other words, why do our patrons continue to “visit our buildings,” rather than conduct all their library-related activities “on their own?”

- Identifying the most popular digital-library resources by closely tracking and analyzing these “preferred resources” our patrons have been consistently selecting.

DATA COLLECTION

The Association of Research Libraries’ “MINES for Libraries” methodology was the foundation for our online survey, the principal instrument designed for our study. Originally developed by Brinley Franklin and Terry Plum, MINES stands for “Measuring the Impact of Networked Electronic Services” and is one of the new measures adopted by ARL to address issues regarding access to digital resources and services and measuring their usage in a networked academic environment. MINES for Libraries has been implemented in the U.S. within seven academic health sciences libraries between 2003 and 2005, logging more than 27,000 responses. Interlibrary survey results served as a bench mark for our study.

Survey Period

Our year-long investigation consisted of two primary, two-hour-long, randomly-assigned windows of operation each month. Each two-hour-long, survey-dissemination period was selected stochastically from the time our library building opened until closing (8 a.m. to 10 p.m. Monday through Thursday; 8 a.m. to 6 p.m. Friday; and 10 a.m. to 6 p.m. Saturdays and Sundays). User responses were gathered during these 48-possible, weekly-surveying hours throughout the entirety of 2006.

Survey Instruments

The study employed two distinctive research-methodology instruments. For in-house patrons, library staff stationed at the library entrance during survey period handed out a single-page, double-sided survey form to each patron upon entering. Completion of the form was wholly voluntary and completely anonymous. Participants deposited their completed forms into designated collection containers located throughout the library.

Second, for online visitors to Denison's Website, a one-page web survey form (http://denison.uchsc.edu/databases/survey.php) would appear onscreen. Figure 1 demonstrates the four questions patrons were prompted to answer:

1. Patron Status: Choose from one of seven statuses: "Graduate Student," "Undergraduate Student," "Faculty," "Research Fellow," "Staff," "Hospital Staff," or "Other."

2. Affiliation: Select from one of five schools ("Medical," "Dentistry," "Nursing," "Pharmacy," "Graduate") or other campus department ("University Hospital," "Other"); or indicate if you are not affiliated with the University.

3. Access Location: From where are you accessing our library? "In-house;" "On-campus but not in the library building proper;" or "Off-campus."

4. Purpose of Visit: For this particular visit, your information search is for: "Sponsored Research," "Instruction/Education/Home Work," "Patient Care," or "Other."

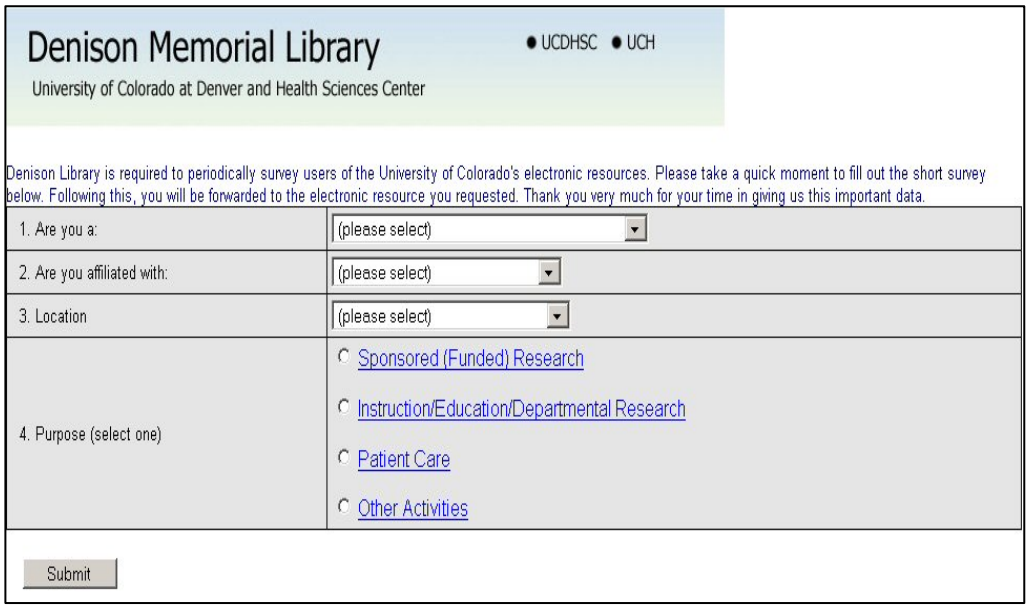

Figure 1: Web-based Survey Instrument

Placement of Online Survey

Patrons were presented with the online survey form before accessing the following library resources during the survey periods:

- All subscribed online resources;

- Denison Library's online catalog;
- Selected library services / pages, including: Electronic reserves, interlibrary loans, and "Ask a Librarian" (a virtual reference service).

