

Information-seeking behavior and the use of online resources: a snapshot of current health sciences faculty

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Objective: The research assesses the information-seeking behaviors of health sciences faculty, including their use of online databases, journals, and social media.

Methodology: A survey was designed and distributed via email to 754 health sciences faculty at a large urban research university with 6 health sciences colleges.

Results: Twenty-six percent (198) of faculty responded. MEDLINE was the primary database utilized, with 78.5% respondents indicating they use the database at least once a week. Compared to

MEDLINE, Google was utilized more often on a daily basis. Other databases showed much lower usage.

Conclusions: Low use of online databases other than MEDLINE, link-out tools to online journals, and online social media and collaboration tools demonstrates a need for meaningful promotion of online resources and informatics literacy instruction for faculty.

Implications: Library resources are plentiful and perhaps somewhat overwhelming. Librarians need to help faculty discover and utilize the resources and tools that libraries have to offer.

INTRODUCTION

Online databases and journals have altered use patterns of academic health sciences libraries over the past decades as more users access online resources remotely and fewer patrons enter the physical library [1, 2]. Academic libraries have built substantial collections of full-text journals and databases, which often come at a great financial cost. While usage statistics record the frequency of use of online journals and databases, they tell little about how users are finding and utilizing the online resources of an academic health sciences library.

Librarians at the authors' home institution, the University of Illinois at Chicago (UIC), have a long history of studying the information-seeking behavior of faculty, researchers, and students. The last time such a study was completed at UIC, online journals were just becoming prevalent in academic libraries, and important changes in health sciences researchers' information-seeking behaviors were already being noted. The 2000 study, surveying journal and database use of health sciences faculty and students, found almost all users had convenient access to a computer and thus, because computers were essentially ubiquitous for health sciences researchers, computer use and Internet access had no apparent relationship to the use of MEDLINE or full-text journals [1]. Ninety-three percent of survey respondents personally searched online databases, the primary database being MEDLINE. Only 18% of

faculty reported using the library building to access online resources, and 69% of faculty reported never entering the library for this purpose. Overall, 71% of survey respondents preferred online journals over print journals. Still, over 50% of surveyed faculty read articles in personal journal subscriptions, close to 40% read the library print version of an article, and 60% reported photocopying journal articles in the library.

Of course, studies on the impact of online journals and databases have been conducted at multiple institutions since the last study in this area was conducted at UIC. A 2003 study at the University of Georgia found 67% of faculty reported reading at least 1 article per week from the library's electronic journal collection [2]. This study also found more assistant professors (88%) utilized online resources than did associate or full professors (69%), demonstrating a possible correlation between rank and electronic usage. A more recent study examining the behavior of academic researchers found researchers read more materials from a broader range of disciplines than they did prior to the availability of online journals, although sometimes at a superficial level in order to determine what to read more in depth [3]. This study also found researchers made fewer trips to the library to browse print journals in the era of online journals, but chose instead to browse journals online or receive email alerts of journal tables of contents (TOCs). It was also noted that researchers often searched Google and Google Scholar when looking for information. A small 2010 study of basic sciences researchers from a medical college revealed a strong preference for online resources rather than print, and most participants reported beginning their searches with PubMed or Google, depending on what was needed [4]. The study also noted researchers used the primary literature databases but "incorporated reading background sources, identifying key researchers, and following references from bibliographies, moving



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A supplemental appendix is available with the online version of this journal.

back and forth between these activities as they learned more." In 2010, Nicholas et al. used interviews, questionnaires, and observation as a follow-up to a log analysis study of e-journal use. They found an "extremely high level of importance attached to peer-reviewed journal articles," evidence that much use of e-resources by faculty and researchers occurs outside the 9–5 work day, conspicuously absent social media use, and little use of alerting services [5].

