Information Seeking Behavior of Academic Scientists

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The information seeking behavior of academic scientists is being transformed by the availability of electronic resources for searching, retrieving, and reading scholarly materials. A census survey was conducted of academic science researchers at the University of North Carolina at Chapel Hill to capture their current information seeking behavior. Nine hundred two subjects (26%) completed responses to a 15-minute Web-based survey. The survey questions were designed to quantify the transition to electronic communications and how this affects different aspects of information seeking. Significant changes in information seeking behavior were found, including increased reliance on web based resources, fewer visits to the library, and almost entirely electronic communication of information. The results can guide libraries and other information service organizations as they adapt to meet the needs of today's information searchers. Simple descriptive statistics are reported for the individual questions. Additionally, analysis of results is broken out by basic science and medical science departments. The survey tool and protocol used in this study have been adopted for use in a nationwide survey of the information seeking behavior of academic scientists.

Introduction

As we begin the twenty-first century, we are seeing a dramatic shift towards electronic communication of scientific scholarly information. While much of this was presaged during the computing revolution of the 1980s and 1990s, it has been the recent widespread adoption of Web-based electronic journals that has been the primary driver for change. The escalation of journal subscription costs and limited academic library budgets have paved the way for the electronic distribution of articles. Another significant factor in the adoption of e-articles has been the ease of finding articles on the Web via free search engines such as Google Scholar or from library-sponsored links in online catalogs and subscribed databases. The end result is that searching, retrieving and reading of scientific scholarly articles appears to be moving towards becoming completely electronic, with the only holdout being the preference by many for reading print copies. The transition to primarily electronic communication has the potential to significantly change the ways scholarly communication takes place. These changes range from the convenience of accessing electronic material on the reader's desktop, through the speed at which scholars can communicate new information, to accessibility to larger amounts of the material, and finally to the corresponding problem of sifting through larger amounts of potentially useful materials.

While many disciplines of scholarly communication have been impacted, academic science appears to be one of the most affected disciplines. This is due to scientists' need to communicate results rapidly, their early adoption of technology, and their support for other types of digital content such as scientific databases (e.g., the Genbank database, as described in Brown, 2003). This article reports on a survey study designed to capture current information seeking behavior of science researchers. Survey questions attempted to quantify academic scientists' transition to electronic communications, and how this affects different aspects of information seeking. The results can guide libraries and other information service organizations as they adapt to meet the

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needs of today's information searchers. Analysis of results is broken out by basic science and medical science units where significantly different. Further analyses, including detailing correlations between variables, breaking out results by department, performing in-depth comparisons with similar prior studies, and review of the open comment questions, are subjects of additional articles.

The survey tool and protocol developed for this study were designed to be entirely hosted at University of North Carolina at Chapel Hill (UNC-CH) but available anywhere, so that other institutions can conduct the study without needing any resources. The tool and protocol have been adopted by a nationwide study that will conduct surveys at approximately 20 national sites over the next three years.

Background

The overall field of research in information seeking and use has grown large enough to support investigations into occupational based groups. Areas receiving significant amounts of attention have been scientists and engineers, and more recently health science and medical specialists (Case 2002). A significant period of research on scientists and engineers occurred in the 1950s and 1960s after World War II, when substantial resources were expended to support research into science and engineering (Bates, 1996). This led to the development of general models of information seeking behavior, as well as studies of specific subgroups' behaviors and their differences from other groups (Case). Studies found both similarities and differences in information seeking behavior by discipline. At a high-level the information seeking strategies used may be similar. Many groups have proposed strategies and models used in general by information seekers (Ellis, 1989; Johnson, 1997; Krikelas, 1983; Leckie, 1996; Wilson, 1999), and have shown to some extent that different groups follow them. Ellis, Cox, and Hall (1993) found no essential differences between the information seeking patterns of physical and social scientists. However, when examining differences between subgroups most researchers have found specific differences. Hurd, Wheeler, and Curtis (1992) found that chemists rely heavily on current journals. Mathematicians make more use of older material based on citation studies (Garfield, 1983). Physicists and astronomers have made more use of preprints due to the development of preprint servers (e.g., arXiv) in their field (Ginsparg, 1994; Taubes, 1993). Several studies have focused specifically on scientists, and in some cases on how electronic access is affecting their behaviors. Studies from the late 1980s and early 1990s found that researchers preferred searching using print resources (Bichteler & Ward, 1989; Bouazza, 1989; Palmer, 1991). More recently, Brown (1999) surveyed astronomers, mathematicians, physicists, and chemists at the University of Oklahoma and found that while researchers indicated a preference for searching electronic content, they still primarily read print journals.

Researchers in science and medicine are becoming inundated with increasing amounts of scholarly literature, and at the same time face a dizzying array of different types of content delivery including books, journal articles, preprints, technical reports, Web pages, scientific databases, listservs, wikis, etc. Additionally, the mechanisms they use to search out, retrieve, and view the content are dramatically changing. Surveys during the past 10 years of the information seeking behavior by academics have found a trend in researchers' behaviors, with researchers becoming more accepting of electronic resources and increasingly utilizing them as their quality and convenience of access have improved. (See, for instance, excellent studies involving multiple universities spanning large time-periods by Tenopir and King, including King, Tenopir, Montgomery, & Aerni, 2003; Tenopir & King, 2002; Tenopir, King, & Bush, 2004, as well as others, such as Dillion & Hahn, 2002). From anecdotal observation, it is clear that today most academic researchers primarily use electronic access for searching and retrieving content. This is a significant change from when users relied on personal journal subscriptions (Curtis, Weller, & Hurd, 1997) or from when they primarily went to the library to read and make copies (Hurd, 1996), or even from when they searched electronically, but read or made a photocopy of the print copy because the electronic copy's text and figures were not of sufficient quality (Sathe, Grady, & Giuse, 2002). In today's world, the most common model appears to be the researcher conducting all the work at his or her personal computer, and then printing out some, but not all, content for reading, often keeping a personal electronic copy of the content. Visits to the physical library to retrieve information are decreasing. Different models have been proposed for this "electronic communication of scholarly information" (Garvey & Griffith, 1972; Hurd; Lancaster, 1978). In order to model scientists' information use, and to evaluate new technologies for assisting them in literature search and knowledge discovery, it is critical to understand their modus operandi. This study provides a comprehensive description of the current information seeking behavior of scientists in a large research university at a time when electronic versions of scholarly materials have become the norm.

