THE USE AND OUTCOMES OF UNIVERSITY LIBRARY PRINT AND ELECTRONIC COLLECTIONS

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Background

This report is part II of results from a study of the comparison of library electronic and print collections at the University of Pittsburgh. Part I (King et al. 2004) describes a conceptual framework of metrics and the comparative cost of the University Library System (ULS) electronic, current periodical and backfile collections and services which support access to these collections. This report describes the use and outcomes of use of these three collections. The principal metric of article use is the amount of reading determined from surveys of university faculty and staff[1] and students. Use is also measured by hits reported by electronic journal vendors and publishers and by reshelving counts from use of current periodical and backfile collections. While the three metrics of use are compared, reading is emphasized because it is a common metric of use to all three collections.

Faculty and student use of the three library collections is initially studied in the context of all article reading because readers have alternative sources from which to obtain articles, of which their libraries are an option. This permits one to examine when and under what circumstances library collections are chosen for reading articles. The broader context also includes information seeking patterns of how readers learn about the articles they read, where they obtain the articles, format of the articles when read, and age of the articles. The use of library collections is very much dependent on or at least related to

[1] From this point on, "faculty and staff" is referred to only as "faculty".

these four dimensions of information seeking patterns. This relationship is demonstrated from an example of trends over 25 years involving readership of scientists where the amount of reading has increased appreciably and the net increase appears to be absorbed by an equivalent increase in reading from library collections. The increase in library reading is clearly due in part to trends in the seeking patterns of scientists such as decreased reliance on personal subscriptions and increased searching from online bibliographic databases, as well as access to larger library electronic collections. Finally, positive outcomes from reading articles are measured in several ways and in all instances reading from library-provided articles achieves more favorable outcomes.

Methods

The principal method used in this study is surveys of University of Pittsburgh faculty and undergraduate and graduate students located at the main campus in Oakland (Pittsburgh) and four other campuses (Bradford, Greensburg, Johnstown and Titusville). Altogether there are 30,085 students (including 23,828 undergraduate and 6,257 graduate students) and 1,725 full-time instructional faculty and about 750 other professional staff, including those engaged primarily in research. The entire University, with the exception of Health Sciences and Law, is served by the University Library System (ULS) with libraries at all five campus sites and 19 departmental or special purpose libraries.

In late winter 2003 a readership survey was conducted with University faculty at all five campuses and toward the end of the Spring 2003 semester a readership survey was done

with students. Excluded from the surveys are law and health sciences (medical) faculty and students. Specific methods for these surveys are described below.

Survey of Faculty and Staff

The faculty survey included four questionnaires in which all four contained common questions on amount of reading, a series of questions about the last article read and general demographics. The four questionnaires also had a specific section dealing with: (1) time spend by readers identifying, locating, obtaining and photocopying or printing out the last article read, (2) outcomes of the last article read, (3) the awareness and use of special electronic journal and article features, or (4) other electronic journal-related issues such as communication connectivity and course assignments involving articles. While the four specific sections resulted in smaller sample sizes (i.e., about one-fourth of the sample), this approach helped reduce the length of the questionnaire by about one-half (i.e., four vs. eight pages).

The basic set of questions replicated 41 readership surveys dating back to 1977 (King et al., 1981). Each respondent was asked how many articles they had read in the past month and then a series of questions was asked about the article read most recently (even if read previously) such as: the journal title or topic (to ensure the respondent focused on a specific article), year the article was published, how the article was identified, where it was obtained, its format, and so on. Demographics included the respondents' professional field, degree, gender, publications, number of personal journal subscriptions and so on. Relevant questions are repeated in the text of this report.

From a statistical standpoint, the amount of reading and demographics are treated as a simple random sample. The faculty survey yielded 209 responses. Amount of reading was estimated from the following question: "In the **past month (30 days)**, approximately how many scholarly articles have you read? Articles can include those found in journal issues, Web sites, or separate copies such as preprints, reprints, and other electronic or paper copies. Reading is defined as going beyond the table of contents, title, and abstract to the body of the article." Annual reading is found by projecting the month estimate by 12. The average annual readings per faculty member is 215 with a confidence interval of $\pm$ 30 at 95 percent level of confidence.

The last incident of reading (i.e., a form of the "critical incident technique") presents a different statistical issue. The observation is a reading and the universe from which the sample is drawn is all readings by faculty or students over the designated time period. The sample design is cluster sampling where a cluster is the reported number of articles read by a respondent. Ideally, one would sample within each cluster of readings in proportion to the size of the cluster. For example, three clusters of, say, 50, 25 and 10 readings might be subsampled by one-fifth to yield subsamples of 10, 5 and 2. The critical incident method had only one reading subsampled per cluster which results in a large estimate of the variance (i.e., low precision) of the estimates made. On the other hand, if one treats the critical incident responses as a simple random sample, the results may be biased because the probability of selecting each reading is not equal. Tests of the amount of bias shows the estimates are reasonably accurate nevertheless, overall

reliability of an estimate is from a combination of precision and accuracy where reliability is like the hypotenuse of a right triangle, sides of the triangle are precision and accuracy (Deming, 1950). We have chosen to accept a small bias versus the lower precision and treat the responses as a simple random sample. For example, the proportion of readings by faculty from library collections is 48.4 percent with confidence interval of $\pm$ 6 .8 percent at 95 percent level of confidence. The response rate is unknown because some questionnaires were apparently lost in the mail and University policy did not allow follow-up to the original mailing.

One section of the report reports results of six surveys of scientists located in universities. Two surveys involve national samples of scientists in 1977 (King et al. 1981) and 1984 (King et al., 1984). Readership surveys were also performed in the University of Tennessee in 1993 (Belefant and King, 2001) and 2000 (Tenopir and King, 2001), Drexel University in 2002 (King and Montgomery, 2002) and the University of Pittsburgh survey. Tenopir and King (2000) reports details on the first four surveys. All questionnaires are essentially the same with minor changes. The Pittsburgh faculty surveys are given in Appendix A.

Survey of Students

The student questionnaire replicated the faculty questionnaire without the four special sections and with relevant demographic questions. Because students are notoriously poor survey respondents, we adopted a technique developed by Talbot, et al., 1998, and Maughan, P.D., 1999 in which students are surveyed in a sample of classes. A total of 16

teachers agreed to administer the questionnaire in their classes covering 11 subjects. As a result we received 245 responses from undergraduate students and 75 from graduate students out of a total of 447 questionnaires handed out or a response rate of 71.6 percent.

The Use and Outcomes of Reading Scholarly Journal Articles

In this section we discuss the amount of reading of journals by faculty and students at the University of Pittsburgh, their time spent reading, and indicators of the outcome of reading journal articles. Journal use is observed in the surveys by asking the following question of faculty and staff: "In the **past month (30 days)**, approximately how many scholarly articles have you read? Articles can include those found in journal issues, Web sites, or separate copies such as preprints, reprints, and other electronic or paper copies. Reading is defined as going beyond the table of contents, title, and abstract to the body of the article." The students' question was different in the first sentence only as follows: "In the **Spring Semester (2003),** approximately how many journal articles did you read? …", Such reading often involves re-reading of an article. In fact, about 18 percent of faculty reading involves an article that is being re-read. Therefore, amount of readings is not the same as number of articles read.

The average amount of reading per person and total reading at Pittsburgh is shown in Table 1. Faculty tend to read much more than students on average; that is, about 215 readings per year per faculty vs. 24 readings by undergraduate students and 130 readings by graduate students. However, since there are over ten times as many students as faculty, about three-fourths of the estimated total of 1.9 million readings are by students.

The average amount of reading by faculty is roughly the same as observed at Drexel University in 2002 (197 readings) and the University of Tennessee, in 2000 (186 readings). All three universities have strong science and engineering programs and scientists and engineers tend to read more articles than non-scientists (King, et al. 2003). At Drexel (King and Montgomery 2002) doctoral students were found to read more than faculty (248 vs. 197 readings per year) and much more than doctoral students at Pittsburgh (248 vs. 170 readings per year). This difference could reflect a different survey method in that the doctoral student survey was done in the same way as faculty (see methods section). Regardless, it appears that journal article reading remains high and, perhaps, as shown later, may actually be increasing.

Table 1 Average and Total Annual Amount of Journal Article Reading by Faculty and Students: University of Pittsburgh 2003

		Students	
	Faculty & Staff	**Undergraduate**	**Graduate**
Annual Reading/Person	215	24	130
Total Reading	532,800	571,900	813,400

Source: Readership Survey - Faculty (N = 2,478, n = 209), Undergraduate Students (N = 23,828, n = 245), Graduate Students (N = 6,257, n = 75)

Information found in scholarly articles may appear in previously available sources such as preprint archives, technical reports, conference presentations or published proceedings, as well as, general acquaintance with reported research or its authors. Because of this possibility, for the last read article we asked readers: "Prior to the first reading of this article, did you know about the information reported or discussed in this article?" About

46 percent of the time readers said they knew about the information. Thus, over one half of the reading involved new information and, as shown below, even when the information is known, it is useful and important to the readers.

An indicator of the "value" of information read in articles is the amount readers are "willing to pay" for it in their time. Presumably they would not be willing to expend this valuable resource, if the return in useful information is not worth it. Table 2 displays estimates of the average time spent per reading and the total annual time spent reading articles by faculty and students at Pittsburgh. As shown, the average time spent per reading by faculty and undergraduate students is about 33 minutes per reading, but less for graduate students (23 minutes per reading). Masters students contribute to this lower estimate in time in that they average 21 minutes per reading, due perhaps to a small response, but doctoral students average 39 minutes per reading. At Pittsburgh, faculty averaged 118 hours per year compared with 139 hours at the University of Tennessee and 130 hours per year at Drexel University (King and Montgomery, 2002, Tenopir and King, 2002). Thus, faculty and students expend valuable time reading. In fact, faculty at Pittsburgh totally spend about 290,000 hours reading scholarly articles or, perhaps, the equivalent of about 120 to 150 full-time faculty members.

Table 2 Average Time Spent Per Reading and Average Annual Amount of Time Spent Per Faculty Member and Student: University of Pittsburgh 2003

		Students	
	Faculty & Staff	**Undergraduate**	**Graduate**
Time/Reading (Min)	33	33	23
Annual Time/Person (Hrs)	118	13	50

Source: Readership Survey - Faculty (N = 2,478, n = 209), Undergraduate Students (N = 23,828, n = 245), Graduate Students (N = 6,257, n = 75)

There is abundant evidence as to why faculty are willing to spend this time reading scholarly articles. One indicator of outcome of reading is the purpose for which articles are read and another is the importance of the information in achieving the purpose. To address the purpose of reading we asked the following question concerning the last article reading: "For what purposes have you used, or do you plan to use, the information obtained from the article you last read?" Respondents were given a list of purposes (including an open-ended response) and asked to report the "principal purpose" and "all other purposes." They were also asked: "How important is the information contained in this article to achieving your **principal purpose**?" with ratings given from 1-not at all important, 4-somewhat important, to 7-absolutely essential. Results of these indicators of outcomes are given in Table 3 below. The principal purpose most often reported by faculty is primary research with an average importance rating of 5.94. In all past 41 readership surveys done by colleagues (Griffiths and King 1993, Tenopir and King 2000), primary research is given as the most frequent and important principal purpose. For whatever reason, teaching tends to be less frequently reported and with lower importance ratings.

Table 3 Proportion of Readings by Faculty by the Principal Purpose for Reading an Article and Average Rating of Importance of Information Read in Achieving the Principal Purpose: University of Pittsburgh 2003

Purposes for Reading	Principal (%)	Average Importance[1]	All[2] (%)
Primary Research	32	5.94	52
Background Research	18	5.14	56
Teaching	18	4.89	40
Writing Proposals, Reports, Articles, etc.	10	6.00	46
Current Awareness/Keeping Up	22	5.19	58
Total	100	5.46	---

[1]Importance Ratings: 1 – not at all important to 7 – absolutely essential
[2]All reported purposes for a reading including the principal purpose
Source: Readership Survey: (N = 2,478, n = 50)

We also asked respondents: "In what ways did the reading of the article affect the **principal purpose**?" Table 4 below gives the proportion of responses to this question across all principal purposes and specifically for the reported primary research and teaching principal purposes for reading. The four most frequently reported ways the principal purpose for reading was affected was (1) "improved the result," (2) "inspired new thinking or ideas," (3) "narrowed, broadened or changed the focus of the purpose," and (4) "led to new authors or data sources." Thus, there is further evidence of favorable outcomes from the information provided by scholarly articles. On the other hand, two percent of faculty indicated that the reading "wasted my time."