Social media and journal alerting services are 2 new technologies that have appeared since the advent of online journals and are visible in the online journals themselves. A 2012 study found that 84% of health sciences journals had a really simple syndication (RSS) feature for keeping current with the journal, and almost all offered email alerting services [6]. In addition to the RSS feeds, other social media features were incorporated in the online journals. Sixty-one percent of all the health sciences journals studied had social bookmarking tools on the journals' websites, allowing users to share journal content on websites such as CiteULike, Facebook, Blogger, Twitter, and others. In addition, over 25% of the journals had Twitter and Facebook accounts for posting news about the journal, such as recently published articles.

Point-of-care resources designed for computers and handheld devices have also evolved in the last ten years. Since their use became very popular in the late 1990s to early 2000s, they have gone from being programs installed directly on handheld devices to apps that allow access to full-text databases on remote servers. With the introduction of the iPad, Kindle, and other tablet devices, larger screens allow easier reading of books, journal articles, and point-of-care information directly online.

Online resources continue to evolve, and their users must continue to adapt to an ever changing environment. The ubiquity and expansion of online journals, the availability of multiple point-of-care resources, and other changes in technology, such as the advent of mobile technology and social media, warrant another study of user behavior. Do readers now read only what is immediately available online, and do they read these articles online, on handheld devices, or in print? Are researchers embracing new technological tools to help organize and obtain information and find collaborators? The purpose of this study is to examine health sciences faculty use of online databases and journals, the obstacles they report in their pursuit of information, and their use of new technological tools for organizing and obtaining information. The results will give librarians insight into health sciences faculty behavior and their needs so that they can optimize their interactions with faculty and the faculty's use of library resources.

BACKGROUND

This study took place at UIC, which is a large urban research university with 6 health sciences colleges (medicine, nursing, applied health sciences, dentistry, pharmacy, and public health). UIC has a large urban

medical center and 3 regional health sciences campuses. At the time of the study, the University Library provided access to 44,388 electronic journals, of which 5,432 covered health or biological sciences. Approximately 100 current print health sciences journal subscriptions remained, and print journal archives were still housed in the library. The library also subscribed to or promoted access to 51 databases related to health sciences, including MEDLINE (both Ovid and PubMed), Web of Science, MD Consult, Current Contents, CINAHL, PsycINFO, Biological Abstracts, Cochrane, EMBASE, International Pharmaceutical Abstracts, and SciFinder Scholar. Almost all full-text databases and journals were configured to link to available full-text using the Serials Solutions link-resolver so that access to subscribed journal articles would be seamless.

METHODOLOGY

To determine how health sciences faculty use online journals and databases, an online survey was developed (Appendix, online only). Several of the questions were based on the previous survey distributed in 2000 [1], but not all of the previous questions were adapted because their results would no longer be relevant, such as surveying one's access to a computer. New questions were developed to query the impact of recent changes in technology. Findings from Ollé and Borrego were also used to develop the questions [3]. Survey questions addressed how users accessed electronic resources, whether the various user groups differed in their use of resources, what users' primary information sources were, whether users were aware of the multitude of library online resources available, if they utilized social media, and how and if researchers were collaborating in an online environment.

Pretests of the survey were conducted, and institutional review board (IRB) approval was obtained. In November 2011, an invitation to participate and the survey itself were distributed through email to 754 tenured or tenure-track professors in the Colleges of Medicine, Nursing, Pharmacy, Dentistry, Public Health, and Applied Health Sciences. The invitation explained the reasons that the survey was being conducted, that participation was voluntary, and that anonymity was guaranteed. Ten days after the initial invitation for survey participation was sent, invitees were sent a reminder email.

RESULTS

A total of 198 (26%) of the 754 faculty members contacted responded to the survey: 75 assistant professors (38%), 57 associate professors (29%), and 66 full professors (33%). From the population surveyed, 22% of assistant professors, 21% of associate professors, and 45% of full professors responded. The breakdowns of respondents by college were: medicine (60.5%), pharmacy (11.6%), dentistry (6.8%), public health (6.8%), applied health sciences (5.8%), nursing