Methods

The main purpose of the study was to survey science researchers on campus. Important secondary aims were to get feedback from as many of the university library patrons as possible, especially on the open-ended comment questions, and to identify resources used by patrons.

Because the candidate subjects could be easily contacted and recruited, and the secondary aim required feedback from as many subjects as possible, a census design was chosen for the survey. Since a potential drawback of census design is sampling bias, the resulting sample was compared to the complete population in age, gender, and department participation.

Survey Instrument

The survey instrument was developed with the PHP Surveyor tool. The survey is Web-based, allowing participants

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to take the survey from any computer with an Internet browser. The initial survey questions were developed by a team of researchers and librarians at UNC-CH. Many questions were chosen intentionally to parallel questions asked in prior studies of the information seeking behavior of scientists (Brown, 1999; King et al., 2003) to facilitate comparisons between studies. The survey was piloted and refined over eight months of testing, with feedback from the university's science libraries and the Health Sciences Library. A live test copy of the survey is available online (Hemminger, 2006a), and a printable version is online (Hemminger, 2006b) and is included in the Appendix.

Subjects and Recruitment

Eligible subjects were adult science researchers at the University of North Carolina at Chapel Hill (UNC-CH), including faculty, research staff, and students (graduate and post-doctoral). Recruitment was focused on science departments within the university. Students who worked on research (primarily doctoral students, but also masters students in departments that required research) were included as researchers—often these students as graduate research assistants are the primary information seekers. At UNC-CH there is no official definition of which departments are "science" departments; the final list was derived from departments that are part of the university's Science Departments committee, and it is expanded to include additional departments (primarily medical ones) after review by the research team. To facilitate comparison with prior research contrasting information seeking behavior between basic and medical science faculty, participants were coded as being in either a basic science or medical science department. The list of departments used in the study is shown in Table 1, including the classification of each department as basic or medical science. The chairs of each department were contacted prior to the study, both to garner their support and so that their endorsement could be included in the invitation letter. All chairs contacted gave their support to this study. Departments distributed the announcements to their eligible faculty, staff, and students. Subjects received an initial invitation letter via email from their department. This was followed by one postal mail follow-up and two email follow-ups. Additionally, flyers were put up in each department announcing the survey. The total number of participants in the science and medical departments in the study was 902, out of 3523 recruited, for a participation rate of 26%. This was considered good given that academic Web-based surveys' participation rates range from 3% to 62% for electronic surveys (Bell, Manione, & Kahn, 2001; Jones & Pitt, 1999; Kwak & Radler, 2002; Owen & Fang, 2003; Schleyer & Forrest, 2000; Vaughan & Hahn, 2004; Vredenburg, Mao, Smith, & Carey, 2002) and most recent Web-based surveys have very low participation rates, especially without significant follow-up (Matthias, Roanald, & Marc, 2001). The study was approved by the UNC-CH IRB committee, and conducted under UNC-CH IRB #LIBS 2005-082**.** Study recruitment and surveys took place during the spring semester of 2005.

TABLE 1. Summary of participants by department and department type (basic or medical science).

Department	Type	Participants
Biochemistry and Biophysics	Basic	30
Biology	Basic	77
Biomedical Engineering	Basic	8
Biostatistics	Basic	18
Cell and Developmental Biology	Basic	36
Cell and Molecular Physiology	Basic	34
Chemistry	Basic	82
Computer Science	Basic	52
Curriculum in Toxicology	Basic	10
Environmental Sciences and Engineering	Basic	17
Epidemiology	Medical	77
Genetics	Basic	23
Lineberger Cancer Center	Medical	3
Marine Sciences	Basic	9
Mathematics	Basic	22
Medicine	Medical	13
Microbiology and Immunology	Medical	43
Neurobiology	Medical	2
Neurology	Medical	12
Nutrition	Medical	26
Orthopedics Surgery	Medical	2
Pathology and Lab Medicine	Medical	38
Pediatrics and Genetics	Medical	2
Pharmacology	Medical	41
Physics and Astronomy	Basic	34
Psychiatry	Medical	23
Radiation Oncology	Medical	1
Radiology	Medical	2
School of Nursing	Medical	39
School of Pharmacy	Medical	109
Statistics & Operations Research	Basic	13
Surgery	Medical	4

Note. The third column is the number of participants in the study from that department.

Analysis

There are 28 main questions on the survey. Several main questions also had optional follow-up subquestions depending on the response to the main question. For instance, if subjects responded that they had personal article collections, they were asked for more details; subjects without personal collections were not. The answers for the first three questions were used to categorize each participant into a specific departmental unit on campus. Additionally, the experimenters coded the departments as belonging to either basic science or medical science departments for subgroup analysis (Table1). The last three main questions were open-ended comment questions in which participants were asked to describe the strengths and weaknesses of their libraries and their ideal searching environment. Excluding these three open-ended questions, all questions could be grouped as having either categorical (22) or continuous (5) answers.

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TABLE 2. Results from survey question #4, "What is your position?" (rank of participants at the university).

Position	Basic Science	(%)	Medical Science	(%)	Total	(%)
professor	58	12%	39	9%	97	11%
associate professor	23	5%	41	9%	64	7%
assistant professor	40	9%	46	11%	86	10%
research staff/adjunct	34	7%	65	15%	99	11%
post graduate/fellow	46	10%	37	8%	83	9%
doctoral student	246	53%	179	41%	425	47%
masters student	18	4%	30	7%	48	5%

Note. The initial column is the raw count, and the second is the percentage. Results are broken out by basic science and medical science departments.

Completed survey data from the PHP Surveyor tool was automatically transferred into a MySQL database. This data was cleaned up and then imported into SAS Version 8 and simple descriptive statistics were calculated for each survey question.

Results

The primary analysis was of the straightforward statistical results from individual survey questions. Table 2 shows the breakdown of the participants by university position, and Table 3 shows the breakdown by gender. At UNC-CH two thirds of the medical science researchers (including students) are women, and one-third of the basic science researchers are women (UNC-CH Factbook, 2006a). The survey respondents reflect these same percentages. Approximately half of participants in both basic and medical sciences were doctoral students, and this is true of the departments involved in the study as well (UNC-CH Factbook, 2006b). The remainder were fairly equally distributed across the remaining positions. The survey sample, in addition to being representative in department and gender, also matched in age with about half of the respondents between 20-30 years old (primarily students) and the rest fairly evenly distributed by decades (UNC-CH Factbook; UNC-CH Departments, 2005).