Table 4 Proportion of Readings by Faculty by the Ways in Which the Principal Purpose for Reading an Article was Affected: University of Pittsburgh 2003

Ways the Principal Purpose for Reading Was Affected	All Principal Purposes (%)	Primary Research (%)	Teaching (%)
Improved the Result	56	56	63
Inspired New Thinking/Ideas	54	50	38
Narrowed/Broadened/Changed Focus	36	44	38
Led to New Authors/Data Sources	34	44	38
Confirmed Suspicions	16	13	0
Saved Time or Other Resources	14	25	13
Resolved Technical Problems	10	31	0
Resulted in Faster Completion	4	6	13
Resulted in Collaboration/Joint Research	4	6	13

Source: Readership Survey (N = 2,478, n = 50)

Another way to address the outcome of reading was to ask: "If you had **not obtained the information** found in the article at all, how might it have affected your work or purpose for which the article was read?" Respondents were given the option of checking that: "work or purpose would not have been affected" and about one-fifth of faculty responded in this way. Of the rest of the respondents, 92 percent expressed a way the work or purpose would be affected. Examples of ways reported (in open-ended response) are:

- A Chemistry professor said: "Lab time would have been required to discover what had been done by others."

- An English Associate Professor indicated that: "This article, which I had my seminar students read, completely changed the direction of their thinking and greatly improved the course. Would have been much less successful without it."

- A PhD Research Associate revealed that the article: "Presented new paradigm in which to understand evaluation research in a particular content area."

- A Mathematics Professor emphasized that: "I would have had to work out for myself the information contained in the article, which would have taken considerable time."

Thus, there is evidence that reading can positively affect the core goals of the university in continued learning, research and teaching.

Over the years others have observed that professionals whose work has been recognized through awards or special recognition tend to read more than those whose work has not been recognized (Lufkin and Miller, 1966; Griffiths and King, 1993; Tenopir and King 2000; and King and Montgomery, 2002). This result is true of the faculty survey at Pittsburgh as well. The question asked of faculty was: "In the past two years, have you received any awards or special recognition for your research or other profession-related contributions?" About one-third said they had and these faculty averaged 262 annual readings, while the other faculty averaged 199 annual readings. Of course this does not necessarily mean that reading more will lead to such recognition, but the result does suggest that reading is important to those who receive such recognition.

Increased faculty productivity is another indicator of positive outcomes from reading scholarly articles. In non-university settings, five indicators of productivity were

developed and the amount of reading was positively correlated with each of these indicators (Griffiths and King, 1993). Others have related amount of publishing as an output measure and shown that reading and authorship are positively correlated (Boyce et al., 2003). Results in Table 5 show similar results for Pittsburgh faculty. We asked faculty how many refereed articles; non-refereed articles; chapters in books, proceedings, etc.; and entire books they had published in the past two years. About 15 percent of faculty indicated that they had not published at all in the last two years. A number of publications of each type are categorized from none to over five and the average amount of reading appears to increase with the number of publications. The result did not hold for entire books, although only 19 of 209 faculty reported they had published a book in the past two years. Those who had not published at all averaged 151 annual readings compared with 229 readings for those who had at least one publication.

Table 5 Average Annual Reading by Faculty Authors by Number of Publications in Past Two Years: University of Pittsburgh 2003

	Type of Publication		
Number of Publications	**Refereed Scholarly Articles (Article Readings)**	**Non-Refereed Articles (Article Readings)**	**Chapters in Books, Proceedings, etc. (Article Readings)**
None	146	200	213
One	187	238	202
2 – 5	265	260	233
Over 5	315	222[1]	480[1]

[1] Fewer than ten responses
Source: Readership Survey (N = 2,478, n = 201)

We make a distinction between authorship and number of articles actually written since articles often have co-authors. This issue is addressed by asking how many co-authors an author had on the last refereed article they had published. About one-third of the

faculty had not published a refereed article in the past two years. Of those who had, about 40 percent were sole authors and, altogether, the articles averaged 2.4 authors.

Students have entirely different purposes for reading than faculty. The student purposes for reading the article read are summarized in Table 6 below. Articles specifically assigned in a class or found as a classroom assignment are frequently given as purposes for reading. Another way of assessing extent of reading from classroom assignment was to ask: "Approximately what proportion of these articles that you read [in this semester] was a result of a classroom assignment?" By cross-multiplying the number of readings and proportion we arrived at an estimate of average readings from classroom assignment: 22 readings from classroom assignment by undergraduate students (compared with 24 total readings) and 32 classroom readings by graduate students (compared with 130 total readings). Undergraduate students appear to read largely due to classroom assignment, but as might be expected, graduate students read more for other reasons such as research for dissertations or theses.

Table 6 Proportion of Readings by Students by All the Purposes for Reading an Article: University of Pittsburgh 2003

Purposes for Reading	Undergraduates (%)	Graduates (%)
Specifically Assigned in a Class	23	28
Found as a Classroom Assignment	42	21
For a Research Project	51	32
To Keep Up with the Literature	4	7
Just of Personal Interest	16	14
Other Purposes	1	5

Source: Readership Survey - Undergraduate Students (N = 23,828, n = 245), Graduate Students (N = 6,257, n = 75)

Information Seeking and Reading Patterns

Information seeking involves different patterns of how readers learn of articles they read and sometimes where they get the articles after they have identified them. The patterns also include the format of articles when read (i.e., electronic or print) and age of articles when read. There are literally thousands of combinations of means of identification, sources, format and age of articles read. Furthermore, each combination has an effect on the time and effort spent by readers, as well as, the outcomes from reading. In order to observe these patterns we have resorted to observing the incident of last reading to isolate individual pattern combinations, reader time and outcomes. In this section we address a few of these patterns.

How Faculty and Students Learn About Articles They Read

Readers learn about articles in many ways. We asked faculty and students: "How did you **initially find out** about this last article you read?" Browsing recently published journals is a common way articles are identified. Browsing could involve personal subscriptions (print or electronic), library collections (print or electronic) or other digital collections. This type of browsing is relevant because the article is available when identified which means that there is no time required by the reader to locate and obtain the article once it is identified. Another means of learning about articles is through searching or browsing online databases. Examples include an abstract and index (A&I) database from database publishers (e.g., Web of Science, ProQuest, First Search, Silver Platter), Web search engine (e.g., Google, Yahoo, AltaVista, Excite, Netscape), or online journal collection (e.g., Highwire, Science Direct). Unlike browsing, this method of identification requires

that readers (or someone on their behalf) must locate and obtain the article for it to be read. The same is true for using a current awareness service (e.g., Current Contents) to learn about articles. Sometimes readers identify articles they want to read from citations in other publications, again requiring it to be located and obtained or linked. Also, another person, such as a colleague or author, may tell readers about the article and sometimes actually give them a copy of the article. The extent of use of these ways of learning about articles and the time spent by readers are described below.

Table 7 summarizes the methods used by faculty and students to learn about articles read by them. Browsing is more frequently used by faculty (44.8 % of readings) than either undergraduate students (4.6%) or graduate students (19.9%). This partially reflects the fact that faculty continue to subscribe to journals (i.e., about 4 personal subscriptions per faculty member) and students, as shown above, have different purposes for reading that do not involve browsing. Undergraduate students appear to browse mostly from library collections (91.3% of reading from browsing), while graduate students browse more from personal subscriptions (18.5% of reading from browsing) because they average 1.4 subscriptions per student (compared with less than 1/2 subscriptions per undergraduate student).

Table 7 Proportion of Reading by Faculty and Students by the Method Used to Learn About Articles Read: University of Pittsburgh 2003

		Students	
Method of Learning About Article	**Faculty & Staff (%)**	**Undergraduate (%)**	**Graduate (%)**
Browsing	44.8	4.6	19.9
Personal Subscription	[63.8][1]	[8.7][1]	[18.5][1]
Library Subscription	[33.0]	[91.3]	[68.5]
Other Digital Collection	[3.2]	[---]	[13.0]
Online Searching	23.3	51.6	42.6
A & I Database	[79.6]	[65.3]	[78.5]
Web Search Engine	[12.3]	[23.1]	[14.6]
Online Journal Collection	[8.1]	[11.6]	[6.9]
Current Awareness Service	4.3	3.3	3.0
Print Version	[11.2]	[6.1]	[87.5]
Electronic Version	[88.8]	[93.9]	[12.5]
Cited in Other Publication	10.5	8.6	1.5
Another Person	14.8	31.5	33.1
Don't Know	2.4	0.4	---
Total	100.1	100.0	100.1

[1] Proportions in brackets are subtotals of principal methods
Source: Readership Survey - Faculty (N = 2,478, n = 209), Undergraduate Students (N = 23,828, n = 245), Graduate Students (N = 6,257, n = 75)

Most faculty browsing of personal subscriptions is from print issues (86.7% of reading vs. 13.3% from electronic versions) even though electronic versions are often available to subscribers. However, their browsing of the library collection is mostly from electronic journals (58.1% of reading from browsing vs. 41.9% from print issues). All observed student browsing from personal subscriptions is from print issues, but electronic browsing is preferred with the library collection: that is, 57 .1 percent of browsed reading from the library collection by undergraduate students and 95.6 percent of reading by graduate students. Clearly subscribers continue to prefer to browse print over electronic journals, perhaps due to portability, ease of use or time required to browse. The time required for faculty to browse is discussed below.

Browsing suggests that several articles may be read during a browsing session. Thus, estimating the average time per article read must take into account total browsing time and number of articles read during a browsing session (often after receipt of an issue). We addressed this estimate by the following questions: "If this article was found by **browsing**, approximately how much time did you spend **browsing?"** and "as a result, how many articles did you read or plan to read?" Estimates from a small sample provide a clue suggesting that readers averaged about 12 minutes browsing per article read and there is little difference observed between browsing personal subscriptions vs. library collections or print vs. electronic versions. Thus, browsing time does not appear to be a reason that subscribers prefer print over electronic versions.

Online searching accounts for nearly one-fourth of faculty reading, but a much higher proportion for undergraduate students (51.6% of reading) and graduate students (42.6% of reading). Searching A&I databases is prevalent for both faculty and students, but undergraduate students seem to use Web search engines more than faculty or graduate students (23.1% vs. 12.3% and 14.6% respectively).

The average online search time required per article read was established from the following questions:

- "If this article was found by searching, about how much time did you (or someone on your behalf) spend searching?"
- "As a result, how many articles did you read and plan to read?"

- "After you identified this article, approximately how much time did you and/or someone else on your behalf spend on each of the following activities?
    - Obtain, request, receive or download and display the article
    - Photocopy or print out the article
    - Other"

The average time spent searching online is much longer than browsing (77 minutes per search vs. 21 minutes per browsing session), but also yields many more articles that are read (10.2 articles per search session vs. 1.8 articles per browse session). Thus, the average time taken in online searching per article read appears to be somewhat less (8 minutes per article read from online search vs. 12 minutes from browsing).

Some articles are initially identified by citation in another publication. About one-tenth of readings are found this way by faculty and undergraduate students, but less frequently by graduate students. Faculty spend about17 minutes per article locating the articles found this way. Another way readers learn about articles is that another person tells them about the article. About one-third of student reading is identified in this manner, largely due to a professor or teacher telling them about it. Faculty also learn about articles from others (14.8% of reading). About half of the time, the article is actually given or sent by that person. On the other occasions, it takes

readers (or someone on their behalf) an average of 12 minutes to locate and obtain the article.

Even though readers learn about articles in many ways, they tend to spend about 8 to 17 minutes on average to identify and/or locate and obtain the articles. Perhaps this amount of time is the limit of tolerance that readers are willing to pay to get the articles they read.