Table 1
Frequency databases are searched for research purposes

Databases	How often do you search the following databases to find articles for research purposes?								With which database do you start with to find articles for research purposes?			
	Daily		Weekly		Monthly		Couple times a year		Never		Response percent	Response count
	%	(n)	%	(n)	%	(n)	%	(n)	%	(n)		
Biological Abstracts	3.7%	(6)	4.3%	(7)	4.3%	(7)	9.3%	(15)	78.3%	(126)	N/A	N/A
CINAHL	0.6%	(1)	2.5%	(4)	8.2%	(13)	10.8%	(17)	77.8%	(123)	0.5%	1
Cochrane	0.6%	(1)	3.0%	(5)	16.3%	(27)	39.2%	(65)	41.0%	(68)	—	0
Current Contents	1.2%	(2)	6.2%	(10)	5.6%	(9)	13.6%	(22)	73.5%	(119)	—	0
EMBASE	0.7%	(1)	1.3%	(2)	6.5%	(10)	12.4%	(19)	79.1%	(121)	—	0
Google Scholar	16.9%	(31)	18.0%	(33)	24.0%	(44)	16.4%	(30)	24.6%	(45)	7.3%	14
Google	50.8%	(94)	18.9%	(35)	14.6%	(27)	8.6%	(16)	7.0%	(13)	3.6%	7
International Pharmaceutical Abstracts	—	(0)	3.3%	(5)	3.9%	(6)	8.6%	(13)	84.2%	(128)	N/A	N/A
MEDLINE	47.7%	(93)	30.8%	(60)	11.3%	(22)	8.2%	(16)	2.1%	(4)	81.3%	156
PsycINFO	1.9%	(3)	6.9%	(11)	8.1%	(13)	11.9%	(19)	71.3%	(114)	2.6%	5
SciFinder Scholar	2.5%	(4)	3.8%	(6)	5.0%	(8)	8.1%	(13)	80.6%	(129)	N/A	N/A
Web of Science	4.0%	(7)	13.1%	(23)	18.2%	(32)	29.0%	(51)	35.8%	(63)	1.6%	3
Other frequently used databases (please specify)										24		6

Note: Those marked as N/A were not options available to respondents in the survey.

(4.2%), and the medical center (4.2%). From the population surveyed, 21% of medicine/medical center faculty, 47% of pharmacy faculty, 28% of dental faculty, 22% of public health faculty, 33% of applied health sciences faculty, and 32% of nursing faculty responded.

Health sciences database use

Table 1 summarizes how frequently respondents used various databases to find articles for research purposes and which database they started with for research purposes. Forty-eight percent of respondents reported using MEDLINE on a daily basis, with a total of 78.5% reporting they used MEDLINE at least once a week. Eighty-one percent reported starting with MEDLINE (PubMed or Ovid) to find articles for research purposes. Only 3.6% reported using Google as a starting point, yet 50.8% reported using it daily to find articles—more than the daily reported use of MEDLINE. Google Scholar was used daily by 16.9% of respondents, but only 7.3% reported it as their first choice for finding research articles. A majority of respondents from all the individual colleges indicated MEDLINE was their starting point for finding research articles (medicine 87.5%, pharmacy 85.7%, dentistry 84.6%, nursing 75%, applied health sciences 72.7%, and public health 69.2%.) This contrasts with those who identified their affiliation with the medical center rather than a college: 57.1% of these respondents reported starting with MEDLINE and 28.6% started with Google or Google Scholar.

When asked to explain why they began with a particular database (open-ended question), some survey respondents provided insight for their choice of MEDLINE, including best coverage for their discipline (22), most comprehensive database (26), and a good source of peer-reviewed articles (4). Familiarity and comfort (48) with the interface were also mentioned, as was the ability to link to available

full-text articles (5) and limit results (4). Several respondents mentioned they start with MEDLINE but then used Google or Google Scholar to find articles from other disciplines as needed. Reasons for starting with Google Scholar included being easy to use, not having to go through the library website, or using their RSS feeds for notification purposes. Respondents who started with Google to find research articles reported doing so due to the ease of use (11) and breadth of coverage (8).