Question 7 in the survey asked how convenient Internet access was for participants. Ninety-one percent of them reported having access to the Internet in their office or lab, and essentially everyone had access in their department. Having such convenient access, especially in their office space, is critical to the increased usage of electronic resources. This was demonstrated by strong correlations of having Internet access in their office with higher levels of electronic searching, alert usage, annotating, and maintaining personal article collections.

The distance from the library to their office is shown in Table 4. Nearly one-fifth of the participants have a library in the same building as their office, and an additional 63% need only walk a very short distance. Despite how convenient the physical library is to the majority of participants, their comments indicated that having to walk to get resources was much less desirable than accessing them from their office computer. This is also seen in their responses to how little they visit the physical library nowadays (question #22).

TABLE 3. Results from survey question #6, "What is your gender?".

	Basic Science	(%)	Medical Science	(%)	Total	(%)
Female	179	38%	280	64%	459	51%
Male	286	62%	157	36%	443	49%

Note. The table presents a breakdown of survey participants by gender and by basic science versus medical science. Total number of participants in each group is reported, and their percentage of the whole.

TABLE 4. Results from survey question #8, "How far from your office (or location where you most often work) is the campus library you use most often".

Distance to Library	Count	Percentage
Same building	175	19%
1/4 mile	570	63%
1/2 mile	88	10%
1 mile or more	69	8%

Note. The first number is the raw count, and the second number the percentage of all responses.

To identify researchers' sources of information and how frequently they are used, participants were asked how often they used different types of information sources. Responses from basic science and medical researchers were very similar and are grouped together and presented in Table 5. The types of resources used most frequently by researchers were journals, Web pages, databases, and personal communications, in that order. This represents a significant change in practice. Previous research indicated that journals/books were the most popular source, generally followed by personal communications for academic researchers (Jirojwong & Wallin, 2002). Personal communication is often reported as the most popular source for nonscholarly information. Researchers in this study utilize general Web pages and online databases much more frequently than previously reported, in fact almost as much as they use journal articles. This is likely due to convenience—researchers can now find

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TABLE 5. Results from survey question #11, "How often do you use the following types of resources as a primary source of information for your research?".

	Daily or Weekly %	Daily	Weekly	Monthly	Quarterly	Annually	Never
Book	24%	60	157	241	223	148	73
Journal	87%	509	277	72	22	6	16
Preprint	18%	57	105	155	109	72	404
Conference	2%	4	14	37	193	492	162
Proceeding	5%	14	37	79	168	273	331
Web page	70%	362	277	132	67	19	45
Online database	67%	293	311	119	49	32	98
Personal communication	52%	241	228	132	114	64	123
Other	1%	5	7	3	0	2	885

material as quickly and easily from the Web as from a colleague. Conferences and proceedings are used significantly less often and more in conjunction with their annual meetings. Preprints fell in between these two groups, and their usage was often strongly correlated with their department. The only major difference between basic and medical scientists was that the former made more frequent use of preprints than the latter. Sixty-five percent of basic science researchers use preprints at least annually, compared to 45% of medical scientists. It is expected that a similar division between the life and physical sciences may also appear upon more detailed examination of departmental data. Table 5 presents raw counts for how frequently resource types were used, and summarizes the percentage of respondents that utilized these resource types at least weekly.

Table 6 contains the top 15 specific sources read by subjects to stay current in their field. The listings are shown separately for the basic science versus the medical science researchers. There is a significant amount of overlap in overall journal titles between the two groupings, with the main differences being slightly more medical and clinical sources in the medical sciences group.

The question specifically did not ask for journal titles, but rather for "individual sources." Given the large percentage of respondents who use Web sites and online databases on a daily or weekly basis (70% and 67%, respectively), the authors expected to see more nonjournal items listed as important for keeping current. The medical sciences group also included two summary database information sources in the top 15 (UpToDate and Lexi-Comp). Both UpToDate and Lexi-Comp are clinical decision support tools—the first for evidence-based medicine and the second for drug information—that digest primary literature into trustworthy secondary information for practitioners. Thus, these sources are necessarily slower to react to new research than research journals. Medical scientists use them to help cut down on the amount of reading that is necessary for understanding in a topic.

It is interesting that the majority of titles in the basic sciences list are from the areas of biology and chemistry. This could be an artifact of the respondents' departments, as the Department of Biology had the most participants in this survey. In addition, many of the smaller departments listed, such as Cellular and Molecular Physiology, are biological in

TABLE 6. Results from survey question #12, "What are the five (or fewer) most important individual sources (journals, reviews, Web sites, listservs, etc.) that you read to stay current in your field? Please list your answers (specific titles, listservs, Web sites, etc.) in order of importance (#1 most important)."

Basic Science Journals	Count	Medical Science Journals	Count
Science	99	Science	45
Nature	90	Nature	39
Cell	36	JAMA	38
Journal of the American Chemical Society	34	UpToDate	30
Journal of Cell Biology	20	New England Journal of Medicine	28
Journal of Biological Chemistry	19	Journal of Immunology	18
Analytical Chemistry	18	American Journal of Epidemiology	17
PNAS	13	Cell	16
Journal of Neuroscience	12	Lexi-Comp	15
Evolution	11	Journal of Biological Chemistry	14
Neuron	11	Epidemiology	13
Development	10	AIDS	12
Journal of Organic Chemistry	10	PNAS	12
Organic Letters	10	Journal of Virology	11
Biometrics	9	Nature Immunology	11

Note. The top 15 individual sources are broken out by basic science and medical science departments. The source titles are on the left, and the total number of times the source was listed (in any of the 1-5 most important slots) is the "count" column to the right of the source title column. A large number of respondents did not identify an individual source, but rather named a category of sources, such as "Web sites" or "journals." These were not included in the above analysis.

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nature. An alternate suggestion could be that there are a few journals in biology and biochemistry that are of core interest to researchers, and so the presence of these titles in the top 15 specific resources read for currency should not be surprising. However, if this were the case one would expect to see these titles in the medical sciences reading as well. Instead, many of the medical scientists are reading journals of clinical research interest, including two titles in immunology and epidemiology in the top 15.

Of the top 15 titles in the basic and medical sciences lists, four are common to both. These four (Science, Nature, the Journal of Biological Chemistry, and Proceedings of the National Academy of Sciences) are well-known, high-impact journals, with broad appeal. Only the Journal of Biological Chemistry is at all subject oriented, and even that is interdisciplinary.

Note that even though Science and Nature are the top two journals for both lists, they account for a relatively minor proportion of overall sources listed. There were over 1000 valid responses given for this question, of which 700 sources were listed only once. This means that, while there are a few highly visible, general-interest sources that are being read, the vast majority of reading for currency is done in titles that are of specialized focus. There is no real agreement as to the core set of science resources that a researcher should read regardless of specialty.