As mentioned earlier, some means of learning about articles requires locating and obtaining articles once identified; that is, when (1) searching online or a current awareness service, (2) identified from a citation in another publication, or sometimes (3) when someone tells the reader about it. Since library collections are a large and trusted source, they are most often relied upon to obtain these articles. We found that 71.3 percent of these articles are obtained from the library collections (i.e., print and electronic). Personal subscriptions are used for 7.5 percent of these articles and 21.2 percent are from other sources.

The means of learning about articles has a bearing on the age of articles read as shown in Table 8 below. As might be expected, most of the articles found by browsing and using current awareness services are recently published articles. Note that the method of learning about an article refers to how it was "initially" identified. However, the article could be read again many years later. In fact, all of the older articles identified through browsing were actually a re-reading of the

article. Thus, these articles could have been new when initially found. Many of the articles found by online searching are new (42.9% of articles read), but some are quite old as well (8.2% over ten years). Interestingly many of the articles found through citations are over ten years old (45.5% of articles read). Apparently, most of the articles mentioned by other persons are new articles (66.7% of articles read), perhaps some being authors promoting their recent articles.

Table 8 Proportion of Reading by Method of Learning About the Article by Faculty by Age of Article Read: University of Pittsburgh 2003

	Method of Learning About Article				
Age of Article Read	**Browsing (%)**	**Current Awareness (%)**	**Online Search (%)**	**Citation (%)**	**Other Person (%)**
Under One Year	79.6	88.9	42.9	18.2	66.7
One to Five Years	16.1	11.1	38.8	22.7	16.7
Six to Ten Years	2.2	---	10.2	13.6	10.0
Over 10 Years	2.2	---	8.2	45.3	6.7
Total	100.1	100.0	100.1	100.0	100.1

Source: Readership Survey (N = 2,478, n = 208)

Sources of Articles Read

The methods used by readers to identify articles are described above, as well as sources used to obtain the articles when necessary. The full range of sources used by readers are described in this section. The principal article sources used by faculty and students at Pittsburgh are their personal subscriptions, free web journals, library collections, or through separate copies of articles such as preprints, reprints, provided by another person, or author Web site. To establish the source and format of read articles we asked the following questions: "From what **source**

did you last read this article?" and "In what form was the article when last read?" The forms included print, photocopy or facsimile copy, computer display of e-text, and printout of e-text. The extent to which these sources are used is given in Table 9 below. We included interlibrary loan and document delivery in estimates of library use. As with browsing, faculty read much more frequently from personal subscriptions than do students. We categorize "a free Web journal" between personal subscriptions and library collections because readers sometimes obtain articles from library electronic collections, but don't realize it (i.e., due to the library branding issue), otherwise this use would be similar to personal subscriptions. Nearly one-half of reading by Pittsburgh faculty is from their ULS library collection. This is higher than recently observed at the University of Tennessee (34.4%) in 2000 and Drexel University (42.4%) in 2002 (King et al. 2003). About three-fourths of student reading is from their library collections. Nearly ten percent of reading by faculty is from separate copies of articles. Students more frequently read from separates (i.e., undergraduate students – 16.8% of reading and graduate students – 14.4% of reading). Another person is the source for most separate copy reading.

Table 9 Proportion of Reading by Faculty and Students by Source and Format of Articles Read: University of Pittsburgh 2003

		Students	
Source & Format of Article Read	**Faculty & Staff (%)**	**Undergraduate (%)**	**Graduate (%)**
Personal Subscription	33.0	2.9	3.6
Print	[90.1][1]	[58.6]	[100.0]
Electronic	[9.9]	[41.4]	[---]
A Free Web Journal	8.8	7.8	5.9
Library Collection	48.4	72.6	76.0
Print	[25.0]	[33.6]	[26.1]
Electronic	[75.0]	[66.4]	[73.9]
Preprint	2.3	---	---
Print	[60.0]	[---]	[---]
Electronic	[40.0]	[---]	[---]
Reprint	0.9	4.1	---
Print	[50.0]	[75.0]	[---]
Electronic	[50.0]	[25.0]	[---]
Another Person	5.1	6.1	8.1
Print	[81.8]	[83.3]	[100.0]
Electronic	[18.2]	[16.7]	[---]
Author Web Site	0.5	0.7	0.4
Other Web Site	0.9	5.8	5.9
Total	99.9	100.0	99.9

[1] Proportion in brackets are subtotals of Principal sources
Source: Readership Survey - Faculty (N = 2,478, n = 209), Undergraduate Students (N = 23,828, n = 245), Graduate Students (N = 6,257, n = 75)

Two electronic article innovations are preprint archives and author Web sites (Tenopir, et al. 2003). Evidence suggests that these two innovations are used, but not frequently so by Pittsburgh faculty. Based on the critical incident estimate faculty average about two annual readings from preprint archives or 4,900 readings at the University. We also had a series of questions dealing with the awareness and use of electronic journal features. We asked the following series of questions about

preprint archives: "Are you aware of large databases of article preprint archives?" and, "if yes, have you ever used them?" and, if yes, "how many times in the last year?" Answers to these questions are as follows:

- One-half of faculty are aware of the databases.
- Only 19.3 percent of all faculty have used these databases.
- Average use in the last year by those who have used the preprint archives databases is 4.9 times per year or 0.9 times per all faculty.

Thus, the second series of questions confirms the infrequent use of preprint archives, although science faculty are more aware and use the databases more frequently than other faculty. Similarly, at the University of Tennessee, faculty average about 3.2 readings per year from preprint archives and at Drexel University there were no observed responses from preprint archives (King, et al. 2003). We also asked the following questions concerning manuscript submitted to preprint archives: "Have you ever submitted articles to them?" and, if so, how many in the last two years?" There were no submittals reported by non-scientists and only eight percent of scientists indicated they had done so. Those scientists who had submitted, averaged 2.7 articles submitted in the last two years.

The critical incident estimate of amount of reading from author Websites is about 1.1 annual readings per faculty member or about 2,700 total reading at the University.

Elsewhere on the questionnaire we asked : "Have you ever read or downloaded a paper directly from an author's website?" and "if yes, about how many times in the last year.? A little over one-half of faculty said they had (51.9%) and those who had used author websites averaged using them five times in the last year. Across all faculty, use was 2.6 times last year, again demonstrating relatively low use at this time. Scientists' results are about the same as non-scientists in their frequency and amount of use. Faculty at the University of Tennessee and Drexel University average about four uses per year based on critical incidents of reading observations (King et al. 2003). Only about one-fifth of Pittsburgh faculty indicated that they have a personal Website of their publications.

Format of Articles Read by Faculty and Students

Readers often have the choice of reading from print or electronic versions of articles. As shown in Table 10 below, both faculty and students appear to favor electronic versions, but students more so. At the University of Tennessee in 2000 faculty still tended to prefer print (80.2% of readings were in print) although this may be because the library was in a transitional state at that time. In 2002, Drexel University faculty also read somewhat more frequently from print versions (56.8% of readings in print) even though the library had migrated to an almost complete electronic collection (King et al, 2003).

Table 10 Proportion of Reading by Faculty and Students by Format of Article Read: University of Pittsburgh 2003

		Students	
Format of Article Read	**Faculty & Staff (%)**	**Undergraduate (%)**	**Graduate (%)**
Print	47.9	34.2	31.6
Electronic	52.1	65.8	68.4
Total	100.0	100.0	100.0

Source: Readership Survey - Faculty (N = 2,478, n = 209), Undergraduate Students (N = 23,828, n = 245), Graduate Students (N = 6,257, n = 75)

Faculty continue to prefer print for their personal subscriptions (King, et al., 2003). At Pitt, about 90 percent of reading from personal subscriptions is in print format and the same is observed at University of Tennessee (92.6%) and Drexel University (87.8%). Electronic format is preferred for the library collections at Pittsburgh (75.0%) of reading which reflects a quick adaptation of this format by faculty. At Drexel University, by 2002 when the survey was done, nearly all of the library collection had migrated to the electronic format and 83.1 percent of reading was in this format. At the University of Tennessee, only 21.9 percent of the reading from the library collection was in electronic format in 2000 since it was in a transitional phase.

With the critical incident method, Pittsburgh faculty are estimated to have about 112 article readings per year from electronic versions. We also estimated annual use by asking the following questions of a subset of respondents: "Have you ever used electronic journals?" and "about how many articles did you read from electronic journals in the past 30 days?" This question is based on observation from a sample of faculty and, therefore, avoids the potential bias of estimates of the proportions of reading (and total)

from electronic versions using the critical incidents method. All faculty reported they had used electronic journals.

Use of Innovative Features of Electronic Format

Several previous readership surveys of scientists from 1990 to 2002 provided an opportunity to observe information seeking and reading patterns through three journal system phases: (1) an early phase following introduction of electronic journals; (2) an evolving phase in which a majority of scientific journals are available in electronic format and (3) an advanced phase in which searching capabilities, advanced features, and individual articles are integrated in a complete system along with full text of core journals available back to their origin (Tenopir, et al 2003). The evolving system was developed by the American Astronomical Society (AAS) in conjunction with the University of Chicago Press. This system and its use is described by Tenopir, et al. (2003) and Boyce, et al. (2004). The comparison among phases provides evidence that advanced features may result in substantial changes in information seeking and reading patterns. For this reason we asked several questions of Pittsburgh faculty concerning their awareness and use of advanced electronic journal features such as journals published exclusively in electronic format; backward and forward citation links; links to numeric databases and images; and electronic access back to original issues.

Tenopir, 2004, estimates that journals are now published exclusively in an electronic journal format and she estimates that about 11,000 active peer reviewed journals are now available in electronic format, either exclusively or in a combination of formats.

Some publishers, such as the AAS, now provide backward and forward citation links. Nearly two-thirds of Pittsburgh faculty is aware that some electronic journals have such features and about 37 percent have used such a feature. The users (i.e., the 37% who used) appear to rely on this feature in that they average using them about ten times in the last year.

Some publishers, such as AAS, also provide links to numeric databases and images. Fewer faculty are aware of these linkages (48% of faculty) and only one-fifth say they have used them. Those who use them, average about five uses in the last year. A number of publishers, such as AAS, American Chemical Society, and Elsevier (Science Direct) and services such as JSTOR now provide electronic journals back to their origin. Most faculty are aware of this feature (84.6% of faculty) and three-fourths say they have used them. The users of this feature indicate that they have used them an average of 21 times in the last year. Thus, awareness of these advanced features of electronic journals is reasonably high at Pittsburgh and use is beginning and undoubtedly will increase as more publishers provide such features.

Age of Articles Read by Faculty and Students

We asked readers: "Approximately what year was the [last read] article published/posted?" The age of articles read by faculty and students is displayed in Table 11 below. Since the questionnaires were completed in the Spring 2003, the proportions of readings by age had to be adjusted by interpolation in log normal scale. These results

show that faculty tend to read newer articles more than students, again reflecting the purposes for which the articles are read and the fact that faculty more often browse and read their current personal subscriptions. The elongated age distribution of articles read by undergraduate students reflect the fact most of their reading is due to classroom assignment. Whereas graduate students are more likely to be concerned with newer articles, perhaps due to exhaustive literature review for their dissertations and theses.

Table 11 Proportion of Reading by Faculty and Students by Age of Article Read: University of Pittsburgh 2003

		Students	
Age of Article Read	**Faculty & Staff (%)**	**Undergraduate (%)**	**Graduate (%)**
1st Year	61.6	26.2	37.1
2nd year	10.4	16.1	19.9
3 – 5 years	12.2	23.7	21.0
6 – 10 Years	6.7	18.7	12.1
11 – 15 Years	4.8	5.9	4.4
Over 15 Years	4.3	9.4	5.5
Total	100.0	100.0	100.0

Source: Readership Survey - Faculty (N = 2,478, n = 209), Undergraduate Students (N = 23,828, n = 245), Graduate Students (N = 6,257, n = 75)

Library Contribution to Article Reading and Outcomes from Reading

This section provides evidence that faculty appear to read more articles now than 25 years ago and that this increase may be due to additional reading from library collections. Estimates of the use of the print collection include reshelving counts and survey amount of reading. Similarly estimates of electronic collection use are from vendor and publisher provided "hits" and again survey amount of reading.