In order to obtain the most comprehensive picture of every library website visitor and to be consistent with the same survey conducted at the other seven health sciences libraries, the online survey was mandatory. During each two-hour survey session, patrons were unable to access those pre-defined resources above without first completing the survey. Once patrons completed the survey, they were forwarded to their destination URL.

To eliminate duplicate data, the online survey instrument employed a code associated with each patron's browser session, in order to keep track of the patron's progress during their visit. As long as patrons did not close their browser or otherwise terminate their browser session, they were never asked to complete the survey form again, even if they switched to a different library resource. However, their original responses remained logged despite any new resources they subsequently selected.

Logging

All patron responses were logged into a plain-text file. Besides the answers from those four questions on the survey form, a special programming script written in-house automatically recorded three additional elements: date and time of patron visit, the IP address of the patron's incoming workstation, and the resource selected (see Table 1).

Date	Time	IP Address	Status	Aff.	Location	Purpose	Resources
2/2/2006	2:03:14 PM	140.226.xx.212	Graduate	GS	oncampus	instruction	http://library.uchsc.edu/search/?searchtype=...
2/2/2006	2:03:22 PM	140.226.x.109	Staff	OHSC	library	Other	http://www.springerlink.com/openurl.asp?genr
2/2/2006	2:03:27 PM	140.226.xx.212	Graduate	GS	oncampus	instruction	http://springerlink.metapress.com/link.asp?id=
2/2/2006	2:03:59 PM	140.226.x.109	Staff	OHSC	library	Other	http://springerlink.metapress.com/link.asp?id=
2/2/2006	2:03:10 PM	140.226.xxx.109	Staff	SOM	oncampus	sponsored	http://www.biophysj.org/
2/2/2006	2:03:30 PM	140.226.xxx.165	Graduate	SOM	library	instruction	http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?
2/2/2006	2:05:03 PM	140.226.xx.212	Graduate	GS	oncampus	instruction	http://gateway.ovid.com/ovidweb.cgi?T=JS&D
2/2/2006	2:04:37 PM	207.174.xxx.212	Fellow	UCH	offcampus	instruction	http://library.uchsc.edu/
2/2/2006	2:04:29 PM	168.200.xx.74	Fellow	SOM	oncampus	instruction	http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?
2/2/2006	2:05:21 PM	207.174.xxx.212	Fellow	UCH	offcampus	instruction	http://www.ejbjs.org

Table 1. Sample Log File

8,185 responses were collected during the 48 hour survey period. Table 2 provides a summary of the characteristics of the raw data. Microsoft Excel was used to analyze data collected.

Survey Summary	
Total survey period (hours)	48

Total survey sessions	24
Total survey entries received	8,185
Average survey entries per session	341
Highest survey entries per session (Monday, 1 - 3 pm)	672
Lowest survey entries per session (Saturday, 10 am – 12 pm)	52
Highest survey entries and date of the week	397 / Thursday
Lowest survey entries and date of the week	100 / Saturday

Table 2. Summary of Survey Logged Characteristics ("the raw data").

SURVEY RESULTS

User Status

As Table 3 shows, Graduate students represent Denison's largest patron base (34%), followed by Faculty members (29%) and Research Fellows (15%).

Status	No.	%
Graduate	2,781	33.98%
Undergraduate	392	4.79%
Faculty	2,393	29.24%
Staff	792	9.68%
Fellow	1,218	14.88%
Hospital	280	3.42%
Other	329	4.02%
TOTAL	8,185	100.00%

Table 3. Status of Survey Users.

Affiliation

As for user affiliation (see Table 4), 45% of respondents were from the School of Medicine, followed by the School of Pharmacy (15%) and Nursing (13%). The University Hospital, which contracts us for library and information services, contributed to 8% of usage.

Affiliation	No.	%
School of Medicine	3,644	44.52%
School of Dentistry	198	2.42%
School of Nursing	1,077	13.16%

School of Pharmacy	1,206	14.73%
Graduate School	412	5.03%
University Hospital	624	7.62%
Other HSC Units	669	8.17%
Denver Downtown Campus	20	0.24%
Other	335	4.09%
TOTAL	8,185	100.00%

Table 4. Breakdown by User Affiliation.