Table 7 lists the top 15 current awareness services used, broken out by basic science and medical science. As with the information sources in Table 6, the main difference between groups was that alerts reported by the medical science participants generally had more of a clinical orientation. Interestingly, alerts from PubMed, the National Library of Medicine's free interface to MEDLINE, was the most used resource by groups. In addition, PubCrawler, a third-party MEDLINE alerting service, appears in both lists. Other commonly used services include the Faculty of 1000, tables of contents from specific journals such as Nature, and alerts from literature databases like the ISI Citation Indexes. These top 15 "titles" account for only 24% of the basic science and 16% of the medical science researchers' choices; as with the reading lists, there is a long tail of low popularity services.

TABLE 7. Results from survey question #13, "Do you use any current awareness services, or alerts, to help you know when new literature becomes available that is relevant to topics that interest you? If you do, please list them in order of importance (#1 most important)."

Basic Science Alerts	Count	Medical Alerts	Count
PubMed	40	PubMed	53
Faculty of 1000	27	Medscape	11
ISI	14	Nature	10
ACS Journal Alert	11	Faculty of 1000	9
Nature	10	PubCrawler	9
ScienceDirect	9	ISI	7
Science	7	ePocrates	6
PubCrawler	4	ASHP	5
Biomail	3	NEJM	5
COS	3	MDLinx	4
J Biol Chem	3	Science	4
ACM	2	ScienceDirect	4
ArXiv	2	ADA Daily Knowledge	3
BMC alerts	2	JAMA	3
Cancer Research	2	Kaiser listserv	3

Note. The top fifteen alerts are broken out by basic science and medical science departments. The source titles are on the left, and the total number of times the source was listed (in any of the 1-5 most important slots) is the "count" column to the right of the source title column.

A major distinction between the items listed for the current awareness reading from those in Table 7 is the diversity of types of alerting service. These vary by amount of content available (e.g., individual journals vs. databases), type of provider (publishers, societies, virtual communities, individuals), and mode of delivery to email (listserv, RSS feed, automated delivery). Also of interest is the diversity among types of information coming from these sources. Most are providing citations to newly published research but others are alerts about preprints, grey literature, news, and funding opportunities.

Table 8 contains the rankings of the types of search tools used most often. Responses to this question included general category answers (e.g., Web search engine) as well as specific tools (e.g., Google, Yahoo). Specific answers were coded into general categories, and the summary counts for the general categories are reported. The primary source is still bibliographic and citation databases (47%), closely followed by full text searching via search engines and digital libraries (37%). As free, Web-based literature databases such as Google Scholar continue to grow, the distinction between bibliographic/citation database and Web search engines is blurring.

Table 9 shows the average number of articles retrieved each month by researchers. The survey results show that electronic access to journals, particularly through library subscription or open access, are the primary methods. For the most part, basic and medical science researchers' access methods are similar. Basic science researchers differ from

TABLE 8. Results from survey question #14, "What are the five (or fewer) most important individual tools that you use to search out information? Please list your answers in order of importance (#1 most important) and indicate how often you read them."

Search tool type	Frequency	Percentage
Bibliographic/citation database	1084	47%
General Web search engine	694	30%
Fulltext digital library	156	7%
Personal search tool	125	5%
Knowledgebase Web portal	93	4%
Others	69	3%
Online or local database	52	2%
Library collection	21	1%

Note. Answers were coded into the search tool type of categories. Frequency is the count of the total number of responses that fell into that category. In some cases, an observer may have listed multiple sources that grouped into the same category (for instance citation database), which is why the frequency count may exceed the number of participants. Percentage is the frequency count divided by the total number of responses.

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TABLE 9. Results from survey question #15, "In a typical month, how many articles did you retrieve to read from the following sources? Please indicate (or estimate) the number for each of the following sources."

Sources	Basic Science	Medical Science	Total
(electronic) library subscribed journal	20.17	19.89	20.03
(electronic) open (free) access journal or institutional repository or digital library	7.86	9.29	8.57
(print) library subscribed journal	4.48	3.61	4.05
(electronic) Web site (author's Web site)	4.36	3.31	3.89
(print) Personally subscribed journal	3.44	4.01	3.73
(print) copy of colleague's print copy	1.07	5.00	3.00
(electronic) personal subscribed journal	3.10	2.65	2.88
(electronic) personal digital library	2.89	1.97	2.43
(electronic) lab subscribed journal	2.72	1.14	1.97
(electronic) copy of colleague's electronic copy	1.60	1.98	1.79
(print) lab subscribed journal	2.05	0.79	1.43
(print) interlibrary loan	0.59	0.55	0.57
(print) document delivery service	0.13	0.19	0.16
other	0.02	0.13	0.07

Note. The average number of articles retrieved per month is given for basic science and medical science departments, as well as the overall total.

medical science researchers in that they make more use of lab subscriptions, both print and electronic, and personal digital libraries. Medical science researchers are more likely to exchange print copies of journal articles with colleagues.

Researchers indicate a strong preference for obtaining information in the most convenient way possible, which generally means for free (they do not pay directly) and via electronic access. Four of the top five sources are electronic and print library journals, open access or otherwise free journals, and author Web sites. It is encouraging that researchers not only use library materials heavily but also seem to distinguish between e-journals to which their institution subscribes and free content. Researchers also prefer to retrieve content electronically when available, as is shown both in the ranking of sources and in further questions below. These numbers may differ somewhat between researchers at Research I institutions and those with smaller budgets for journals; in particular, at UNC-CH faculty rarely need to turn to interlibrary loan, document delivery, or colleagues for copies of articles. Researchers at institutions with less comprehensive library journal subscriptions may rely more heavily on freely available materials such as open access journals and author Web sites.

Table 10 depicts the confidence researchers felt about finding out everything they should on the topic. The ratings by basic and medical science researchers were very similar and are grouped together. Many studies have reported that researchers are overwhelmed by the amount of material to review and feel that they do not find all the information on the topic for which they are searching (Nylenna & Aasland, 1996; Nylenna, Falkum, & Aasland, 2000; Smith, 1996; Williamson, German, Weiss, Skinner, & Bowes,1989), with one study finding that a third of physicians "felt they could not cope with the information flow" (Nylenna et al., 2000). The results in this study appear to agree, finding only 10% of the researchers responding that they are very confident they are finding everything, and 60% of the researchers having some confidence that they are finding everything (a response rating of 4 or 5 to question #16).