Twenty-Five Year Trends of Science Faculty Reading

From 1977 to 2003 there have been 41 readership surveys of professionals using the same questions with minor revisions to reflect changes in technologies (i.e., the Web and electronic sources). Two of the surveys were national surveys of scientists done for the National Science Foundation in 1977 and 1984 (King, et al., 1981, King et al., 1984). These surveys included nine fields of science: physical science (e.g., physics and chemistry); mathematics and statistics; environmental sciences; computer sciences; engineering, life sciences; psychology; social sciences; and other sciences (e.g., library and information sciences). Other surveys were done for companies (e.g., AT&T Bell Labs), government agencies (e.g., National Institutes of Health), or national laboratories (e.g., Oak Ridge National Laboratory). Four of the other surveys were of university faculty. Since the two national surveys involved scientists and about half of respondents were located in universities, we extracted scientists' responses from the national survey and examined the university surveys to establish a common trend of university scientists reading patterns over a quarter century period. The latter four surveys were from the University of Tennessee in 1993 and 2000, Drexel University in 2002 and the University of Pittsburgh in 2003 (Belefant – Miller and King 2001, 2002; Tenopir and King 2002, King and Montgomery 2002, Tenopir et al., 2003, King et al., 2003). All of the surveys included the nine fields of science mentioned above.

Figure 1 below shows the average readings per scientist in the years 1977, 1984, 1993 and, collectively, 2000 to 2003. There appears to be a steady increase in amount of

reading with a net increase of 66 readings over the 25-year time span with an increase of about three readings per year from 1977 to 1984, two reading from 1984 to 1993 and three readings from 1993 to the recent years. A similar trend also exists with non-university scientists as well (Tenopir & King 2000). Figure 2 shows that amount of reading from university library collections has increased about the same amount; that is 64 readings from 37 in 1977 to 101 in recent years. Thus, the net growth in amount of reading by university scientists appears to be largely absorbed by the university library collections. Reasons for this phenomenon are discussed below.

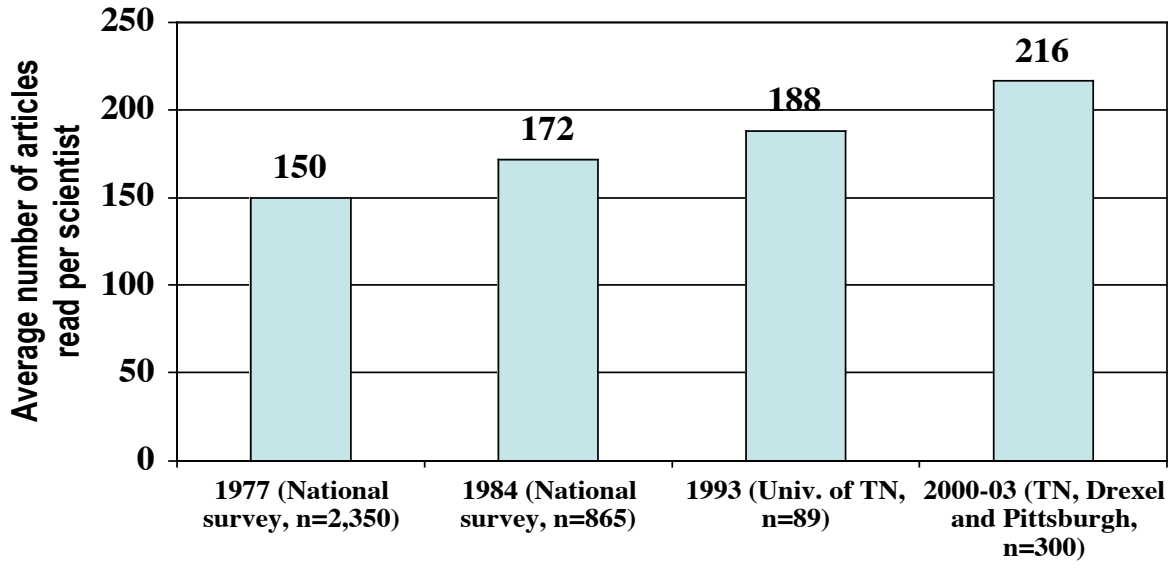

Fig. 1 – Average Articles Read Per Scientist

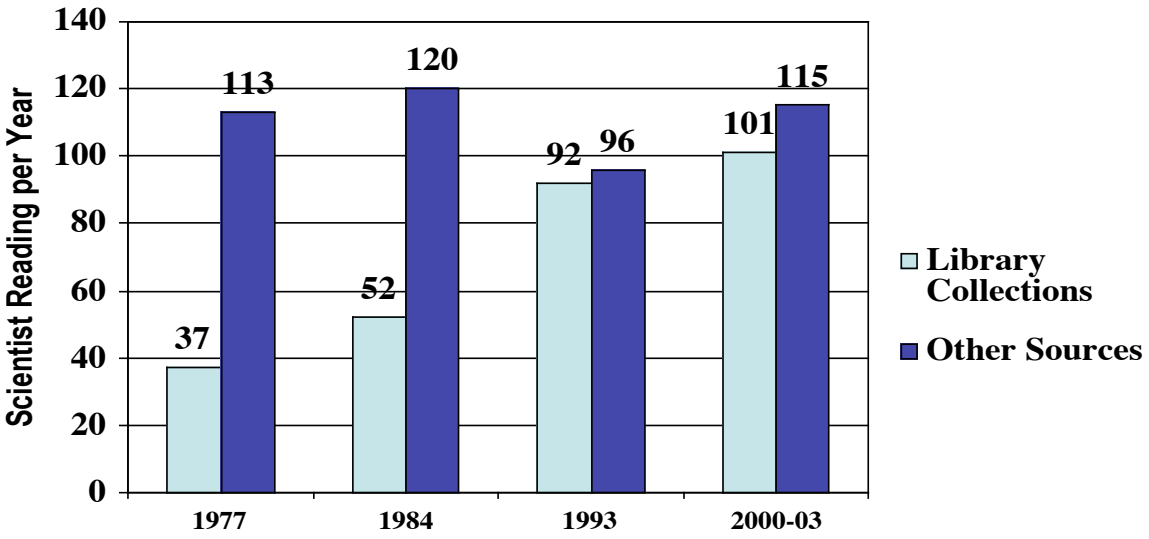

Figure 2 – Scientist Readings per Year

We mentioned previously that libraries are a trusted source or location for articles that are initially identified but need to be located and obtained. Over the 25–year period scientists have broadened the range of journals from which they read. In 1977 they read at least one article from 13 journals, but now read from over twice that number of journals. In 1977 university scientists subscribed to an average of 4.2 subscription and that amount has decreased to 3.5 subscriptions and scientists tend to use their library collections to read from the cancelled subscriptions accounting for about ten to 15 increased readings from the library collections. In 1977 university scientists read an average of about three articles per year found from online (or other automated) searching and that number has increased to over 50 articles in the recent years. At Pittsburgh over 70 percent of articles identified this way by scientists are located and obtained from the library collections. When scientists go to libraries to locate and obtain articles or just to browse, they are exposed to new journals that they might not have read before, thus

potentially broadening the number of journals read. Finally, the addition of library electronic journals has made additional library journals readily available to faculty (and students). There is evidence that these additional journals are in fact read. Ongoing research at Drexel University shows that most of their electronic titles that were not previously subscribed by the library in print have at least some hits and, presumably are read.

Even though the amount of reading by faculty scientists has apparently increased, the time spent reading apparently has not. In 1977, time spent reading articles was 120 annual hours per scientist and it is currently 127 annual hours. Thus, scientists spend less time per reading now (35 minutes per reading) than in 1977 (48 minutes per reading). Whether the evidence of increased reading and stable time spent reading by science faculty extends to faculty in other disciplines is unknown. However, since many universities like Tennessee, Drexel and Pittsburgh have extensive science and engineering schools and research programs, these results suggest that information seeking and reading patterns are changing in important ways, due in part to economic and technical influences.

The Use and Outcomes of Reading Library Provided Articles

Use of Library Collections

In Table 9 we showed that about one-half of faculty reading and three-fourths of student reading comes from the library collection or is library-provided (i.e., through interlibrary loan or document delivery). The estimated total amount of reading of the library collection is given in Table 12 below. Altogether, there estimated to be about 1.3 million readings from the Pittsburgh library collections, about 71.7 percent of these readings are in electronic format. Nearly one-half of library article reading is done by graduate students (47.6%) followed by undergraduate students (31.9%) and faculty (20.5%).

Table 12 Estimated Annual Total Reading by Faculty and Students from the Library Collection by Format: University of Pittsburgh 2003

		Students		
Format of Article Read	**Faculty & Staff**	**Undergraduate**	**Graduate**	**All Readers**
Electronic	199,800	275,700	457,700	933,200
Print	66,600	139,500	161,900	368,000
Total	266,400	415,200	619,600	1,301,200

Source: Readership Survey - Faculty (N = 2,478, n = 209), Undergraduate Students (N = 23,828, n = 245), Graduate Students (N = 6,257, n = 75)

One reason that the survey estimates of reading are projected to an annual total is to compare the amount of reading from the electronic collection with vendor and publisher provided data and amount of reading from print collections with observed amount of reshelving. These reading estimates were also used for allocation purposes in library cost analyses (King et al., 2004). The annual sum of vendor and publisher "hits" is 1,320,000 or about 42 percent higher than the survey estimate of reading (933,200). One expects the number of hits to be greater than the number of readings because of the nature of hit

counts (Luther, 2000). Also, not all vendors or publishers provide use data. The Pittsburgh results are compared with similar results from Drexel University (King and Montgomery, 2002) since Drexel results should reflect about the same amount of overcount of hits and undercount due to lack of reporting these data. The annual vendor and publisher provided results was about 400,000 hits compared with about 300,000 readings or about one-third more hits than readings which is reasonably close to the Pittsburgh comparison (i.e., 42% more hits).

Excluding reading from interlibrary loan and document delivery, the total amount of reading from the print current and backfile use is estimated to be 341,200 readings. The annual reshelving is estimated to be 44,600 reshelved issues from the current collection and 88,800 reshelved volumes from the backfifles. Reading estimates from these collections are based on the age of the article read where articles from publications read up to one year old are considered to be from the current collection. These results imply 127,300 readings from the current collection and 213,900 readings from the backfiles. These results are displayed in Table 13 below. There is evidence that readers tend to read more than one article when an issue or volume is used (then reshelved). An exit survey at the National Institutes of Health Library yielded an estimate of 3.2 readings per item reshelved (Griffiths and King, 1993) which is not too different from the overall comparison at Pittsburgh (2.6 readings per item). At Drexel University the ratio observed was 1.8 readings per item reshelved (King and Montgomery, 2002). Thus, these overall data are similar, although the Pittsburgh ratio may be low for current issues and high for backfile volumes.

Table 13 Estimated Amount of Reading by Faculty and Students and Reshelved Items Current and Backfile Collections: University of Pittsburgh 2003

Type of Collection	Readings[1]	Items Reshelved[2]	Readings/Item
Current (Issues)	127,300	44,600	2.9
Backfile (Volumes)	213,900	88,800	2.4
Total	341,200	133,400	2.6

Source: [1]Readership Survey - Faculty (N = 2,478, n = 209), Undergraduate Students (N = 23,828, n = 245), Graduate Students (N = 6,257, n = 75)
[2]Annual ULS statistics

The extent to which library collections are used appears to be dependent on the age of articles as shown in Table 14. About 39 percent of reading of new articles (under 1 year old) by faculty is from library collections and increases to 89 percent of reading for articles over 15 years old. A similar trend holds for students as well, but with some aboration. Clearly the library is the source of choice for older articles.

