

## **Digging Deeper into E-Journal Use: Outcomes, Value, and Interdisciplinary Reading**

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### **Introduction**

I am pleased to return to the CONCERT meeting again this year. Those of you who attended last year may remember that I talked about “How Electronic Journals Are Changing Scholarly Journal Patterns.” I did not delve too deeply into my data last year, because the surface patterns are so dramatic. Some highlights from the data I presented last year show that subject experts:

- read more articles now than in the past,
- spend less time per reading,
- read a higher percentage of older articles if they are available in electronic form, and
- rely more than ever on electronic journal articles from library collections.

In this presentation I take a deeper look to focus on implications of the changing reading patterns due to e-resources. I will touch on *outcomes* of reading or the *value* to the readers of the investment that libraries make in e-collections and, secondly, provide some results on how e-resources influence *interdisciplinary* reading.

### **Value of E-Journal Collections**

To understand the value of e-journal collections, we first must make sure we understand the value of *what* and to *whom* and also *why* value matters. (Much of this section on value is covered in more detail in Tenopir & King, 2007.)

The question of *what* has value takes on special meaning in a changing online environment. *What* may refer to entire journal titles or an entire library collection. Focusing on value of entire journals is generally for collection development decisions.

*What* may instead apply to individual articles or readings. It can be argued that the value of the individual pieces (or articles) can be measured quite independently of the whole journal. An important article may appear alongside many articles of low importance or dubious value. Measuring individual article value is often done to measure relative contributions of an author or an academic department. But the value of reading articles can also be aggregated and used to measure the value of the library's collection to library users. My work focuses on the value of readings of individual articles.

In the e-environment, *what* is measured for value may even apply to parts of individual articles such as a specific graph or table or piece of an article to help in design of future products, services, or metadata, to better understand user behaviour, and to get a more in depth look at the value of what the library provides. (Sandusky, Tenopir, and Casado, 2007.)

To *whom* may refer to libraries or institutions or to individuals. Individuals, of course, may be further subdivided into constituent groups such as academic staff, students, or others and they may be even further divided into their role as readers or authors.

*Why* for me is often just because it is interesting, but from a library or publisher perspective *why* is also to demonstrate return on investment, or the value of the journal collection to readers and to the university as a whole, assist with collection decisions, and help improve information products and services, including library instruction.

The perspective of my work is the value to *readers*, specifically academic staff or students. Libraries should extrapolate upwards, for the academic library's value to the institution lies in how well it provides valuable resources and services to the academic staff and students.

And, I will focus mostly on individual journal *articles*, although again, libraries may extrapolate upwards to journal titles as a whole or categories of journals. *Why* is to quantify the value of journal article reading to faculty and students, and ultimately to the university as a whole.

## Measuring Explicit and Implicit Value to Readers

Value can be measured in multiple ways. I will provide an overview as means of introduction to two broad categories of value to readers: that is, explicit value and implicit value.

*Explicit* value in this context is something that is readily identifiable as valuable by and for the readers. For example, in the surveys of university faculty and students that I do with Donald W. King, we explicitly ask respondents “for what purpose did you read the last scholarly article that you read” and “how valuable was it to you”? This uses a variation of the critical incident technique, which looks at details of the last article reading to shed light on patterns, purpose, and value of readings. The last article reading is assumed to be random in time and this technique therefore provides us with a random sample of readings. (Survey instruments are available at: [web.utk.edu/~tenopir/research/](http://web.utk.edu/~tenopir/research/)).

Of over 1500 faculty responses from our 2004-2006 surveys in 7 universities in Australia and the United States, about half of all readings were for research, with the next biggest group for teaching. On average, on a 3 point scale of value, readings were rated over 2 by faculty. Those readings for research or teaching were more likely to be rated highly.

Students, not surprisingly, read most to

- Help complete a course assignment or required reading in a course (46-50%)
- Thesis/dissertation (33-37%) and very little to:
- Keep up with the literature (7-8%) or
- Personal interest (2-4%) (These figures are from over 3500 student responses, both undergraduate and post graduate).

Another explicit value we ask about is how the reading helped or did not help with the purpose of reading. In order of frequency, article readings help readers in many ways to accomplish their tasks including:

- Inspired new thinking/ideas (33%)
- Improved results (25%)

- Changed focus (17%)
- Resolved technical problems ( 7%)
- Saved time ( 6%)
- Faster completion ( 4%)
- Collaboration ( 3%)
- Wasted my time ( .6%)

Clearly, scholarly articles have many explicit values to readers, many of which have not been quantified or even collected. The best way to gather these data is by interview or surveys. We prefer the critical incident technique so we can get information at the individual reading level. Another method to get the outcomes and value of readings is to trace “downstream” effects, or how the increase in the library’s e-journal collections has influenced the increase in authorship and grant proposal writing in the university. Cause and effect may be difficult to demonstrate without the use of surveys to allow authors to directly attribute their productivity to the library collection.