Location of Access

It is scarce wonder to see that more than 50% of our patrons are accessing library online resources from off-campus (see Table 5). 32% of them came to our website from locations on campus, but not in library. Comparing to the surveys conducted by Franklin and Plum of the seven academic health sciences libraries in the U.S. during 2003 to 2005 (see last column of Table 5), we have almost three times more users off-campus with significantly smaller usage coming from users located in the library.

	Location	%	Franklin & Plum
Library	1,346	16.44%	24%
On Campus	2,616	31.96%	58%
Off Campus	4,223	51.59%	18%
TOTAL	8,185	100.00%	100%

Table 5. Location of Access.

Purpose of Use

44% of respondents indicated that they visited Denison's website for instructional purposes, which can include all teaching and training activities, student coursework and term papers, personal research and studies, independent faculty research, writing – working on theses and dissertations, and other scholarly activities. About 20% of the usage is related to patient care. Usership related to sponsored or funded research projects, imperative to the research activities and financial health of the University, represents another 20%. Compared with the same survey results by Franklin and Plum (see last column of Table 6), Denison has relatively less library usage related to sponsored research. On the other hand, our usage related to instruction and patient care is much stronger than the average of the seven, benchmark academic health sciences libraries cited.

	Purpose	%	Franklin & Plum
Sponsored research	1,656	20.23%	33%
Instruction	3,616	44.18%	37%
Patient Care	1,629	19.90%	13%

Other	1,284	15.69%	17%
TOTAL	8,185	100.00%	100%

Table 6. Purpose of Library Access.

Usage by Location

As Table 7 indicates, more than 45% of graduate students, the largest user group, accessed Denison Library's website from off campus. On the other hand, faculty members, the second largest user group, and research fellows, the third largest contingent, tend to access library resources from their office or research lab on campus, but not in the library.

	Graduate	Faculty	Staff	Fellow	Undergrad.	Hospital	Other	Subtotal
In Library	22.44%	19.54%	24.81%	15.60%	3.57%	5.13%	8.92%	100.00%
On Campus	21.52%	42.24%	10.44%	17.43%	1.68%	4.59%	2.10%	100.00%
Off Campus	45.37%	24.27%	4.38%	13.07%	7.10%	2.15%	3.65%	100.00%
% of Total Responses	33.98%	29.24%	9.68%	14.88%	4.79%	3.42%	4.02%	100.00%

Table 7. Use by Location.

Such phenomena depicted in Table 8, which displays location of usage cross-tabulated with usage purpose, further reveals that 49% of instruction and course related activities, related to usage by graduate students, was tapped into off-campus. Library usage related to sponsored research, involving most faculty members and research fellows, came mostly from on-campus locations. The results from Tables 7 and 8 are consistent with the survey of the seven academic health sciences libraries.

	Sponsored	Instruction	Patient Care	Other	Subtotal
Library	7.36%	37.82%	12.56%	42.27%	100.00%
On Campus	31.84%	39.83%	19.92%	8.41%	100.00%
Off Campus	17.14%	48.90%	22.24%	11.72%	100.00%
% of Total Responses	20.23%	44.18%	19.90%	15.69%	100.00%

Table 8. Purpose of Use and Location of Access.

Top Library Resources

By analyzing the resource URLs from the survey log, we are able to identify the top 20 library subscribed resources or services as shown in Table 9. It is not surprising to see that Ovid databases and PubMed, two most popular comprehensive health sciences online resources, occupied the top two spots by our

users. Two locally maintained and produced online resources made the list. Impulse, our library catalog, commands a high usage and took the number three slot. Our electronic reserve site, popular among students, is ranked 16th. Our electronic journal portal, originally hosted by Gold Rush and migrated to Serials Solutions, was the fourth most-popular resource.

Two aggregator database vendors, EBSCO and Gale, which cover general subject areas, are also on the list. Both offer decent coverage of full text journals that might not be available from other sources. It is similarly unsurprising to see two high-demand medical journals, New England Journal of Medicine and JAMA, appear on the list.

The 20 Top Used Resources account for 87% of all resource URLs collected in this survey, an indication of the heavy concentration of resources used by our patrons. This observation is further strengthened by the usage report generated from our web transaction logs from the same survey period. The first column of Table 9 lists the ranking order derived from our web server log analysis for each resource. Although the ordering may differ, there are only two resources (Taylor and Francis journals and JAMA) that are not in the top 20 list of the web log analysis.