Table 14 Proportion of Reading by Faculty and Students from the Library Collection by Age of Article Read: University of Pittsburgh 2003

	Age of Article Read				
Source of Article Read	Under 1 Year (%)	2 to 5 Years (%)	6 to 10 Years (%)	11 to 15 Years (%)	Over 15 Years (%)
Faculty & Staff					
Library	39.2	64.4	64.3	70.0	88.9
Other	60.8	35.6	35.7	30.0	11.1
Total	100.0	100.0	100.0	100.0	100.0
Undergraduate Students					
Library	67.4	72.3	85.0	70.0	97.2
Other	32.6	27.7	15.0	30.0	2.8
Total	100.0	100.0	100.0	100.0	100.0
Graduate Students					
Library	57.0	97.7	78.0	100.0	92.5
Other	43.0	2.3	22.0	---	7.5
Total	100.0	100.0	100.0	100.0	100.0

Source: Readership Survey - Faculty (N = 2,478, n = 209), Undergraduate Students (N = 23,828, n = 245), Graduate Students (N = 6,257, n = 75)

In Table 9, we show that most articles read from library collections are from electronic versions of journals and articles: faculty (75.0%), undergraduate students (66.4%) and graduate students (73.9%). Since most reading of older articles is from library collections, we examined the extent to which these older articles are available and read in electronic format as shown in Table 15. Generally, the newer articles read from library collections tend to be in electronic format, but decline as the articles become older to about one-half of articles over 15 years being in electronic format. Thus, licenses from JSTOR and library access to older electronic journals from American Chemical Society and American Astronomical Society appear to be well used.

Table 15 Proportion of Reading by Faculty and Students from Library Collections by Format and by Age of Article Read: University of Pittsburgh 2003

	Age of Article Read				
Format of Article Read	**Under 1 Year (%)**	**2 to 5 Years (%)**	**6 to 10 Years (%)**	**11 to 15 Years (%)**	**Over 15 Years (%)**
Print	31.1	21.2	31.2	37.5	49.6
Electronic	68.9	78.8	68.8	62.5	50.4
Total	100.0	100.0	100.0	100.0	100.0

Source: Readership Survey - Faculty (N = 2,478, n = 209), Undergraduate Students (N = 23,828, n = 245), Graduate Students (N = 6,257, n = 75)

Pittsburgh provides access to the electronic collection from non-library locations such as an office or lab for faculty and schools or departments for students and a campus library, home, out-of-town location and elsewhere for all Pittsburgh readers. Table 16 shows the proportion of reading by faculty and staff from these locations. Most reading from the electronic collection by faculty is done in their office or lab (87.7% of reading from

electronic collection). Undergraduate students rely most often on their campus library workstations to obtain articles from this collection (41.4% of reading), but also frequently obtain the articles at home (30.1% of reading) or from workstations in their school or department. Graduate students, on the other hand, obtain most of their electronic collection articles at workstations at their school or department (75.9% of reading). Of all reading from the library electronic collection, most reading originates from readers' office, lab, school or department workstations (62.9% or about 590,000 total reading). The campus library workstations are used for 21.5% of reading or about 200,000 total reading. The rest are obtained at home, out-of-town or elsewhere (15.6 percent or about 145,000 total reading).

Table 16 Proportion of Reading by Faculty and Students of the Library Electronic Collection by Where the Reader Obtained the Article: University of Pittsburgh 2003

		Students		
Where Electronic Article Was Obtained	**Faculty & Staff (%)**	**Undergraduate (%)**	**Graduate (%)**	**Total Reading (%)**
Office or Lab	87.7	---	---	18.8
School/Department	---	23.5	75.9	44.1
Campus Library	4.1	41.4	17.1	21.5
Home	6.9	30.1	7.0	13.8
Out of Town	1.4	---	---	0.3
Elsewhere	---	5.1	---	1.5
Total	100.1	100.1	100.0	100.0

Source: Readership Survey - Faculty (N = 2,478, n = 209), Undergraduate Students (N = 23,828, n = 245), Graduate Students (N = 6,257, n = 75)

Outcome of Reading from the Pittsburgh Library (ULS) Collections

Earlier in this article we presented some examples of favorable outcomes from faculty reading of journal articles. In this section we describe indicators of outcomes from faculty reading of Pittsburgh library collections, sometimes comparing these outcomes with those observed from other sources of reading. The purposes for which the library collections are used are essentially the same as reading from other sources. However, the average ratings of importance of the information read from the library collection is higher than from other sources; that is, 5.58 average rating for reading library articles versus 5.22 average rating from other sources. Had the information found in the library-provided article not been found, the work or purpose would not have been affected for 12.5 percent of readings. However, much more of the reading from other sources would not affect the work, thus indicating that the library collection articles are not only more important but generally have greater affect on faculty's work; particularly their primary research. We mentioned above that faculty whose work has been recognized through award or special recognition are found to read more than others. These award winners tend to have even greater reading when they are more likely to use the library collection.

We asked faculty to indicate where they would obtain the information from the last article read, if the source of the article (i.e., the library) was not available. Some said they would not bother getting the information, presumably because its informational worth is not justified by the time, effort or cost necessary to acquire it from another source. In fact, 21.7 percent of the readings were such that readers would not bother getting the information, with a much lower proportion from library articles than those

obtained elsewhere. Places they would go to get articles included from a non-Pittsburgh library, subscribing to the journal, the author, a colleague and so on. Presumably the readers would have used these sources initially if they would cost readers less in their time or ease of use. The readers who would obtain the same information from a non-Pittsburgh library source were asked how much they would spend in their time and/or dollars to obtain the information from the other source. By comparing this cost to the time they spent obtaining the information from the library collections, it appears that faculty would spend an average of 17 minutes more than spent obtaining the article from the library in addition to an average expenditure of $2.10 more.

There are estimated to be about 1.3 million readings from the ULS collections, of which about 78 percent would involve going to another source if the library collection was not available. Thus, there would be an additional cost of about 250,000 hours of faculty time and $2.1 million. That is, access to the Pittsburgh library collections saves faculty about this amount of time (perhaps 125 full-time equivalent faculty) or an average of 5 percent of faculty member's time and $2.1 million expenditure. This order of magnitude of return-an-investment has been observed in other libraries as well (Griffiths and King 1993). It is clear that one of the most important indicators of values added by library services is the saving of time (and effort) and money of users.

A similar saving in user time is observed with access to the library electronic collection. Here we compare the observed time spent obtaining articles from the library and electronic articles from their office, lab, home, etc. The average saving in time appears to

be about 15 minutes less per such reading by having access away from the library. Since faculty currently average 81 such readings, they save about 20 hours per year per person or a total of about 50,000 hours or, perhaps 20 to 25 full-time equivalent faculty members. Thus, the library electronic collection not only provides a broadened range of journals, but also saves faculty and the university substantial faculty resources.

Conclusions

Evidence presented in this article indicates that faculty are reading more articles and library collections are the principal source of articles for the additional reading. Some of the increased library reading per faculty member is due to declining personal subscriptions, which reading is replaced by reading from the library collections. However, a much larger contribution to the increased use of library collections is due in part to the evidence that faculty, science faculty at least, read from nearly twice as many journals now than they did 25 years ago. A substantial portion of this reading is from an increase in articles identified by online searching, citations in other publications, etc. that require locating and obtaining the articles following identification. Libraries are an obvious source for readers to use in these circumstances and they become even more so with expanded electronic collections.

Journal articles are extensively read by University of Pittsburgh faculty and students and information provided by these articles is observed to be extremely useful and valuable. Most of the estimated 1.9 million article readings at Pittsburgh are by students (72%) but faculty individually read a great deal (about 215 article readings per year) and spend

substantial time reading these articles (118 hours per year). Presumably faculty would not spend this amount of time reading, if the information was not worth this effort. Evidence of the usefulness of this information is as follows:

- The significant purposes for reading articles include primary research, writing, teaching and continued learning.

- The information is often shown to be very important or absolutely essential to achieving these purposes.

- Ways in which purposes of reading are affected include improving result of research, teaching, etc., inspiring new thinking, saving time or other resources, etc.

- Amount of reading and productivity are positively correlated. For example, reading and number of publications are related and reading saves time of faculty.

- Faculty who have received awards or other special recognition for research or other contributions tend to read appreciably more articles than other faculty.

Thus, journal articles provided through libraries are an important resource for faculty, as well as students.

The library collections at Pittsburgh are extensively used by faculty (48% of their reading) and students (75% of their reading). Of 1.3 million readings from the University library collections, four-fifths of this reading is by students, but faculty average about 110 readings per year from the library collections. Indicators of favorable outcomes from use of the library collections tend to be greater than use from other sources. For example:

- Readers tend to spend more time reading from library-provided articles than those obtained from other sources; thereby, indicating greater value in what they are "willing to pay" for the information in their time.

- While purposes of reading is essentially the same for library and other sources of reading, the importance of information read from the library collection is greater than that from other sources.

- Articles obtained from the library collection have a more positive affect on faculty's work.

- If there were no library collections, faculty indicate that it would take them an average of 17 minutes and $2.10 to obtain needed information from elsewhere; recognizing that sometimes they would not bother getting the information.

- Across all reading, faculty would spend about 250,000 hours of their time and $2.1 million in purchases. Thus, having the library collections saves faculty and the University, substantial time and expenditures that can be re-allocated to better use.

All library services tend to achieve favorable outcomes from use of the information provided and the ability to share the collections and other resources saves faculty and students an enormous amount of their time and expenditures.

Faculty and students at Pittsburgh have quickly adapted to electronic journals. In fact, well over half (63%) of reading is now from electronic versions for a total of 1.2 million such readings. Faculty are less than likely than students to use the electronic versions (about half of reading vs. two thirds for students) because they continue to subscribe to print versions of their personal subscriptions. In fact, only about ten percent of reading from personal subscriptions is from electronic format. On the other hand three-fourths of their reading from library collections is from electronic versions. Students also rely mostly on the electronic portion of the library collections (71% of reading from library collections). Perhaps the reason for this choice to use electronic library collections is the convenience of remote access to the electronic collection from readers' office, home, etc. In fact, faculty are estimated to save about 15 minutes per reading by remote access compared with going to their library to read or get a copy of the article. While saving a

single faculty member only about 20 hours per year, over all 2,478 faculty members the saving projects to about 50,000 hours that can be re-allocated to more important activities thus yielding potential benefit to the University.

Unfortunately, we have not been able to demonstrate other improved outcomes from reading electronic versions of articles. This may be due to the fact that the information content of electronic versions is essentially the same as print versions. However, this may change as readers continue to broaden access to new journals and make more extensive use of innovative features such as backward and forward citation linking, links to numeric database and images, and electronic access to older articles.

Appendix A

Readership Survey 1

UNIVERSITY OF PITTSBURGH
UNIVERSITY LIBRARY SYSTEM
READERSHIP SURVEY 1

As you know, scholarly journals are rapidly migrating to electronic media and many journals are including value-added features such as backward and forward citation links and links to databases and images. The University Library System (ULS) plans on providing access to more journals in electronic form in the future. This is an appropriate time to examine current information seeking and reading patterns of faculty, students and staff to ensure that the ULS journal collection continues to meet the needs and requirements of readers. This survey is an important element toward achieving this objective.

The survey instrument is subdivided into four parts that are being sent to four independent samples, in order to keep the length of the survey short for every respondent. Some questions are common to all four questionnaires to provide needed cross-classifications. Pilot tests show that your questionnaire should take approximately four to eight minutes to complete. Because of the importance of the survey to the University community, we need a high response rate.

Some of the questions involve a "critical incident" method for establishing information seeking and reading patterns, in which we ask about the last article you read. This last reading may not be typical, but when combined with other responses, will give us the range and combination of patterns that exist and should be considered. This method provides a powerful decision-making tool that has been used by us with nearly 25,000 survey responses from scientists, other faculty and other professionals over the years.

Your answers are extremely important to the library and, ultimately, to you. Your responses will be kept confidential and reported only in an aggregated manner, although we have assigned you a unique identifier for follow-up clarification of answers as necessary.

If you have any questions or comments about the survey, please contact Donald King (4-9315) or survey staff at ulssurvey@sis.pitt.edu at the School of Information Sciences.

If you are interested in receiving general results and/or any references involving the survey please check here. ❑

Please return the completed questionnaire to the Sara Fine Institute located in the School of Information Sciences, 601 IS Building, 135 N. Bellefield Ave., Pittsburgh, PA 15260.