After MEDLINE, Google, and Google Scholar, the percentage of respondents who reported using other databases on a daily basis decreased drastically. The next highest used were Web of Science at 4.0% and Biological Abstracts at 3.7%. Many databases had a large percentage of respondents who reported they never used the database; however, only 2.1% reported never using MEDLINE. Seven percent indicated they never used Google, and 24.6% indicated they never used Google Scholar.

Respondents indicated their primary reason for article searches was research purposes (90.8%), followed by keeping current (63.8%), preparing instruction (57.7%), and caring for patients (37.2%). As displayed in Table 2, the 180 respondents to the question rarely searched the 13 point-of-care databases listed in the survey for clinical or patient-care information. Over 90% stated that they never used 5 of the databases for clinical or patient care, and another 5 databases had between 75% and 90% of respondents never using them. For example, UpToDate was used daily by 4.8% of respondents but was never used by 64.1% of respondents for clinical or patient care purposes. MD Consult was the most used by all respondents, with 43.6% reporting using it at least a few times a year or more for clinical or patient care information.

To access library resources, 69% of respondents indicated they used the library's web page. Personal bookmarks on Internet browsers (41.5%) and search

Table 2
Frequency with which point-of-care tools are accessed for patient care information

Point-of-care tool	How often do you search the following databases for clinical and patient care information?									
	Daily		Weekly		Monthly		Couple times a year		Never	
	%	(n)	%	(n)	%	(n)	%	(n)	%	(n)
Access Medicine	0.6%	(1)	6.9%	(12)	5.2%	(9)	9.8%	(17)	77.5%	(134)
Access Pharmacy	1.2%	(2)	2.4%	(4)	3.0%	(5)	7.1%	(12)	86.4%	(146)
Clinical Evidence	0.6%	(1)	2.4%	(4)	2.4%	(4)	10.1%	(17)	84.5%	(142)
Clinical Pharmacology	2.4%	(4)	0.6%	(1)	3.0%	(5)	5.4%	(9)	88.6%	(148)
Cochrane	1.2%	(2)	3.0%	(5)	13.6%	(23)	24.3%	(41)	58.0%	(98)
DynaMed	2.4%	(4)	1.2%	(2)	1.8%	(3)	3.0%	(5)	91.5%	(151)
Essential Evidence Plus	—	(0)	1.8%	(3)	0.6%	(1)	4.8%	(8)	92.7%	(153)
First Consult	1.8%	(3)	0.6%	(1)	4.8%	(8)	6.0%	(10)	86.9%	(146)
JB Connect	—	(0)	0.6%	(1)	0.6%	(1)	2.4%	(4)	96.4%	(159)
MD Consult	2.3%	(4)	5.7%	(10)	17.8%	(31)	17.8%	(31)	56.3%	(98)
Nursing Reference Center	—	(0)	—	(0)	—	(0)	3.7%	(6)	96.3%	(158)
ACP Pier	0.6%	(1)	1.2%	(2)	3.0%	(5)	4.3%	(7)	90.9%	(149)
UpToDate	4.8%	(8)	12.0%	(20)	10.8%	(18)	8.4%	(14)	64.1%	(107)
Other frequently used databases (please specify)										31

Note: 18 respondents did not provide answers to this question.

engines (21.8%) were also methods respondents used to access library resources.

Journal use and information technology adoption

The majority of respondents (84.3%) indicated having good or excellent access to most of the journal articles needed, but slightly over 15% suggested some difficulty. However, the 15.7% who reported varied or poor access to needed journals also reported low use of the library's web pages and journal link-resolver.

As illustrated in Table 3, survey respondents indicated keeping current in their field in 2 primary ways: searching databases for articles on specific topics (98.4%) and reading tables of contents of selected online journals or browsing journals (print or online) (50%). Few faculty members utilized social media technology, such as RSS or Twitter feeds, or read blogs or wikis in their field, with over 84% indicating never utilizing each of those services. A number of respondents (43.5%) had citations emailed to them from saved searches either often or sometimes.