TABLE 10. Results from survey question #16, "How confident are you that you are finding everything you should on your topic?".

Confidence in finding all information	Total	(%)
Very not confident	29	3%
	94	10%
	246	27%
	442	49%
Very confident	91	10%

Note. The rating scale used gave values only for the endpoints, i.e., rating of 1 was "Very not confident" and 5 was "Very confident", with 3 assumed to be neutral. Counts of ratings per confidence level and their corresponding percentages are reported.

Survey question 17 asked, "Do you maintain a personal article collection?" Most participants (85.4%) responded that they did. For those with personal article collections survey question 17.1 asked researchers to estimate the size of the collections. Results were similar for basic and medical science researchers, and their responses were combined and are reported in Table 11. Researchers' maintaining print collections of articles is an established practice, and as expected the estimated print collection sizes followed a standard normal distribution (Moore & McCabe, 1998) with the mean in the 100–500 articles range. Keeping electronic journal article collections appears to be a newer practice. A larger number of researchers have not adopted this practice and keep only a few or no articles in electronic format, while the rest of the researchers appear to also follow a normal distribution with a mean in the range of 100–500 electronic articles.

Researchers were asked whether they used a personal bibliographic database in survey question 18: "Do you maintain a personal bibliographic database for print and/or electronic references?" 52.2% of the participants maintain one. A follow-up to this was survey question 18.2, which asked,

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TABLE 11. Results from survey question 17.1, "Indicate the approximate size of both your print and electronic article collections?".

Number of Articles	Print	%	Electronic	%
1–49	154	21%	259	39%
50–99	160	22%	127	19%
100–499	280	39%	210	31%
500–999	81	11%	44	7%
1000+	50	7%	26	4%

Note. For both print and electronic, the counts of participants per category (how many articles in their collection) are shown and the percentage of the total.

"Of the articles you have in your personal article collection, what percentage of them have entries in your personal bibliographic database?" The average percentage across the 770 participants who maintained a personal bibliographic database was the same for basic and medical sciences (59%).

Survey question 19 asked how many articles the researcher has annotated. The results for basic and medical science researchers are again nearly identical and their totals are summarized in Table 12. While over one third of the researchers annotate less than 10% of their articles, the remaining distribution shows variability across the full range with larger peaks around responses of 25%, 50%, and 75% annotation levels, possibly suggesting that respondents may have tended to round off their answers to these quartiles.

Part 6 of the survey dealt with searching and using information. Survey question 20 asked researchers how they preferred to search for information. Almost all researchers prefer to search using electronic versions of resources as seen in Table 13. A slightly greater percentage of medical science researchers (98%) use only electronic searching compared to basic scientists (95%).

The next question, number 21, addressed how the participants preferred to read information they had retrieved.

TABLE 12. Results from survey question #19, "Of articles you have in your personal article collection, on what percentage of them have you made some sort of notes?".

Percentage of entries with notes	Total count	Percentage
<10%	327	36%
11–20%	75	8%
21–30%	82	9%
31–40%	30	3%
41–50%	126	14%
51–60%	19	2%
61–70%	26	3%
71–80%	100	11%
81–90%	47	5%
>90%	70	8%

Note. This continuous response has been binned into percent decades for presentation. Total counts and overall percentages are given for each percent decade.

While there were small subpopulations that preferred reading electronic-only or print-only, the majority of researchers used both depending on the circumstances. Participant's comments indicated that they choose the most appropriate presentation depending on the conditions, for example, reading electronic copies on the computer in their office but reading print copies on the bus ride home. Medical science researchers showed a slightly higher preference for print (29%) compared to the basic science researchers (24%). The results are shown in Table 14.

Separating the question of how users prefer to search for information (question 20) from how they wish to read it (question 21) is important. The two issues are often confounded in studies that address both activities in one question. The typical result is that users indicated a preference for print but stated in their comments that they liked finding articles electronically but preferred reading them in print journals due to the lower quality of print copies made from electronic journal articles. This concern has been obviated

TABLE 13. Results from survey question 20, "If given the option, how would you prefer to search for information?".

	Basic Science	(%)	Medical Science	(%)	Total	(%)
Electronic versions of databases and journals	443	95%	429	98%	872	97%
Print versions of databases and journals	22	5%	8	2%	30	3%

Note. Answers are given as raw counts of participants and as percentages and broken out by basic science and medical science departments.

TABLE 14. Results from survey question 21, "If you were given the option, how would you prefer to read retrieved information (journal articles, etc)?".

	Basic Science	(%)	Medical Science	(%)	Total	(%)
Both/it depends	292	63%	260	60%	552	61%
Electronic (computer) only	63	14%	52	12%	115	13%
Print (hard copy) only	110	24%	125	29%	235	26%

Note. Answers are broken out by the basic science and medical science categories, with raw participant counts and percentages of all participants given.

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by improvements in such programs as Adobe Acrobat (PDF format), which provides electronic copies nearly identical to the print. As a result, electronic access provides many advantages of convenience and shared access previously identified (De Groote & Dorsch, 2003) as the only remaining barrier to widespread acceptance.

An important concern of many libraries is that fewer people are visiting the library in person. Health and science libraries are adjusting their services as patrons increasingly use electronic library resources remotely. Many libraries are renovating or changing structurally to adapt, and it is important to know why researchers still visit the library in person. How often researchers visit the library was asked in survey question 22, and the results are shown in Table 15. The majority of researchers visit the library fewer than 10 times per year for any reason, and almost a quarter visit it twice or less per year. Faculty visits have been declining since the time when materials became electronically accessible from their office computers. The survey results support the already documented trend of the declining number of visits per year. (For instance, the percentage of faculty visiting the University of Washington Library on a weekly basis decreased from 47% to 39% from 1999 to 2002; Hiller, 2002.). A small minority of researchers frequently visit the library, with some of the contributing factors being their discipline, position, availability of Internet access in their office, and distance to the library.

Survey question 23 asked why researchers visit the library; results are shown in Table 16. The reason given most often for library visits was to photocopy print-only articles, followed by picking up and dropping off print materials. Surprisingly, the library as a quiet reading space was the third most common reason, ahead of reading current journals. Several comments referred to nonlibrary public spaces as being noisy and crowded by undergraduates and that the quieter libraries were important spaces for research and reflective thought. This focus on library as place, rather than library as collection, is supported by the fact that the number of reported circulation and reference transactions fell sharply in the period 1995–2004 for both UNC-CH and for academic libraries as a whole, according to Association of Research Libraries annual statistics (Association of Research Libraries [ARL] Report, 2004). Basic and medical science researchers had a few differences. Medical science researchers more commonly conducted searches, used computers, had meetings, and sought assistance in the library. Basic science researchers more frequently came to the library to pick up and drop off materials, and to browse.