SECTION I: SCHOLARLY JOURNAL ARTICLE READING

1. In the **past month (30 days)**, approximately how many scholarly articles have you read? Articles can include those found in journal issues, Web sites, or separate copies such as preprints, reprints, and other electronic or paper copies. Reading is defined as going beyond the table of contents, title, and abstract to the body of the article.

   Number of articles read/used in the past month: _____ articles

2. Do you ever read articles from electronic journals or other electronic sources?
   Yes …….1 No …….2

The following questions in this section refer to the SCHOLARLY ARTICLE YOU READ MOST RECENTLY, even if you had read the article previously. Note that this last reading may not be typical, but will help us establish the range of patterns in reading.

3. What is the title of the journal from which this last article was read **or**, if not from a journal, what is the topic of the article?

   Journal title
   _____

   or

   General topic of article:
   _____

4. If this article was (or will be) published in a specific journal, approximately how many articles did you read from this journal in the **last 12 months**?

   Not published in a journal ……1 Articles read _____

5. Approximately what year was this article published/posted? _____

6. How did you **initially find out** about this last article you read?
   Circle only the best answer

   a. Found while **browsing**:
      A personal print subscription……..……..1
      A personal electronic subscription…….……..2

A University Library System print subscription……..……..3
A University Library System electronic subscription…….……4
A print subscription copy in a school, department, unit, etc. collection..5
Other digital collection (please specify)_____6

b. Found while I (or someone on my behalf) was **searching**:
An indexing/abstracting database (e.g., Web of Science, ProQuest, FirstSearch, SilverPlatter)…….7
Web search engine (e.g., Google, Yahoo, AltaVista, Excite, Netscape)……..8
Online journal collections (e.g., HighWire, ScienceDirect)……..9
A current awareness service (e.g., Current Contents)
Print version……..10
Electronic version……11
A preprint/e-print service……...12

c. **Cited** in another publication…….…….……13
d. Another person (e.g., a colleague) told me about it…..……14
e. Don't know or other (please specify)_____15

7. a. If this article was found out by **browsing**, approximately how much time did you spend **browsing**? _____ minutes
As a result, how many articles did you read and plan to read? _____ articles
b. If this article was found by searching about how much time did you (or someone on your behalf) spend searching? _____ minutes
As a result, how many articles did you read and plan to read? _____ articles

From what **source** did you last **read** this article? Circle only the best answer

f. A personal print subscription …… 1
g. A personal electronic subscription …….. 2
h. A University Library System print subscription ……. 3
i. A University Library System electronic subscription ……...… 4
j. A free Web journal ……..…… 5
k. A print subscription located in a school, department unit, etc. collection…… 6

g. A separate copy of an article:
Preprint ……..…….…….. 7
Reprint ……..…… 8
Personal copy ……..……..…9
Copy from a colleague, author, etc. ……..…….. …..10
Interlibrary loan ……..…….. ..11
Document delivery service ……..……..…….. .12
Author's Web site ……..……. ……13
Other Web site (please specify) _____ 14

h. Other (please specify) _____ 15

8. In what form was the article when last read?
   Circle only the best answer

   a. Print ……..…….. 1
   b. Photocopy or facsimile copy ..…….…… 2
   c. Computer display of e-text ……..……3
   d. Printout of e-text …….…… 4
   e. Other (please specify) _____ 5

9. If (c) or (d) above, was it from a saved electronic copy?
   Yes ……1 No …….2

10. If the last reading was from an electronic source, where were you or someone on your behalf when the article was obtained?

    Didn't read from electronic source ❑ Go to Question 12

In my office or lab	1	At home	3
Campus Library (please specify) _____	2	Out of town	4
		Elsewhere (please specify) _____	5

11. After you identified this article, approximately how much time (in seconds or minutes) did you and/or someone else on your behalf (e.g., graduate student, lab assistant, librarian) spend in **each** of the following activities? (If no time was spent, please enter 0.)

    Obtain, request, receive, or download and display the article:
    Your own time …… ____ seconds or ____minutes
    Someone else's time on your behalf ___ seconds or ____minutes
    Photocopy or print out the article:
    Your own time ……..……... ____ minutes
    Someone else's time on your behalf ……. ____ minutes
    Other (please specify) _____ ……. ____ minutes

12. Please indicate your best estimate of the time in minutes that you spent reading this article most recently. _____ minutes

14. Had you previously read this article, i.e. is this a re-reading?
    Yes ……..1 No ……..2

15. Prior to your first reading of this article, did you know about the information reported or discussed in this article?
    Yes ……1 No……2

16. Thinking back to the source of the article (Question 8-personal print subscription, a library print subscription, etc.), where would you obtain the information, if the source was not available?

I would not bother getting the information ……1
I would obtain the information from (please specify source):
_____

In order to obtain the same information from the source, I would expect to spend _____minutes of time and/or $ _____

SECTION 2: DEMOGRAPHICS

1. Please indicate your department **or** your professional field (e.g., chemistry, history, law, engineering, etc.).
_____

2. Please specify your rank:

	Circle one	
Professor	1	Research Associate/GSR 5
Associate/Assistant Professor	2	Staff 6
Instructor	3	Other (please specify) 7
Teaching Asst./Fellow	4	_____

3. Please indicate your highest degree earned: _____
Year received: _____

4. How many years have you been teaching? _____
Years

5. Gender: Male …….1 Female …….2

6. In the past **two years**, how many:
   a. Articles in refereed scholarly journals have you published? _____ articles
   b. Non-refereed articles have you published? _____ articles
   c. Chapters in books, proceedings, etc. have you published? _____ chapters
   d. Entire books have you published? _____ books

7. For the **last refereed scholarly article** that you published:
   a. How many co-authors did you have, if any? _____ co-authors

   b. How was the effort funded? Circle all that apply.

Government grant	1	As part of my role at University	
Foundation grant	2	(not specifically funded)	5
Industry grant/contract	3	Other (please specify)	
University-provided grant	4	_____	6

8. In the past two years, have you received any awards or special recognition for your research or other profession-related contributions? Yes …..1 No …..2

9. How many personal subscriptions to professional journals do you receive, including those obtained as a member of a professional society? (Personal subscriptions are those which are **personally addressed to you** at your home, office, or lab.)

   a. Subscriptions paid myself
   …….…….._____
   b. Free subscriptions
   ……..……..._____
   c. Subscriptions purchased by grant or other source for my personal use
   _____
   d. Subscriptions purchased by grant or other source for shared use……...._____
   How many of these are electronic subscriptions?
……...._____

Please return to Sara Fine Institute, University of Pittsburgh School of Information Sciences, 601 IS Building, 135 Bellefield Ave., Pittsburgh, PA 15260.

THANK YOU!!

UNIVERSITY OF PITTSBURGH
UNIVERSITY LIBRARY SYSTEM
READERSHIP SURVEY 2

As you know, scholarly journals are rapidly migrating to electronic media and many journals are including value-added features such as backward and forward citation links and links to databases and images. The University Library System (ULS) plans on providing access to more journals in electronic form in the future. This is an appropriate time to examine current information seeking and reading patterns of faculty, students and staff to ensure that the ULS journal collection continues to meet the needs and requirements of readers. This survey is an important element toward achieving this objective.

The survey instrument is subdivided into four parts that are being sent to four independent samples, in order to keep the length of the survey short for every respondent. Some questions are common to all four questionnaires to provide needed cross-classifications. Pilot tests show that your questionnaire should take approximately four to eight minutes to complete. Because of the importance of the survey to the University community, we need a high response rate.

Some of the questions involve a "critical incident" method for establishing information seeking and reading patterns, in which we ask about the last article you read. This last reading may not be typical, but when combined with other responses, will give us the range and combination of patterns that exist and should be considered. This method provides a powerful decision-making tool that has been used by us with nearly 25,000 survey responses from scientists, other faculty and other professionals over the years.

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If you are interested in receiving general results and/or any references involving the survey please check here. ❑

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SECTION I: SCHOLARLY JOURNAL ARTICLE READING

1. In the **past month (30 days)**, approximately how many scholarly articles have you read? Articles can include those found in journal issues, Web sites, or separate copies such as preprints, reprints, and other electronic or paper copies. Reading is defined as going beyond the table of contents, title, and abstract to the body of the article.

   Number of articles read/used in the past month: _____ articles

2. Do you ever read articles from electronic journals or other electronic sources?

   Yes …….1 No …….2

The following questions in this section refer to the SCHOLARLY ARTICLE YOU READ MOST RECENTLY, even if you had read the article previously. Note that this last reading may not be typical, but will help us establish the range of patterns in reading.

3. What is the title of the journal from which this last article was read **or**, if not from a journal, what is the topic of the article?

   Journal title

   _____

   or

   General topic of article:

   _____

4. If this article was (or will be) published in a specific journal, approximately how many articles did you read from this journal in the **last 12 months**?

   Not published in a journal ……1 Articles read _____

5. Approximately what year was this article published/posted? _____-___

6. Please indicate your best estimate of the time in minutes that you spent reading this article most recently. _____ minutes

7. Had you previously read this article, i.e. is this a re-reading?

   Yes …….1 No …….2

8. Prior to your first reading of this article, did you know about the information reported or discussed in this article?

Yes …….1 No …….2

9. How did you **initially find out** about this last article you read? Circle the best answer
   a. Found while **browsing**:
   A personal print subscription……..……..1
   A personal electronic subscription…….……..2
   A University Library System print subscription……...……..3
   A University Library System electronic subscription…….……4
   A print subscription copy in a school, department, unit, etc. collection…….…5
   Other digital collection (please specify)_____6
   b. Found while I (or someone on my behalf) was **searching**:
   An indexing/abstracting database (e.g., Web of Science, ProQuest, FirstSearch, SilverPlatter)…….7
   Web search engine (e.g., Google, Yahoo, AltaVista, Excite, Netscape)……..8
   Online journal collections (e.g., HighWire, ScienceDirect)……..9
   A current awareness service (e.g., Current Contents)
   Print version……..10
   Electronic version……11
   A preprint/e-print service……...12
   c. **Cited** in another publication…… ……13
   d. Another person (e.g., a colleague) told me about it…… ……14
   e. Don't know or other (please specify)_____15

10. From what **source** did you last **read** this article? Circle only the best answer
   a. A personal print subscription …… 1
   b. A personal electronic subscription …….. 2

c. A University Library System print subscription ……. 3
d. A University Library System electronic subscription ……..… 4
e. A free Web journal ……..…… 5
f. A print subscription located in a school, department unit, etc. collection…… 6
g. A separate copy of an article:
Preprint ……..……... 7
Reprint ……..…… 8
Personal copy ……..……9
Copy from a colleague, author, etc. ……..…….. 10
Interlibrary loan ……..…… 11
Document delivery service ……..……..…… 12
Author's Web site ……..…….. 13
Other Web site (please specify) _____ 14
i. Other (please specify) _____ 15

11. In what form was the article when last read? Circle only the best answer
a. Print ……..…….. 1
b. Photocopy or facsimile copy ..…… 2
c. Computer display of e-text ……3
d. Printout of e-text ……...…… 4
e. Other (please specify) _____ 5

12. If (c) or (d) above, was it from a saved electronic copy? Yes ……1 No …….2

13. If the last reading was from an electronic source, where were you or someone on your behalf when the article was obtained?

Didn't read from electronic source ❑ Go to Section 2

In my office or lab 1 At home 3
Campus Library (please specify) Out of town 4
_____ 2 Elsewhere (please specify)

_____ 5

SECTION 2: PURPOSES AND CONSEQUENCES OF THE LAST ARTICLE READING

1. For what purposes have you used, or do you plan to use, the information obtained from the article you last read?

	Principal Purpose (Circle **only** the best one)	All Other Purposes (Circle **all** that apply)
Primary research	1	1
Background research	2	2
Teaching	3	3
Writing proposals, reports, articles, etc.	4	4
Consulting, advising others	5	5
Internal or external presentations	6	6
Current awareness/keeping up	7	7
Other (please specify)_____	8	8

2. In what ways did the reading of the article affect the principal purpose?

Circle all that apply

It improved the result 1
It narrowed/broadened/changed the focus 2
It inspired new thinking/ideas 3
It resulted in collaboration/joint research 4
It resulted in faster completion 5

It confirmed my suspicions …… 6
It led me to new authors/data sources …… 7
It resolved technical problems…….…….. 8
It saved time or other resources…… 9
It wasted my time…….……. 10
Other (please specify) _____ 11

3. How important is the information contained in this article to achieving your **principal purposes**? (Circle appropriate number)

Not at all Important			Somewhat Important			Absolutely Essential
1	2	3	4	5	6	7

4. If you had not obtained the information found in the article at all, how might it have affected your work or purpose for which the article was read?