When respondents were asked about the factors that influenced their selection of articles, the majority of respondents indicated that they select articles by looking at the relevance of the specific article to their topics (98.5%), and most (72.6%) made selection

decisions based on information in abstracts. A little over half of respondents felt the impact factor and reputation of the journal were somewhat important criteria when selecting articles. Close to 70% of those surveyed would select an article to read based on online availability.

When asked to identify the methods used to obtain or access an article, nearly 67% of respondents indicated using the library's link-resolver identified by the "Find it @ UIC" icon, which is available in most online indexes licensed by the library. The icon takes users to a page showing the citation, links to available full text, links to the catalog's print holdings, and a link to an interlibrary loan (ILL) form for requesting unavailable material. Some respondents (40%) also used the library's online list of e-journals, and a small percentage (10.5%) used the online catalog. Many faculty members also indicated using nonlibrary web pages and services to find online articles. These included publisher link-outs provided in some databases such as PubMed (45.3%), search engines such as Google Scholar (43.7%), personal journal subscriptions (23.7%), and browser bookmarks or personalized home pages (12.6%).

Table 4 illustrates the ways in which faculty would attempt to access an article if it was not available online through the library. If the library did not

Table 3
How health sciences faculty find articles for research and keeping current

Method for finding articles	Often use		Sometimes use		Never use	
	%	(n)	%	(n)	%	(n)
Search databases for articles on a topic	83.5%	(162)	14.9%	(29)	1.5%	(3)
Read print table of contents or browse print journals	26.7%	(47)	55.1%	(97)	18.2%	(32)
Read online table of contents or browse online journals	45.6%	(82)	45.0%	(81)	9.4%	(17)
Have table of contents emailed to personal email account (email alert)	36.9%	(65)	25.6%	(45)	37.5%	(66)
Have citation information of articles on a topic emailed to a personal email account (email alert from a database using a predetermined search)	20.0%	(34)	23.5%	(40)	56.5%	(96)
Create a really simple syndication (RSS) feed for the table of contents of a journal	5.5%	(9)	9.7%	(16)	84.8%	(140)
Create an RSS feed for articles on a topic (predetermined search in a database)	3.1%	(5)	7.4%	(12)	89.6%	(146)
Through Twitter updates	1.2%	(2)	1.2%	(2)	97.5%	(159)
Through blog and/or wiki feeds of other individuals or groups	1.2%	(2)	4.3%	(7)	94.4%	(153)
Other (please specify)						8

Table 4
Ways in which faculty are likely to obtain journal articles not available online

	Very likely		Somewhat likely		Not likely	
	%	(n)	%	(n)	%	(n)
Requesting it through interlibrary loan (ILL)	39.5%	(75)	34.2%	(65)	26.3%	(50)
Going to the library, if article is newer (less than 5 years old) and available only in the library in print	18.0%	(33)	31.1%	(57)	50.8%	(93)
Going to the library if the article is older (5 years or older) and available only in the library in print	19.2%	(35)	35.7%	(65)	45.1%	(82)
Going to the author's own web page	7.7%	(14)	23.2%	(42)	69.1%	(125)
Sending a request to the author directly (e.g., email)	10.3%	(19)	34.1%	(63)	55.7%	(103)
Online pay-per-view	0.6%	(1)	10.5%	(19)	89.0%	(161)
An open access repository (e.g., PubMed Central, institutional repositories)	54.1%	(100)	29.7%	(55)	16.2%	(30)
Sending a request to a colleague at another institution	7.7%	(14)	30.2%	(55)	62.1%	(113)

provide online access to a needed article, the most likely methods that respondents would use to obtain the full-text included ILL (74%) and open access repositories such as PubMed Central (84%). Most respondents (89%) indicated they would not use online pay-per-view for access, and over 55% were unlikely to send a direct request to the author or visit the author's web page (69%). They were also not likely to send a request to a colleague at another institution (62%). The results also show faculty members did not wish to make a trip to the library, with nearly 51% stating it was unlikely they would go for a recent article and 45% stating it was unlikely they would go for an older article.