20 Top Used Resources				Jan - Dec 2006
Web Log	***Rank***	***Resource***	***Count***	***% of Total***
2	1	Ovid	1,187	14.52%
1	2	PubMed	1,177	14.40%
7	3	Impulse Library Catalog	1,135	13.89%
6	4	Journal A to Z, Gold Rush, Serials Solutions	834	10.20%
5	5	ScienceDirect	579	7.08%
3	6	Micromedex	386	4.72%
4	7	MDConsult	231	2.83%
10	8	Interscience.wiley.com	200	2.45%
16	9	EBSCO Databases	185	2.26%
18	10	Blackwell-synergy.com	174	2.13%
8	11	STAT!Ref	166	2.03%
14	12	Springer	124	1.52%
27	13	Taylor and Francis	118	1.44%
12	14	New England Journal of Medicine	116	1.42%
11	15	FIRSTConsult	105	1.28%
13	16	Denison Electronic Reserve	98	1.20%
20	17	Gale Databases	91	1.11%
15	18	Web of Science	77	0.94%
17	19	Nature	75	0.92%
21	20	JAMA	45	0.55%
		TOTAL	**8,174**	**86.90%**

Table 9. Top 20 Library Resources or Services.

CONCLUSION

At Denison Memorial Library, we carried out a hybrid, two-pronged research study featuring a web-based survey to address University and federal government requirements yet more critically, to better understand patron information needs and their information-seeking behaviors. Without doubt, we gained a clearer perspective of how our resources are currently being utilized. By employing the "MINES for Libraries" statistical methodology, we analyzed more than 8,000 user responses gathered during 48 hours of randomly-selected survey windows throughout 2006.

Our findings reveal that graduate students and faculty members are our largest user cohorts and more than 40% of our patrons hail from the School of Medicine. More than 50% of respondents answered our survey from off-campus, and "conducting instruction-related research" is by-far the main purpose for using our library's online resources. We likewise identified the top 20 online resources respondents are using, which closely correlates with the most-popular resources as derived from our web server logs during the exact-same study period. We also found that these top 20 online resources represent 87% of total resources accessed by *all* respondents.

Further, we are able to compare our results with the benchmarks derived from seven other academic health sciences libraries. Such an objective comparison validates and reaffirms long-suspected, "seat of the pants" guesstimates on our part for many years, as well as sheds fresh, certifiable light upon the uniqueness of Denison Library.

We were surprised, for example, to observe that a much larger portion of our users receive our services from off-campus, contrasted against the seven other libraries drawn upon as our "locus of reference." Additionally, we are concerned about the relatively low segment of our users ostensibly conducting sponsored/funded research. We hope to employ our valid statistically-descriptive and factual evidence, coupled with unobtrusive, ongoing web-access logging and vendor statistics, to review our current operations in collection development, resource allocation, user service and education; budget and funding requests; system performance and IT capacity planning.

Most crucially of all, the labor-intensive but methodologically-sound exercise of incorporating the power of statistical thinking-in-practice, statistical data gathering and consequent effects yielded, collectively empowers the digital library to assimilate "hard science," evidence-based information for the sheer necessity of buttressing knowledge-management skills into daily library operations at a time when the only way to "fight information is with information" or – to place a more-positive spin on the challenge – if we want to remain viable as an enlightened information provider, we must remain informationally-enlightened ourselves.

As Pfeffer and Sutton incisively expostulated in their article on evidence-based management, organizations and executives must learn from the medical establishment in making informed decisions based on facts and proof in order to gain the competitive advantage in a world where information is now currency, and in the prophetic words of Herbert Marshall McLuhan, "When a thing is current, it creates currency."

Statistics enable us to know what otherwise we can only surmise. Pfeffer and Sutton recommend setting aside conventional wisdom and ideologies. Instead, examine the logic, the fallacies and the limitations behind the results, statistical reports and research designs. Nurture an evidence-based culture and practice in our organization by encouraging trials, pilot studies, experiments; and rewarding such learning and efforts. In the current digital-information ecosystem, it is no mystery that libraries are facing enormous challenges and competition from all fronts. With the rapid evolution of scholarly communication, open access publishing, information discovery and delivery, and increased-knowledge of user behavior, librarians need to institute evidentiary-based practices at all levels, in transforming our traditional, printed-oriented, sited-based services; namely: to serve our patrons better and keep them coming back to us for more and more up-to-the-moment information.

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