Work or purpose would not have been affected……1

Ways affected (please specify)

_____

_____

_____

_____

_____

SECTION 3: DEMOGRAPHICS

10. Please indicate your department **or** your professional field (e.g., chemistry, history, law, engineering, etc.).

_____

11. Please specify your rank: Circle one

Professor	1	Research Associate/GSR	5
Assoc./Asst. Professor	2	Administration	6
Instructor	3	Other (please specify)	7
Teaching Asst./Fellow	4	_____	

12. Please indicate your highest degree earned: _____
Year received: _____

13. How many years have you been teaching? _____
Years

14. Gender: Male …….1 Female …….2

15. In the past **two years**, how many:
    e. Articles in refereed scholarly journals have you published? _____ articles
    f. Non-refereed articles have you published? _____ articles
    g. Chapters in books, proceedings, etc. have you published? _____ chapters
    h. Entire books have you published? _____ books

16. For the **last refereed scholarly article** that you published:
    c. How many co-authors did you have, if any? _____ co-authors

    d. How was the effort funded? Circle all that apply.

Government grant	1	As part of my role at University	
Foundation grant	2	(not specifically funded)	5
Industry grant/contract	3	Other (please specify)	
University-provided grant	4	_____	6

17. In the past two years, have you received any awards or special recognition for your research or other profession-related contributions? Yes …..1 No …..2

18. How many personal subscriptions to professional journals do you receive, including those obtained as a member of a professional society? (Personal subscriptions are those which are **personally addressed to you** at your home, office, or lab.)

    a. Subscriptions paid myself ……_____
    b. Free subscriptions ……_____
    c. Subscriptions purchased by grant or other source for my personal use _____
    d. Subscriptions purchased by grant or other source for shared use……..._____
    How many of these are electronic subscriptions? ……..._____

Please return to Sara Fine Institute, University of Pittsburgh School of Information Sciences, 601 IS Building, 135 Bellefield Ave., Pittsburgh, PA 15260.

THANK YOU!!

UNIVERSITY OF PITTSBURGH
UNIVERSITY LIBRARY SYSTEM
READERSHIP SURVEY 3

As you know, scholarly journals are rapidly migrating to electronic media and many journals are including value-added features such as backward and forward citation links and links to databases and images. The University Library System (ULS) plans on providing access to more journals in electronic form in the future. This is an appropriate time to examine current information seeking and reading patterns of faculty, students and staff to ensure that the ULS journal collection continues to meet the needs and requirements of readers. This survey is an important element toward achieving this objective.

The survey instrument is subdivided into four parts that are being sent to four independent samples, in order to keep the length of the survey short for every respondent. Some questions are common to all four questionnaires to provide needed cross-classifications. Pilot tests show that your questionnaire should take approximately four to eight minutes to complete. Because of the importance of the survey to the University community, we need a high response rate.

Some of the questions involve a "critical incident" method for establishing information seeking and reading patterns, in which we ask about the last article you read. This last reading may not be typical, but when combined with other responses, will give us the range and combination of patterns that exist and should be considered. This method provides a powerful decision-making tool that has been used by us with nearly 25,000 survey responses from scientists, other faculty and other professionals over the years.

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If you have any questions or comments about the survey, please contact Donald King (4-9315) or survey staff at ulssurvey@sis.pitt.edu at the School of Information Sciences.

If you are interested in receiving general results and/or any references involving the survey please check here. ❑

Please return the completed questionnaire to the Sara Fine Institute located in the School of Information Sciences, 601 IS Building, 135 N. Bellefield Ave., Pittsburgh, PA 15260.

SECTION I: SCHOLARLY JOURNAL ARTICLE READING

14. In the **past month (30 days)**, approximately how many scholarly articles have you read? Articles can include those found in journal issues, Web sites, or separate copies such as preprints, reprints, and other electronic or paper copies. Reading is defined as going beyond the table of contents, title, and abstract to the body of the article.

    Number of articles read/used in the past month: _____ articles

15. Do you ever read articles from electronic journals or other electronic sources?

    Yes …….1 No …….2

The following questions in this section refer to the SCHOLARLY ARTICLE YOU READ MOST RECENTLY, even if you had read the article previously. Note that this last reading may not be typical, but will help us establish the range of patterns in reading.

16. What is the title of the journal from which this last article was read **or**, if not from a journal, what is the topic of the article?

    Journal title

    _____

    or

    General topic of article:

    _____

17. If this article was (or will be) published in a specific journal, approximately how many articles did you read from this journal in the **last 12 months**?

    Not published in a journal ……1 Articles read _____

18. Approximately what year was this article published/posted? _____-___

19. How did you **initially find out** about this last article you read? Circle the best answer

    a. Found while **browsing**:

    A personal print subscription……..……..1

    A personal electronic subscription…….……..2

A University Library System print subscription……...……..3
A University Library System electronic subscription…….……4
A print subscription copy in a school, department, unit, etc. collection…….…5
Other digital collection (please specify)_____6

b. Found while I (or someone on my behalf) was **searching**:
An indexing/abstracting database (e.g., Web of Science, ProQuest, FirstSearch, SilverPlatter)…….7
Web search engine (e.g., Google, Yahoo, AltaVista, Excite, Netscape)……..8
Online journal collections (e.g., HighWire, ScienceDirect)……..9
A current awareness service (e.g., Current Contents)
Print version……..10
Electronic version…….11

(Continued on Next Page)

A preprint/e-print service……...12

c. **Cited** in another publication…… ……13

d. Another person (e.g., a colleague) told me about it…… ……14

e. Don't know or other (please specify)_____15

20. From what **source** did you last **read** this article? Circle only the best answer

a. A personal print subscription …… 1

b. A personal electronic subscription …….. 2

c. A University Library System print subscription ……. 3

d. A University Library System electronic subscription ……..… 4

e. A free Web journal …….……..… 5

f. A print subscription located in a school, department unit, etc. collection…… 6

g. A separate copy of an article:

Preprint
…….. 7
Reprint
……. 8
Personal copy
……..……9
Copy from a colleague, author, etc.
…….. 10
Interlibrary loan
…….. 11
Document delivery service
…….……..…… 12
Author's Web site
…….. 13
Other Web site (please specify)
_____ 14

j. Other (please specify)
_____ 15

21. In what form was the article when last read? Circle only the best answer
a. Printed
……..…….. 1
b. Photocopy or facsimile copy
..…… 2
c. Computer display of e-text
……3
d. Printout of e-text
……..……. 4
e. Other (please specify)
_____ 5

22. If (c) or (d) above, was it from a saved electronic copy? Yes ……1 No …….2

23. If the last reading was from an electronic source, where were you or someone on your behalf when the article was obtained?

Didn't read from electronic source ❑ Go to Question 11

In my office or lab	1	At home 3
Campus Library (please specify)		Out of town 4
_____	2	Elsewhere (please specify)

_____ 5

11. Please indicate your best estimate of the time in minutes that you spent reading this article most recently. _____ minutes

12. Had you previously read this article, i.e. is this a re-reading? Yes ……..1
No ……..2

13. Prior to your first reading of this article, did you know about the information reported or discussed in this article? Yes ……1
No……2

SECTION 2: OTHER ELECTRONIC JOURNAL-RELATED ISSUES

1. a. Do you ever access electronic journal articles from home or other non-university sites?
Yes…….1 No…….2

b. If yes, about how often do you use library electronic resources at home?
_____ times per month

c. What kind of connection to the Internet do you have? Circle all that apply

Dial-up……..1
Cable Modem…….2
DSL……...3
Direct TV……..……..4
Other (please specify)
_____ 5

2. a. Did you teach any courses in the past 12 months?
Yes…….1 No…….2 (Skip to Section 3)

b. Please indicate below the number of courses (total sections of courses) taught by you in the last 12 months (include team teaching).
_____ courses

c. Estimate the number of journal articles assigned or likely to be read in all your courses.

Undergraduate	Master's Level	Ph.D. Level
_____ Courses	_____ Courses	_____ Courses
_____ Articles	_____ Articles	_____ Articles

d. About what proportion (%) of these articles was:

Assigned by title? _____%
Identified by student? _____%

e. Did you ever suggest or recommend that any articles could be obtained from an electronic full-text database? Yes…….1
No…….2

Please feel free to comment on any aspect of University Library System journal services.

_____

_____

_____

_____

SECTION 3: DEMOGRAPHICS

19. Please indicate your department **or** your professional field (e.g., chemistry, history, law, engineering, etc.).
_____

20. Please specify your rank: Circle one

Professor	1	Research Associate/GSR	5
Assoc./Assist. Professor	2	Administration	6
Instructor	3	Other (please specify)	7
Teaching Asst./Fellow	4	_____	

21. Please indicate your highest degree earned: _____
Year received: _____

22. How many years have you been teaching? _____
Years

23. Gender: Male …….1 Female …….2

24. In the past **two years**, how many:
i. Articles in refereed scholarly journals have you published?
_____ articles

j. Non-refereed articles have you published? _____
articles
k. Chapters in books, proceedings, etc. have you published? _____
chapters
l. Entire books have you published? _____
books

25. For the **last refereed scholarly article** that you published:
e. How many co-authors did you have, if any? _____ co-authors

f. How was the effort funded? Circle all that apply.

Government grant	1	As part of my role at University	
Foundation grant	2	(not specifically funded)	5
Industry grant/contract	3	Other (please specify)	
University-provided grant	4	_____	6

26. In the past two years, have you received any awards or special recognition for your research or other profession-related contributions? Yes …..1 No …..2

27. How many personal subscriptions to professional journals do you receive, including those obtained as a member of a professional society? (Personal subscriptions are those which are **personally addressed to you** at your home, office, or lab.)

a. Subscriptions paid myself
…….……_____
b. Free subscriptions
…….……._____
c. Subscriptions purchased by grant or other source for my personal use
_____
d. Subscriptions purchased by grant or other source for shared use……...._____
How many of these are electronic subscriptions?
……...._____

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THANK YOU!!

UNIVERSITY OF PITTSBURGH
UNIVERSITY LIBRARY SYSTEM
READERSHIP SURVEY 4

As you know, scholarly journals are rapidly migrating to electronic media and many journals are including value-added features such as backward and forward citation links and links to databases and images. The University Library System (ULS) plans on providing access to more journals in electronic form in the future. This is an appropriate time to examine current information seeking and reading patterns of faculty, students and staff to ensure that the ULS journal collection continues to meet the needs and requirements of readers. This survey is an important element toward achieving this objective.

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If you have any questions or comments about the survey, please contact Donald King (4-9315) or survey staff at ulssurvey@sis.pitt.edu at the School of Information Sciences.

If you are interested in receiving general results and/or any references involving the survey please check here. ❑

Please return the completed questionnaire to the Sara Fine Institute located in the School of Information Sciences, 601 IS Building, 135 N. Bellefield Ave., Pittsburgh, PA 15260.

SECTION I: SCHOLARLY JOURNAL ARTICLE READING

24. In the **past month (30 days)**, approximately how many scholarly articles have you read? Articles can include those found in journal issues, Web sites, or separate copies such as preprints, reprints, and other electronic or paper copies. Reading is defined as going beyond the table of contents, title, and abstract to the body of the article.

    Number of articles read/used in the past month: _____ articles

25. Do you ever read articles from electronic journals or other electronic sources?

    Yes …….1 No …….2

The following questions in this section refer to the SCHOLARLY ARTICLE YOU READ MOST RECENTLY, even if you had read the article previously. Note that this last reading may not be typical, but will help us establish the range of patterns in reading.