Of course, these statistics do not measure how much use researchers make of virtual library services and collections,

TABLE 15. Results from survey question 22, "How often did you visit the University libraries in person in the last 12 months?".

	Basic Science	(%)	Medical Science	(%)	Total	(%)
0–2	101	22%	107	24%	208	23%
3–5	75	16%	99	23%	174	19%
6–10	77	17%	71	16%	148	16%
11–20	84	18%	55	13%	139	15%
21–50	85	18%	67	15%	152	17%
51–100	34	7%	19	4%	53	6%
101–200	7	2%	13	3%	20	2%
>200	2	0%	6	1%	8	1%

Note. Answers are broken out by the basic science and medical science categories, with raw participant counts and percentages of all participants given.

TABLE 16. Results from survey question 23, "If you visit the library, what are your reasons for going?".

	Basic Science	(%)	Medical Science	(%)	Total	(%)
Photocopy	256	23%	274	23%	530	23%
Get assistance from a librarian	65	6%	96	8%	161	7%
Use computers	59	5%	112	9%	171	7%
Perform searches	81	7%	117	10%	198	8%
Read current journals or other materials	161	14%	156	13%	317	14%
Quiet reading space	156	14%	179	15%	335	14%
Meeting	45	4%	73	6%	118	5%
Browse	99	9%	60	5%	159	7%
Pick up /drop off materials	214	19%	134	11%	348	15%

Note. Participants could select as many responses as applied to them. The counts reported for a given reason are the total number of participants that selected that reason as one of their reasons for visiting the library. The total number of counts is larger than the number of participants because participants could list multiple reasons. Percentages are the total number of counts per reason divided by the total number of reasons given overall. Results are reported for basic science and medical science groups.

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TABLE 17. Results from survey question 24 "What determines your choice of journals for the publication of your work?".

Factors Affecting Choice of Journal in which to Publish	Basic Science	Medical Science	Total
Ability to include links, color, graphics, multimedia	1.38	1.24	2.31
Audience	3.52	3.38	4.45
Author having to pay cost of publication	1.51	1.54	2.53
Availability on campus	1.79	1.88	2.83
Editorial board	2.11	1.95	3.03
Page charges for long articles or color figures	1.40	1.45	2.42
Speed of publication	2.42	2.27	3.35
Standing of journal in your field	3.77	3.61	4.70
Support of open access to journal articles	2.09	2.17	3.13

Note. The survey question response was 1 "Insignificant" to 5 "Significant". Average scores for each attribute are reported in the table.

including the number of times they visit the library's homepage or contact a librarian via telephone or the Internet. Researchers with embedded librarians may never need to visit the library to reach "library services," and the library's document delivery service allows researchers to get electronic copies of print journals for a nominal fee. These survey results show that researchers do not come to the physical library to do traditional information retrieval tasks; however, taken with the high use of library-subscribed journals according to question 15, researchers are still using the library. In addition, both the number and the attendance in library-sponsored educational sessions are increasing (ARL Report).

The last question in this section (survey question 24) asked researchers what factors were important to them in choosing a journal to which to submit their articles. While factors such as publication speed, open access support, and editorial board were important, the two dominant factors were the standing of the journal in the field and the journal's audience. This correlates with the results of a small study of UNC-CH open access authors (Warlick, 2006) as well as other studies of publication choice (Rowlands & Nicholas, 2005). The results are seen in Table 17.

As the number of journals and available scholarly resources continues to increase, researchers are increasingly requesting metasearch tools that search across all resources for initial discovery searching. This is evidenced by the increasing popularity of tools like Google Scholar. Thus, the type of search interface researchers prefer is becoming an important question today. There is growing evidence that both novice and experienced searchers are increasingly using simple single text box search interfaces such as those provided by search engines like Google (http://google.com). Survey question 25 asked the question, "Which interface would you rather use to begin your search process?" with the possible responses "Google search page" and "Your library's home page." Overall, a slight majority of users preferred Google (53.3% to 46.7%) to the UNC library page (http://www.lib.unc.edu/); however, the difference was substantially larger for basic science researchers (Google 58.5% versus Library 41.5%) compared to medical researchers (Google 52.2% versus Library 47.8%). Had the wording of the question focused on the style of type of interface, rather than naming specific tools, the gap between a metasearch portal (e.g., Google) and a metaindex (e.g., the library) may have been wider. Many comments in the survey indicated a strong preference for a single "meta" search tool where the user could enter a single search string that would result in all content in all resource collections being searched, as opposed to manually identifying resource collections and individually searching them.

Discussion

The advent of the electronic exchange of scholarly communications, in particular for journal articles, is transforming the way scholars work. The first changes have been simple conversions from using print to electronic resources, making researchers' work easier. Searching for research materials is becoming more convenient as researchers increasingly utilize a single interface to search across multiple resources (Google Scholar, open archives harvesters, library metasearch engines). Searching and retrieving information is now done primarily at the researcher's desktop, resulting in a dramatic decrease in the number of visits to the library. As a result, libraries are changing their physical presences by increasing their emphasis on coffee shops, Internet access, meeting rooms, and quiet spaces. While researchers have demonstrated that they almost exclusively search and retrieve materials electronically, many still print out materials for reading. While some researchers clearly favor one format over the other for reading, the majority utilize both methods as appropriate. Researchers are on their way to building collections of electronic articles in the same way they have collected print copies of articles in the past. They also annotate their electronic articles and organize them in bibliographic databases as they do for print collections.

The types of materials used by researchers is evolving and expanding due to the simplicity of electronic access to any type of digital material. It is just as easy to retrieve a genetic sequence, a literature review, or a multimedia presentation as a journal article. Researchers are making increasing use of nonjournal content such as online scientific databases, like GenBank, or the Web pages of research labs. For the scientists in our survey, this type of access has surpassed personal communications, and it is close to journal articles in frequency of

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use by researchers. Researchers still primarily use library and bibliographic database searches but the use of Web search engines such as Google Scholar is almost as common.

There were strong correlations between some of the participants' demographic variables and their information seeking behaviors. Factors such as department, department type (basic versus medical science), gender, and distance to the library all had strong correlations with several of the behaviors. These included the frequency with which researchers visited the library, how often they utilized personal article collections, whether they made annotations, what kind of search interface they preferred, etc. Knowing that these correlations exist allows libraries to make informed choices about resource allocation and services. For instance, particular departments still frequently use print library resources, while other departments' interactions are almost entirely electronic.