Explicit values can also be qualitatively measured through stories or open ended comments. For example, some open ended answers from our surveys reveal much about the value of e-collections. These can make compelling arguments, especially to funding agencies.

- *How did we ever get along without electronic journals? (faculty member)*
- *The ability to obtain articles online has made [my work] much more efficient and more thorough. (faculty member)*
- *I use electronic media for 90% of my literature searching. This has been true for 10 years now. (faculty member)*
- *Finding articles online is so much easier and faster than finding articles in dusty journals in musty corners of the library. (student)*
- *I have found electronic journals an invaluable aide as it means I do not have to travel to the Uni[versity] for every little article (which takes AT LEAST 1 hour.) (student)*

Explicit values can be influenced by perceptions. Librarians are no doubt faced with these perceptions when trying to eliminate certain journal titles. Perceptions are

powerful, but must be coupled with actual or reported measures of use to get the whole picture of value.

Implicit values in this context are those values that are implied by answers to other questions, for example those relating to amount of use. We see how often a specific article (or articles from a specific journal title) is downloaded and then equate amount of use with value to the user community (Nicholas and Huntington, 2006). We don't really know that, of course, all downloads may not have been read or they may have been read and dismissed as low quality or not valuable, but we equate higher amounts of use with higher value to readers because it is convenient.

Implicit measures of electronic resources are easier to collect, don't necessarily involve users directly, are easier to quantify, and are particularly valuable for measuring changes over time, such as increased use of e-journals. Showing the increase in overall downloads of articles is a powerful argument for the e-collection.

In our surveys we have several questions that help us derive implicit measures of value. The first of these is time spent reading. If users are willing to spend hours of their time reading scholarly articles, the act of reading can be assumed to have value for them. Faculty members show the value of scholarly articles to them by spending many hours reading. Faculty spend on average ~143-159 hours per year just reading, while Medical faculty spend on average ~168 hours per year just reading.

Contingent valuation—meaning estimating the time or cost of not having a service and comparing that with the time or cost of the service—is another way to measure the value of a library collection. “Contingent Valuation is an economic method used to assess the benefits of non-priced goods and services (e.g., libraries or specific library services) by examining the implication of not having the product or service.” (Aerni and King, 2006.)

Readings from personal subscriptions, library provided journals, or other sources (such as the free web) demonstrates the implicit value of the library collections based on increased use with electronic collections. Sometimes in questionnaires we ask, would you have found the information without the source you used and how long

would it have taken you? This can be compared to actual time to give contingent value.

Another measure is to put explicit and implicit value together. Our studies over time have found that articles that are read for research are more likely to be older than readings for current awareness and that those which come from the library are more likely to be from an electronic journal and rated as of higher value to research.

Journal article reading clearly has many explicit and implicit values to readers and readers are depending on reading from library e-collections more than ever before. It is important to capture those values and to measure use and value to readers in multiple ways, including perceptions, expressions of value, and use that implies value in order to see the benefits that accrue from the library investment in e-resources.

### **Increase in Interdisciplinary Reading**

Electronic journal collections are allowing researchers to identify and read more articles. Does the convenience and depth of e-collections lead to more important differences in how scholarship is conducted? It is difficult to tell, but one thing we can hypothesize is that there may be more interdisciplinary reading due to availability of e collections, both from the library and from free Internet search engines than from print or personal sources.

The number of sources on average from which a reader reads at least one article steadily increased in our surveys throughout the 1990s and early 2000s. Although reading remains highly skewed (many readings in a few journal titles), readers read at least one article from just 13 journal titles in 1977, from 18 journal titles in 1995, and up to 23 journal titles in 2003 (the most current year for which we have data on this question.)

In a 2007 nationwide survey of academics in Finland, respondents were asked to self-identify as low, medium or high interdisciplinary readers. Some significant differences in patterns of readers were statistically significant among these groupings. Highly interdisciplinary readers are slightly more likely to find e-articles by following

citation links, value scientific monographs and conference proceedings more than others and textbooks less, and are more likely to be older than 36.

Individual readings in our U.S. surveys were coded as within discipline readings or interdisciplinary readings by comparing the subject discipline of the reader with the topic or journal of their last reading. For the most part there were few differences in the value or reading patterns associated with whether the reading was within or interdisciplinary. Some differences are evident, however.