When asked (open-ended question) what caused the most problems in finding and accessing the literature, the most common response was lack of access to e-journals (62 respondents, 31%). Of these responses, 12 stated that lack of access to older issues online was a problem. A portion of the respondents spoke to online fees and pay-per-view, also indicating lack of awareness of accessing online collections and use of ILL. Respondents also stated problems occur with incorrect links to articles. Some examples of faculty's frustration with accessing online journal content included:

- "Electronic journals that delay access for 12-months."
- "Older articles—which I need to retrieve if I am doing a full comprehensive systematic review."
- "I have become spoiled by the wonderful access to as many journals as we have. When I do not have that journal at my fingertips, I get frustrated."
- "Journals the access to which is exclusively pay-to-view or is not available at UIC."
- "Article not available or bad links to publisher from the library."

A number of responses focused on accessing and searching the databases and referred to difficulty searching and being unable to narrow results sufficiently. Several also indicated a frustration with selecting the right database to use and not being able to search across multiple databases.

When asked what would help them better utilize library resources, respondents wanted more online journals, easier access, direct article links, and access to older literature, as well as "in-press" articles. Respondents indicated being "unaware" of what the library has to offer, not knowing about all the databases listed in the survey, "not thinking about the

library as a resource," and needing training on the library's resources. Fifteen respondents commented directly about the web pages or indicated a need for better, more intuitive, easy-to-navigate design.

Faculty were asked their current methods for reading journal articles. Most respondents reported both reading print-outs of an online journal article (82.7%) and reading the article directly on a computer (81.1%). Faculty continued to read articles directly in print journals (55.6%) and articles photocopied from a print journal (34.2%). Faculty were unlikely to read a journal article on a handheld device such as a smartphone (10.7%) or on a personal reader such as a Kindle or an iPad (16.3%).

Faculty were asked how the growth of electronic access to information has changed how they search and select articles (open-ended question). Examples of their changed behaviors included: reading or downloading more articles, using more articles in research and grants, expanding the variety of journals used (wider range of disciplines), having better ability to keep up-to-date (only a small percentage used TOC alerts or RSS feeds), accessing and reading almost exclusively journals that are only online, having faster access to articles (for research and patient care), searching more easily and more successfully, being able to save time with more efficient access (not wasting time going to physical library), having the ability to expand interests, doing more peripheral and/or more in-depth reading, being able to be more selective in the quality read or included, and increasing their research productivity. Negative consequences observed included less thoughtful and systematic searches and access to so much research, leading to difficulty keeping up.

Research collaboration

Faculty were also asked about research collaboration. Faculty were most likely to share documents when collaborating through email (99.5%), followed by Google Docs (23%), Dropbox (21%), and YouSendIt (4%). Some faculty used the following reference management tools when collaborating on research: EndNote Web (9%), Zotero (1%), RefWorks/RefShare (9%), Mendeley (0.5%), and CiteULike (0.5%). Faculty indicated primary methods for locating other colleagues or researchers for research collaboration were: attending conferences/scholarly meetings (70%),

asking colleagues for recommendations (51%), relying on existing relationships with colleagues in their departments or colleges (51%), and searching publication databases (PubMed, Web of Science) (39%). Other methods for finding collaborators included searching grant databases (14%), the Internet (14%), and Google Scholar (12%). Other less popular methods were LinkedIn (5%), UIC's SciVal Experts (3.4%), Biomed Experts (1.7%), and Facebook (1%). No respondents indicated using ResearcherID or Academia.

Information needs

One hundred fifty of the respondents answered questions on their information and training needs. A recently developed faculty profile tool illustrating faculty publications and collaborators (45%) was of greatest interest. Bibliographic management software (38%), the h-index and other metrics (36%), online library resources (33%), online collaboration tools (28%), preservation and sharing of research data (25%), the impact factor of a journal (24%), information about complying with the National Institutes of Health (NIH) public access policy (23%), and information about retaining intellectual property rights to one's research articles (23%) were also of interest. The preferred method for learning more about these topics was online tutorials (64.9%), and other methods had varying levels of support, including online workshops (34%), exploration of databases or tools on own (32%), hands-on instruction arranged through researcher's department (25%), library workshops (19%), and reading of articles or books (17.5%).