The beginnings of more significant transformative changes can also be seen. New collaborative group communication applications are changing the consumer marketplace. Examples include multitudes of purchasing or recommender systems that provide for comment, rankings, and reviews of products (Amazon, 2006), folksonomies supporting community tagging (Del.icio.us, 2006; FLickr, 2006), and group collaborative authoring (Wikipedia, 2006). Similar changes are in their initial stages for scholarly communities. Examples include open shared rankings and reviews (Faculty of 1000, 2006), open access journals (BioMedCentral, 2006; British Medical Journal, 2006), open peer review (Nature, 2006), annotating prior publications and supporting dynamic changing publications (PLoS One, 2006), and online sharing of bibliographic databases and annotations (Connotea, 2006). While initial changes are often electronic equivalents of print counterparts, there are efforts to be more truly transformative. For example, as digital resources gain permanent unique identifiers such as Digital Object Identifiers (DOI; 2006) and are openly available through open archives initiatives (Open Archives, 2006), researchers may be more inclined to entrust copies of articles, database searches, annotation, sequences, etc. to online services that make them accessible via the Web. Thus, in the future researchers may maintain all their scholarly knowledge online and make it accessible to others as they see fit. Having scholars' descriptions and annotations of digital scholarly materials as well as the materials themselves available on the Web could allow online communities and community review systems to blossom, just like the availability of online journal articles has transformed basic information seeking practice of science scholars today.

Future Work

The success of this initial study has led to interest by other universities in conducting similar work at their sites. After discussions at the ASIS&T 2004 and 2005 conferences, a protocol for using this survey tool at other universities was developed, and a nationwide study has been planned. The national survey will begin in Fall 2006 and continue until 2009. Participation is still open; information can be found at http://www.ils.unc.edu/bmh/isb/ISB.site.protocol.htm. The authors are also conducting a complementary study, involving structured interviews with bioinformatics researchers and observations of these researchers in order to better understand their information seeking behavior and their information workflows.

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APPENDIX A

Survey

Information Seeking Behavior of Scientists

Part 1. Background Information

1: 1. What is your department?

Please write your answer here:

2: 2. What is your campus box (CB) number?

Please write your answer here:

3: 3. What is your major field of research?

Please write your answer here:

4: 4. What is your position?

Please choose **only one** of the following:

- ☐ Professor
- ☐ Associate Professor
- ☐ Assistant Professor
- ☐ Research Staff/Adjunct
- ☐ Post graduate/Fellow
- ☐ Doctoral Student
- ☐ Masters Student
- ☐ Other

5: 5. What is your age?

Please write your answer here:

6: 6. What is your gender?

Please choose **only one** of the following:

- ☐ Male
- ☐ Female

7: 7. Do you have access to the Internet in your

Please choose **all** that apply

- ☐ Office or lab
- ☐ Department or campus
- ☐ Home
- ☐ No Internet connection

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8: 8. How far from your office (or the location where you most often work) is the campus library you use most often?

Please choose **only one** of the following:

- ☐ Same building
- ☐ 1/4 mile
- ☐ 1/2 mile
- ☐ 1 mile or more

9: 9. In a typical week, how many hours do you spend reading information relevant to your work?

Please write your answer here:

10: 10. How many articles have you published in refereed journals in the last 5 years?

Please choose **only one** of the following:

- ☐ 0 - 4
- ☐ 5 - 9
- ☐ 10 - 14
- ☐ 15 - 19
- ☐ 20 or more

Part 2. Types of Resources Used

11: 11. How often do you use the following types of resources as a primary source of information for your research?

For each item, please select one of the values on the following scale

Please choose the appropriate response for each item

	Never	Annually	Quarterly	Monthly	Weekly	Daily
Books	☐	☐	☐	☐	☐	☐
Journals	☐	☐	☐	☐	☐	☐
Preprints	☐	☐	☐	☐	☐	☐
Attendance at conferences	☐	☐	☐	☐	☐	☐
Conference proceedings	☐	☐	☐	☐	☐	☐
Web pages	☐	☐	☐	☐	☐	☐
Online databases	☐	☐	☐	☐	☐	☐
Personal communications	☐	☐	☐	☐	☐	☐
Other (describe below)	☐	☐	☐	☐	☐	☐

[Only answer this question if you answered 'Other (describe below) - Daily' or 'Other (describe below) - Weekly' or 'Other (describe below) - Monthly' or 'Other (describe below) - Quarterly' or 'Other (describe below) - Annually' to question '11']

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11.1: (continued from 11)
Please describe your *Other* resource

Please write your answer here:

Part 3. Keeping current

12: 12. What are the five (or fewer) most important individual sources (journals, reviews, web sites, listservs, etc) that you read to stay current in your field? Please list your answers (specific titles, listservs, web sites, etc) in order of importance (#1 most important).

Please write your answer(s) here:

1.:

2.:

3.:

4.:

5.:

12.1: How often do you read X?

Please choose the appropriate response for each item

Annually	Quarterly	Monthly	Weekly	Daily
☐	☐	☐	☐	☐

12.2: How often do you read X?

Please choose the appropriate response for each item

Annually	Quarterly	Monthly	Weekly	Daily
☐	☐	☐	☐	☐

12.3: How often do you read X?

Please choose the appropriate response for each item

Annually	Quarterly	Monthly	Weekly	Daily
☐	☐	☐	☐	☐

12.4: How often do you read X?

Please choose the appropriate response for each item

Annually	Quarterly	Monthly	Weekly	Daily
☐	☐	☐	☐	☐

12.5: How often do you read X?

Please choose the appropriate response for each item

Annually	Quarterly	Monthly	Weekly	Daily
☐	☐	☐	☐	☐

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13: 13. Do you use any current awareness services, or alerts, to help you know when new literature becomes available that is relevant to topics that interest you? If you do, please list them in order of importance (#1 most important).

Examples: PubMed Alerts, ISI Personal Alert and Reference Update, INSPEC Current Awareness, Faculty of 1000

Please write your answer(s) here:

1.:
2.:
3.:
4.:
5.:

Part 4. Searching for Information

14: 14. What are the five (or fewer) most important individual tools that you use to search out information? Please list your answers in order of importance (#1 most important) and indicate how often you read them.