The results show that interdisciplinary reading is more likely in electronic format than within discipline reading. This coincides with the idea that electronic journals increase interdisciplinary reading. In addition, the final form of reading is significantly more likely to be on screen for interdisciplinary readings, while in discipline readings are more likely to be in print or printed out.

**Table 1. Source of Last Intra- or Inter-Discipline Reading**

$\chi^2 = 7.484, p = 0.024$

Discipline reading	Source of last article			Total
	Print	Electronic	Other	
intra-discipline	359	388	1	748
	48.0%	51.9%	.1%	100.0%
inter-discipline	59	103	0	162
	36.4%	63.6%	.0%	100.0%
Total	418	491	1	910
	45.9%	54.0%	.1%	100.0%

**Table 2. Form of Last Intra- or Inter-Discipline Article**

$\chi^2 = 14.476, p = 0.013$

Discipline reading	Format of Last Article						Total
	Print article in a print journal	Photocopy	Facsimile copy	Online computer screen	Previously downloaded and read on computer screen	Downloaded & printed on paper	
Intra-discipline	260	60	1	84	32	310	747
	34.8%	8.0%	.1%	11.2%	4.3%	41.5%	100%
Inter-discipline	40	10	1	30	12	69	162
	24.7%	6.2%	.6%	18.5%	7.4%	42.6%	100%
Column Total	300	70	2	114	44	379	909
	33.0%	7.7%	.2%	12.5%	4.8%	41.7%	100%

Interdisciplinary readings are more likely to come from a library source and, not surprisingly, less likely to come from personal subscriptions. This result is expected, since scholars are more likely to subscribe to journals in their own research field, but as the number of personal subscriptions has gone down steadily over the last three

decades, it demonstrates the growing importance of library journal collections on interdisciplinary scholarship.

**Table 3. Article Source for Intra- and Inter-Discipline Readings**

$\chi^2 = 7.367, p = 0.025$

Discipline reading	Article source			Total
	Library Source	Personal Source	Others	
intra-discipline	375 50.1%	231 30.9%	142 19.0%	748 100.0%
inter-discipline	91 56.2%	33 20.4%	38 23.5%	162 100.0%
Total	466 51.2%	264 29.0%	180 19.8%	910 100.0%

When participants were asked if the source of their reading had not been available would they get the information from another source, a greater percentage of readers of interdisciplinary articles said they would not bother to get the article at all if it were not readily available from the first choice source.

**Table 4. Would Readers Get the Information if Original Source were Not Available**

$\chi^2 = 3.198, p = 0.074$

Discipline reading	When original source were not available...		Total
	I would not bother getting the information	I would obtain the information from another source	
intra-discipline	126 16.9%	620 83.1%	746 100.0%
inter-discipline	37 22.8%	125 77.2%	162 100.0%
Total	163 18.0%	745 82.0%	908 100.0%

A majority of both inter-discipline and within discipline readings are done with great care or attention to main points, rather than to “just get the idea”. This shows that most of the readings our participants recall are relatively serious. However, interdisciplinary readings are slightly more likely to be read with greater care than within discipline readings. This might be because interdisciplinary readings need the reader to be more involved to understand it. However, and in seeming contradiction to the care of reading, average time spent on a within discipline reading is slightly longer than the average time spent on an interdisciplinary reading.

Within discipline reading is significantly more likely to come from browsing than searching, while interdisciplinary reading is more likely to come from searching and other ways (such as citation linking) than browsing. Using citation linking to find interdisciplinary articles is likely to increase, as respondents indicated they are more likely to cite an interdisciplinary reading than a within discipline reading.

## **Conclusions**

Both explicit and implicit values of library e-journal collections for readers are evident. Readers report an increase in reading, mostly due to library e-journal collections, and log files support that conclusion. Readers in surveys report many valuable outcomes from these readings and value can also be implied by the continued dedication of their time to reading scholarly literature. Both faculty and students read for many reasons and they report that as a result of these readings, the outcome of the purpose of reading is improved.

E-journal collections have also provided a way for readers to locate more interdisciplinary articles, which they are reading and citing in their work. In this way library e-journal collections are assisting with the changing nature of scholarship and are allowing researchers to find materials they would not have otherwise found.

Continued demonstration of the value of library journal collections should include multiple methods of both explicit and implicit values and outcomes of readings. Knowing how journal readings from library e-collections are used in scholars’ ongoing research, teaching, and writing will show the contribution of the library collection that goes deeper than just the number of downloads or readings.

For more information see:

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