DISCUSSION

Most survey respondents started their literature searches with MEDLINE, but over half also used Google, a finding similar to other studies that showed researchers were incorporating Google and Google Scholar in their search processes [3, 4]. The data showed that 78.5% respondents searched MEDLINE at least once a week, up from 53.0% in the 2003 study. Many users were also searching Google and Google Scholar on a regular basis. While users for the most part were satisfied with their access to databases and journal articles, results showed that faculty were not finding and/or making use all of the available tools and resources. As found in the 2003 study, "users select a small number of available online resources and seem unaware of the broader spectrum of available resources" [1]. This suggests that the unique attributes of the databases require better explanation and highlighting, such as the value of some of the databases in assessing the impact of research (Web of Science, Scopus). Some survey respondents indicated an interest in more information about the library's databases in order to better utilize features available in the databases (34%).

In both the current study and the 2003 study, users were asked how they read journal articles. Approximately the same percentage would print an online

article to read it (approximately 80%). The number who would read a photocopy of an article from a print journal was down to 34% from 60% in 2003. The number who would read an article directly on a computer increased from about 52% to 81%. Reliance on personal journal subscriptions decreased from 54% to 24%. In the 2003 survey, 55% of respondents said they used ILL to obtain articles. In the current survey, 74% of faculty indicated they would be very likely or somewhat likely to use ILL. This might reflect that link-resolver tools such as Serials Solutions make ILL easier and in general, much faster.

While some researchers experienced access issues for journal articles, other researchers indicated the online access to journals and databases often meant they had more articles to read and it was difficult to manage all the information, which is similar to the findings in the Ollé and Borrego article, where researchers noted reading more material [3]. Despite this, few respondents were taking advantage of the available social media technology that would help to manage the alerting process for new information and research, and most continued to search online databases. However, similar to the findings in another study, researchers were also reading online TOCs and having TOCs of journals emailed to them [3].

Technology has changed the ways that faculty can access and read articles compared to a decade ago, but technologies for current awareness are not being adopted as rapidly as would be expected. This demonstrates the need for more promotion of and information training for social media features and online collaboration tools of databases and journals. However, the slow adoption of these technologies might be related to the findings expressed in the 2011 OCLC study examining researchers in the United States. This study noted researchers "relegate [the improvement of their information retrieval and management skills] low in their priorities" [7]. The study also said that "Most scholars are aware that rapid changes in information technology threaten to eclipse the effectiveness of their information management and retrieval skills over time. Some express concern over this issue and describe different strategies for adding to their skills or at least keeping them current. Because researchers find Google and Google Scholar to be amazingly effective in finding isolated bits of information or getting to publications or findings of interest to them, they feel limited pressure to augment their current skills given all the other demands on their time" [7].

The number of respondents utilizing the library's web page to access databases (69%) and the link-resolver (67%), while not low, does indicate that more than 31% of faculty do not use the library's website or the link-out tool to access the full text. While it is unrealistic to think that faculty would always go to the library's website to access databases such as PubMed, the likelihood that these faculty are unaware of the vast resources available is great and is compounded by missed opportunities to learn about new databases or access full-text link-out tools

embedded by institutions in their databases. Not accessing PubMed through the websites of libraries utilizing PubMed's Outside Tool means users are not making use of PubMed uniform resource locators (URLs) that provide link-resolver access to the full text subscribed to by the institution. The same issue applies to libraries that provide PubMed links incorporating campus proxy URLs that allow researchers to use the publisher full-text links provided in PubMed to go directly to the publisher full text (assuming access has been licensed by the user's institution). If users do not access customized links providing the specialized tools for accessing the full text, such access becomes more cumbersome and complicated. Comments from respondents certainly indicate that many have difficulty accessing the full text, and there may be a correlation between lack of awareness of the institutionally customized PubMed, how to display the Outside Tool in PubMed, and difficulty accessing full text. Another unsettling surprise in the results was the number of comments indicating a need for remote access. Libraries have provided remote access to collections for well over a decade. While comments indicating dissatisfaction with the library website may contribute to the low use of some resources, there is an indication that databases, social media, and other services and tools such as link resolvers need better publicity and training so that faculty are aware of and utilize these opportunities. Faculty indicated a preference for online tutorials, perhaps indicating that they want the training available 24/7 so that they can do it on their schedules, as needed and as time permits.