Examples: ISI Science Citation Index, PubMed, ArticleFirst, Google, colleague, specific listserv, CiteSeer, BIOSIS, Chemical Abstracts, ERIC, INSPEC, Mathematical Reviews, ACM Digital Library, Physics Abstract, online books (NetLibrary, Safari, StatNetBase, etc), online journal search engines (Kluwer, Link Springer, etc)

Please write your answer(s) here:

1.:
2.:
3.:
4.:
5.:

14.1: How often do you read X?

Please choose the appropriate response for each item

Annually	Quarterly	Monthly	Weekly	Daily
☐	☐	☐	☐	☐

14.2: How often do you read X?

Please choose the appropriate response for each item

Annually	Quarterly	Monthly	Weekly	Daily
☐	☐	☐	☐	☐

14.3: How often do you read X?

Please choose the appropriate response for each item

Annually	Quarterly	Monthly	Weekly	Daily
☐	☐	☐	☐	☐

14.4: How often do you read X?

Please choose the appropriate response for each item

Annually	Quarterly	Monthly	Weekly	Daily
☐	☐	☐	☐	☐

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14.5: How often do you read X?

Please choose the appropriate response for each item

Annually	Quarterly	Monthly	Weekly	Daily
☐	☐	☐	☐	☐

15: 15. In a typical month, how many articles did you retrieve to read from the following sources? Please indicate (or estimate) the number for each of the following sources.

Please write your answer(s) here:

[Electronic] Personally subscribed journal:

[Electronic] Lab subscribed journal:

[Electronic] Library subscribed journal:

[Electronic] Open Access (or free) Journal or Institutional Repository or Digital Library:

[Electronic] Web site (author's web site):

[Electronic] Personal digital library:

[Electronic] Copy of colleague's electronic copy:

[Print] Personally subscribed journal:

[Print] Lab subscribed journal:

[Print] Library subscribed journal:

[Print] Copy of colleague's print copy:

Interlibrary loan:

Document delivery dervice (describe below):

Other (describe below):

15.1: (continued from 15)
What document delivery service do you use?

Please write your answer here:

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15.2: (continued from 15)
Please describe your *Other* method for obtaining articles

Please write your answer here:

16: 16. How confident are you that you are finding everything you should on your topic?

1 = Very Not Confident, 5 = Very Confident

Please choose **only one** of the following

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Part 5. Personal Article Collection

17: 17. Do you maintain a personal article collection?

Please choose **only one** of the following:

☐ Yes

☐ No

[Only answer this question if you answered 'Yes' to question '17']

17.1: Indicate the approximate size of both your print and electronic article collections

Please choose the appropriate response for each item

	1-49	50-99	100-499	500-999	1000+
Print	☐	☐	☐	☐	☐
Electronic	☐	☐	☐	☐	☐

[Only answer this question if you answered 'Yes' to question '17']

17.2: How often do you utilize your personal article collection?

Please choose **only one** of the following:

☐ Never

☐ Annually

☐ Quarterly

☐ Monthly

☐ Weekly

☐ Daily

18: 18. Do you maintain a personal bibliographic database for print and/or electronic references?

Examples: EndNote, ProCite, Reference Manager, etc

Please choose **only one** of the following:

☐ Yes

☐ No

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[Only answer this question if you answered 'Yes' to question '18']

18.1: Which software do you use?

Please choose **only one** of the following:

- ☐ Biblioscape
- ☐ EndNote
- ☐ Nota Bene
- ☐ Papyrus
- ☐ ProCite
- ☐ Reference Manager
- ☐ Other

[Only answer this question if you answered 'Yes' to question '18']

18.2: Of the articles you have in you personal article collection, what percentage of them have entries in your personal bibliographic database?

0% - 100%

Please write your answer here:

19: 19. Of articles you have in you personal article collection, on what percentage of them have you made some sort of notes?

0% - 100%

Please write your answer here:

Part 6. Searching and Using Information

20: 20. If given the option, how would you prefer to search for information?

Please choose **only one** of the following:

- ☐ Print versions of databases and journals
- ☐ Electronic versions of databases and journals

21: 21. If given the option, how would you prefer to read retrieved information (journal articles, etc)?

Please choose **only one** of the following:

- ☐ Print (hardcopy) only
- ☐ Electronic (computer) only
- ☐ Both/it depends

22: 22. How often did you visit University libraries in person in the last 12 months?

Please write your answer here:

23: 23. If you visit the library, what are your reasons for going?

Please choose **all** that apply

- ☐ Photocopy materials
- ☐ Get assistance from a librarian

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- [ ] Use computers
- [ ] Perform searches
- [ ] Read current journals or other materials
- [ ] Quiet reading space
- [ ] Meetings
- [ ] Browse
- [ ] Pick up/drop off materials

Other: _____

24: 24. What determines your choice of journals for the publication of your work?

Please choose the appropriate response for each item

	Insignificant				Significant
Ability to include links, color, graphics, multimedia	☐	☐	☐	☐	☐
Audience	☐	☐	☐	☐	☐
Author having to pay cost of publication	☐	☐	☐	☐	☐
Availability on campus	☐	☐	☐	☐	☐
Editorial board	☐	☐	☐	☐	☐
Page charges for long articles or color figures	☐	☐	☐	☐	☐
Speed of publication	☐	☐	☐	☐	☐
Standing of journal in your field	☐	☐	☐	☐	☐
Support of open access to journal articles	☐	☐	☐	☐	☐

25: 25. Which interface would you rather use to begin your search process?

Please choose **only one** of the following:

- [ ] Google search page
- [ ] Your library's home page

26: 26. In your opinion, what are the successes of your library?

Please write your answer here:

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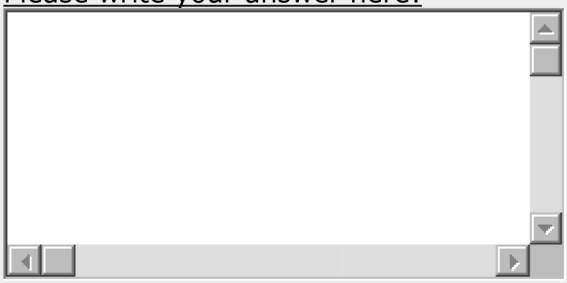
27: 27. In your opinion, what are the shortcomings of the library, and what new or different services you would like to see provided?

Please write your answer here:

28: 28. Imagine that you could have information made available to you in any form you desired. What one thing would you change to improve your access to, or use of, scholarly information?

Please write your answer here:



Submit Your Survey

Thank you for completing this survey. Please fax your completed survey to: .

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