26. What is the title of the journal from which this last article was read **or**, if not from a journal, what is the topic of the article?

    Journal title

    _____

    or

    General topic of article:

    _____

27. If this article was (or will be) published in a specific journal, approximately how many articles did you read from this journal in the **last 12 months**?

    Not published in a journal ……1 Articles read _____

28. Approximately what year was this article published/posted? _____-___

29. How did you **initially find out** about this last article you read? Circle the best answer

    a. Found while **browsing**:

    A personal print subscription……..……..1

A personal electronic subscription……..2

A University Library System print subscription……...……..3

A University Library System electronic subscription…….……4

A print subscription copy in a school, department, unit, etc. collection……..…5

Other digital collection (please specify)_____6

b. Found while I (or someone on my behalf) was **searching**:

An indexing/abstracting database (e.g., Web of Science, ProQuest, FirstSearch, SilverPlatter)…….7

Web search engine (e.g., Google, Yahoo, AltaVista, Excite, Netscape)……..8

Online journal collections (e.g., HighWire, ScienceDirect)……..9

A current awareness service (e.g., Current Contents)

Print version……..10

Electronic version…….11

(Continued on Next Page)

A preprint/e-print service……...12

c. **Cited** in another publication…… ……13

d. Another person (e.g., a colleague) told me about it…… ……14

e. Don't know or other (please specify)_____15

30. From what **source** did you last **read** this article? Circle only the best answer

a. A personal print subscription …… 1

b. A personal electronic subscription …….. 2

c. A University Library System print subscription ……. 3

d. A University Library System electronic subscription ……..… 4

e. A free Web journal ……..…… 5

f. A print subscription located in a school, department unit, etc. collection…… 6

g. A separate copy of an article:
Preprint
…….. 7
Reprint
…… 8
Personal copy
……..……9
Copy from a colleague, author, etc.
…….…….. 10
Interlibrary loan
……..……. 11
Document delivery service
……..……..…… 12
Author's Web site
……..…….. 13
Other Web site (please specify)
_____ 14

k. Other (please specify)
_____ 15

31. In what form was the article when last read? Circle only the best answer
a. Print
……..…….. 1
b. Photocopy or facsimile copy
..…… 2
c. Computer display of e-text
……3
d. Printout of e-text
……...……. 4
e. Other (please specify)
_____ 5

32. If (c) or (d) above, was it from a saved electronic copy? Yes ……1 No …….2

33. If the last reading was from an electronic source, where were you or someone on your behalf when the article was obtained?

Didn't read from electronic source ❑ Go to Question 12

In my office or lab 1 At home 3

Campus Library (please specify) 4
_____ 2
Out of town
Elsewhere (please specify)
_____ 5

11. Please indicate your best estimate of the time in minutes that you spent reading this article most recently. _____ minutes

12. Had you previously read this article, i.e. is this a re-reading? Yes ……..1 No ……..2

13. Prior to your first reading of this article, did you know about the information reported or discussed in this article? Yes ……1 No……2

SECTION 2: AWARENESS, USE AND SATISFACTION WITH ELECTRONIC ARTICLE SERVICES AND ATTRIBUTES

This question deals with your awareness and use of some alternative electronic article services.

(A) If you were previously **not aware** that the service was available, but might have a **need** for it, **circle 1**. If you were previously **not aware** that the service was available, and would **not** have a need for it, **circle 2**.

(B) If you were **aware** of the service, but have **never used** it, **circle 3**. If you were **aware** of the service, and **have used** it, **circle 4**.

PLEASE ENTER AN ANSWER IN **EITHER** A OR B, BUT NOT BOTH.

(C) If you **have used** the service (you circled 4), please indicate the approximate **number of uses** in the last month.

(D) If you **have used** the service, please rate (i) the **importance** of the service or service attribute to you and (ii) your **satisfaction** with it.

IMPORTANCE: VERY LITTLE IMPORTANCE-1 to VERY IMPORTANT-5;
SATISFACTION: VERY DISSATISFIED-1 to VERY SATISFIED-5

Service	A		B		C	D	
	Not aware of service		Aware of this service		Answer only if you have ever used the service		
	Have a Need for for Service	Have no Need for Service	Have Never Used	Have Used	No. of Uses in t the Last Month	(i) Importance Rating (1 [low] - 5 [high])	(ii) Satisfaction Rating (1 [low] – 5 [high])
1. Electronic Journals	1	2	3	4			
Quality of Content							
Links to citations	1	2	3	4			
Links to data, images, etc.	1	2	3	4			
2. Preprint Archives	1	2	3	4			
Quality of content							
3. Author Website	1	2	3	4			
Quality of content							

SECTION 3: DEMOGRAPHICS

28. Please indicate your department **or** your professional field (e.g., chemistry, history, law, engineering, etc.).
_____

29. Please specify your rank: Circle one

Professor	1	Research	6
Associate Professor	2	Librarian	7
Assistant Professor	3	Administration	8
Lecturer	4	Other (please specify)	
Instructor	5	_____	9

30. Please indicate your highest degree earned: _____
Year received: _____

31. How many years have you been teaching? _____ Years

32. Gender: Male …….1 Female …….2

33. In the past **two years**, how many:

m. Articles in refereed scholarly journals have you published? _____ articles

n. Non-refereed articles have you published? _____ articles

o. Chapters in books, proceedings, etc. have you published? _____ chapters

p. Entire books have you published? _____ books

34. For the **last refereed scholarly article** that you published:

g. How many co-authors did you have, if any? _____ co-authors

h. How was the effort funded? Circle all that apply.

Government grant	1	As part of my role at University	
Foundation grant	2	(not specifically funded)	5
Industry grant/contract	3	Other (please specify)	
University-provided grant	4	_____	6

35. In the past two years, have you received any awards or special recognition for your research or other profession-related contributions? Yes …..1 No …..2

36. How many personal subscriptions to professional journals do you receive, including those obtained as a member of a professional society? (Personal subscriptions are those which are **personally addressed to you** at your home, office, or lab.)

a. Subscriptions paid myself ……_____

b. Free subscriptions ……_____

c. Subscriptions purchased by grant or other source for my personal use _____

d. Subscriptions purchased by grant or other source for shared use……..._____

How many of these are electronic subscriptions? ……..._____

Please return to Sara Fine Institute, University of Pittsburgh School of Information Sciences, 601 IS Building, 135 Bellefield Ave., Pittsburgh, PA 15260.

THANK YOU!!

Student Readership Survey

Dear University of Pittsburgh Faculty Member,

As you know, scholarly journals are rapidly migrating to electronic media and many journals are including value-added features such as backward and forward citation links and links to databases and images. The University Library System plans on providing access to more journals in electronic form in the future. This is an appropriate time to examine current information seeking and reading patterns of faculty, students and staff to ensure that the ULS journal collection continues to meet the needs and requirements of readers. A survey of faculty and students is an important element toward achieving this objective.

Unfortunately, students are notorious for not responding to surveys. For this reason, we have found that the best way to get them to respond to important surveys is to ask a sample of faculty to distribute the survey instruments in a class and have them fill them out at the beginning or end of a class and hand them back in when they leave.

You have been chosen randomly to fulfill this task. The enclosed survey instrument is very brief and should not take the students more than five minutes to fill out.

If you are willing to perform this task we will send copies of the questionnaire to you in the next 2 to 3 weeks.

Please indicate the number of questionnaires you will need. _____

Your cooperation is very much appreciated. If you are interested in receiving the results of this survey, please check here and we will send it to you. ❑

Please return this letter to me at:

Donald W. King
Sara Fine Institute
School of Information Sciences
601 IS Building, 135 N. Bellefield
Pittsburgh, PA 15260

Sincerely,

Donald W. King,
Research Professor, School of Information Sciences

UNIVERSITY OF PITTSBURGH
UNIVERSITY LIBRARY SYSTEM
STUDENT READERSHIP SURVEY

SECTION 1: JOURNAL ARTICLE READING

34. In the **Fall Semester (2002)**, approximately how many journal articles did you read? Articles can include those found in journal issues, Web sites, or separate copies such as preprints, reprints, and other electronic or paper copies. Reading is defined as going beyond the table of contents, title, and abstract to the body of the article.

    Number of articles read/used in the fall semester: _____ articles
    If none, skip to Section 2, page 3.

35. Approximately what proportion of these articles that you read was the result of a classroom assignment? _____ %

36. Do you ever read articles from electronic journals or other electronic sources?

    Yes …….1 No …….2

The following questions in this section refer to the ARTICLE YOU READ MOST RECENTLY, even if you had read the article previously. Note that this last reading may not be typical, but will help us establish the range of patterns in reading.

37. What is the title of the journal from which this last article was read **or**, if not from a journal, what is the topic of the article?

    Journal title
    _____

    or

    General topic of article:
    _____

38. Approximately what year was this article published/posted? _____-___

39. Please indicate your best estimate of the time in minutes that you spent reading this article. _____ minutes

40. For what purpose(s) was this last article read? Circle all that apply.
    This article was specifically assigned in a class
    ……1
    This article was found as a classroom assignment
    ……..……2
    This article was for a research project
    ……3
    This article was to keep up with the literature
    ……4
    This article was just of personal interest
    ……5
    Other (specify)
_____ 6

41. How did you **find out** about this last article you read? Circle only the best answer
    a. A professor/teacher told me about it.……1
    b. **Cited** in another publication…… ……....2
    c. Found while I was **searching**:
        An indexing/abstracting database (e.g., Web of Science, ProQuest, FirstSearch,
        SilverPlatter)……..3
        Web search engine (e.g., Google,
        Yahoo)…….…….…... 4
        Online journal collections (e.g., HighWire,
        ScienceDirect)……...5
        A current awareness service (e.g., Current Contents)
        Print
        version…….……..6
        Electronic
        version…….…….7
        A preprint/e-print
    service…….……...8
    d. Found while **browsing**:
        A University Library System print
        subscription……...……..9
        A University Library System electronic
        subscription…….……10
        A print subscription copy in your school, department, unit, etc.
        collection……11
        A personal print subscription
        ……12

A personal electronic subscription
……..13
Other digital collection (please
specify)_____14

e. Don't know or other (please
specify)_____15

42. From what **source** did you last **read** this article? Circle only the best answer

a. A University Library System print subscription
……. 1

b. A University Library System electronic subscription
……..… 2

c. A personal print subscription
…… 3

d. A personal electronic subscription
……..…….. 4

e. A print subscription located in a school department unit, etc. collection…… 5

f. A separate copy of an article:
Copy handed out/given in class
…….…….. 6
Interlibrary loan or document delivery service
...…… 7
Preprint
……..……... 8
Reprint
…….…… 9
Copy from a friend
…….. 10
Author's Web site
…….…….. 11
Other Web site (please specify)
_____ 12

g. Other (please specify)
_____ 13

43. In what form was the article when last read? Circle only the best answer

a. Print
……..…….. 1

b. Photocopy or facsimile copy
..……. 2

c. Computer display of e-text
……3

d. Printout of e-text
…..…….4
e. Other (please specify)
_____ 5

44. If the last reading was from an electronic source, where were you when the article was obtained? Didn't read from electronic source ❑

At my school/department 1 Out of town 4
Campus library (specify) _____ 2 Elsewhere (please specify)
At home 3
_____ 5

SECTION 2: DEMOGRAPHICS

37. What year are you in school?
Freshman ……1 Senior ……...4
Sophomore …….2 Masters Student ……..5
Junior ……...3 Ph.D. Student ……..6

38. What is your major?
_____

39. How many credit hours did you take in the Fall Semester (2002)? _____ hours

40. What is your GPA? _____ Unknown 1

41. Gender/sex: Male…….1
Female…….2

42. Where do you live?

On campus ……1
Within one mile of campus …….2
More than one mile from campus ……..3

43. Do you have online access to electronic journals from where you live?

Yes …….1 No …….2

44. How many personal subscriptions to professional journals do you receive, including those obtained as a member of a professional society? (Personal subscriptions are those which are **personally addressed to you** at your home, office, or lab.)

_____ print subscriptions _____ electronic journal subscriptions

Please return to your professor/teacher at the end of class.

THANK YOU!!