Although faculty continue to collaborate on their research, new tools to share documents and find collaborators were not widely adopted as of the time of this study. While learning about tools for finding collaborators was of interest to researchers, the OCLC study noted researchers had no difficulty finding collaborators and often did not want to be approached by anyone outside of the researcher circle for the purpose of collaboration [7]. This might be part of the reason for the low adoption of the recently offered faculty profile tool, although there was interest from faculty in learning more about it.

Limitations

This study reflects the database and journal use of tenured and tenure-track health sciences faculty. These faculty indicated their primary need for accessing the literature to be research oriented. They likely spent little time in the clinical care setting, which was reflected in the low use of clinical tools. The few faculty from the medical center who responded to the survey also indicated research as their primary objective in accessing the literature, although they spent slightly more time with the clinical tools. There were too few respondents in this survey to make any conclusions that could be generalized to clinicians. Further analyzing the use statistics of the clinical tools and surveying professional students and clinical

faculty might provide a better understanding of the use of and need for the clinical tools.

CONCLUSIONS

This study provides a snapshot in time of health sciences faculty use of online resources, their information-seeking behaviors, their characteristics, and the obstacles that they encounter. The results illustrate some challenges undoubtedly faced by many libraries. At this moment in time, library resources are plentiful and perhaps somewhat overwhelming. Libraries may need to help faculty discover and facilitate use of all they have to offer.

Low use of the library's databases outside of MEDLINE/PubMed and lower than expected use of the library's website and link-resolver suggests several courses of action for the library. First, the library's website needs to provide more streamlined, user-friendly access to the online resources. Secondly, more publicity is needed for library-provided tools such as full-text linking, other research literature databases (beyond MEDLINE), and the library website with all of its features and finding aids. Further assessment of why databases are not being used and determining what databases are truly needed is required. Some databases or tools may be important to students but not faculty, and other tools may be more important to the medical center personnel. Faculty also are not using general tools such as RSS feeds and email alerts, indicating the library may want to consider ways to further help faculty in utilizing these tools. As part of this training, faculty's preference for online instruction at the time of need, especially online tutorials, has to be met.

Google and other search engines are a strong presence in respondents' behaviors. While more publicity and training on the databases may be needed, the ease of one search box may be the reason for the lure of Google. As libraries implement web-scale discovery products, which offer a one-search-box feature, it will be interesting to observe if those who favor Google and Google Scholar will adopt a web-scale discovery tool. What are the implications if adoption of these generic search engines grows, and what about the users who already appear to not be using the resources provided through the library? What are they missing, and is the information not captured in their searches critical? Library web-scale discovery services need to be evaluated for use in the health-sciences, and their advantages and possible disadvantages over generic search engines made apparent to faculty.

This study's findings reaffirm that users in academic health sciences environments prefer online resources to print. They still prefer to print out the articles to read them or read them directly on a computer screen, but adoption of tablets or handheld readers to read the articles is low. Users seem to limit their use of online resources to a small number of tools and are either unaware of or do not have need or time to use other tools available to them. While use of computers is ubiquitous, use of information management

technology such as RSS feeds and reference management tools are not, suggesting informatics literacy continues to play a role in adopting and using databases and other information management tools. Despite the integrated presence of online journals and online databases at academic institutions for well over a decade, technology continues to evolve, which in turn requires researchers to continue to evolve and adapt to best utilize online information. In addition, the availability of open access literature continues to grow, providing another avenue of access to information. Librarians and library services need to continue to develop and evolve to help researchers access and use the multitude of information resources available to meet users' information needs in the online environment.

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