The Use and Value of Scholarly Journals

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Abstract

This paper summarizes results of 13,591 readership survey responses of scientists and reviews of hundreds of other readership studies reported in a recent book: *Towards Electronic Journals: Realities for Scientists, Librarians, and Publishers* (Tenopir & King, 2000). In particular, survey results reveal amounts and trends of reading and information-seeking patterns, such as how readers identify articles that are read and where they obtain them. The survey results also demonstrate the usefulness and value of scientific scholarly journals. Past results suggest that electronic journals and digital full-text databases will play a major role in the future of scientific scholarly journals, but not necessarily in the way predicted by many.

SCIENTIFIC SCHOLARLY JOURNAL READERSHIP DEFINED

For the purpose of this paper we define reading as going beyond the table of contents, title and abstract to the body of an article. Unfortunately, there is some confusion in the literature concerning reading and use (King & Tenopir, in press). Even reading itself is used in different ways. For example, some studies provide survey respondents with a list of recently published articles and ask them to indicate which articles they have read. This provides an estimate of the number of times an article is read (and proportion of articles read in a journal), although the estimate is less than the true number since the estimates apply only to the population from which the sample is drawn. It does not include reading beyond the date of the observations, and it does not include many readings from separate copies of articles. Furthermore, information read by one person is often passed on to others, which adds to the value of journal articles. Over the years, King Research and the University of Tennessee performed a series of studies in which scientists, as part of larger studies, were surveyed and asked how many scholarly articles they read in the past month. We received a total of 13,591 responses to this question. This response differs in two ways from the one that estimates the number of times an article is read. First, a particular article can be read multiple times and each time would be included as a "reading." Secondly, this observation provides an estimate of the average number of readings (not articles read) per scientist and, therefore, the total number of readings of all persons in the population sampled. By knowing the number of articles published over time and the age of articles read, one can also roughly estimate the average number of article readings per article.

Journal or article "use" is often confused with "reading." Journal "use" is the object of three types of studies. One type of study determines sources of information used to solve problems, make decisions and so on. Typically, these studies estimate the proportion of times journals and other sources (e.g., discussion, technical reports) are used to solve problems, and so on. While useful to establish relative use, these studies shed little light on amounts of reading per article or per person. A second type of study involves use of journals in libraries. These studies are often done to see if the amount of "use" is sufficient to warrant purchase of a journal or, instead, if the libraries should rely on interlibrary loan or document delivery. These observations are often made by asking users to not reshelve an issue or bound copy that they have used. The library then counts the number of such items shelved. One can established a breakeven point in amount of "use" at which a journal should be purchased and below which separate copies should be obtained. Unfortunately, items reshelved implies that only one article is read, when in fact all articles read should be compared, since, if the journal is cancelled, all needed articles would be requested by the user. Another kind of "use" involves electronic journals and digital full-text databases. These observations are usually of "hits" and/or number of items downloaded. While useful indicators, they do not provide accurate estimates of either the amount to which articles are read or the amount of readings.

READERSHIP OF SCHOLARLY JOURNALS

Based on estimated total number of readings by scientists and total number of articles published, we estimate the number of readings per article to be about 900 readings and, since there is an average of 123 articles per journal title, there are about 110,000 total readings per journal. We estimate that there are about 13 readings by scientists from their personal subscriptions. From a 1977 national survey of scientists and journal tracking study, King Research estimated that the readings per article was 638. Garvey and Griffith reported a median of 200 readings of psychology articles (1971) and an average of 520 readings of these articles based on asking respondents which articles they read from a list of recently published articles. Using this method, Machlup and Leeson (1978) estimated an average of 1,240 readings per article from eight economics journals and a similar survey yielded an estimate of 1,800 readings per article from the *Journal of the National Cancer Institute*, or 756,000 readings of 12 issues (King, McDonald, & Roderer, 1981). Thus, there is consistent evidence that scientific scholarly journals are well read.

The amount of scholarly journal reading by scientists is estimated to be about 120 readings per scientist per year. This amount appears to be increasing slightly. National surveys of scientists in 1977 and 1984 showed averages of 102 and 114 readings respectively. While scientists in universities read scholarly articles over 70 percent more frequently than scientists working elsewhere, the non-university scientists are found to have more total readings because there are far more of them. In fact only about 30 percent of all readings are by academicians. This is particularly true in the physical and life sciences.

USEFULNESS AND VALUE OF SCHOLARLY JOURNALS

Scholarly journals have historically been shown to be read for a variety of purposes (King & Tenopir, in press). Generally, however, purposes of reading are to keep updated, research, teaching and other reasons such as preparing proposals. Most reading takes place within the first year following publication (about two-thirds of readings). This reading is done primarily to keep updated in one's discipline. More of this reading is for teaching purposes than research. However, the age of articles read slowly decreases over time. In fact, about five percent of readings are of articles over 15 years old, and most of these readings are for research purposes. Information found in journal articles are found to be important for the purposes above (through ratings of importance) and they tend to be more important as the age of articles increase.

Machlup (1979) indicated that there are two types of value of information: the purchase value and the use value. The purchase value is what readers are willing to pay for information in terms of money exchanged (e.g., the purchase price of a subscription) and the time (and effort) paid in obtaining and reading the information. The use value is the consequences of using the information. The purchase value is estimated to be at least $50 per reading when readers' time is included and the readers' time tends to be about five to ten times the price paid in purchasing journals and separate copies of articles.

A number of studies dating back to the 1950s have shown ways in journal information has been beneficial (King & Tenopir, in press). Generally, these studies show that information read improves quality of research and teaching, as well as doing work faster and at lower cost in time or money. Several studies, done in different ways, also show that amount of reading is correlated with productivity. Another indicator of use value is that scientists whose work has been formally recognized tend to read more than others. This finding has been replicated many times dating back to the 1960s. While some have questioned scholarly journals, they have been repeatedly shown to be extensively read, extremely useful, and of great value.

INFORMATION SEEKING PATTERNS

Articles that are read are identified in a variety of ways. The principal method is browsing through recently published copies of journals and this has held true for at least the last 30 years. Other methods (ranging from 12% to 6% of readings) are, in order, automated searches, from other persons, citations in publications, and other means such as current awareness services, printed indexes, and so on. In 1977 citations and printed indexes were a more prevalent means of identification, but automated searches accounted for only one percent of article readings. Few

older articles are found by browsing, with citations used about one-third of the time and automated searches, other persons and other means used about equally.

The sources of articles read have changed dramatically over the years. In 1977, 68 percent of readings were from personal subscriptions, but now only 27 percent are from this source. The reason for this is that price increases have resulted in the average number of personal subscriptions dropping from 5.8 subscriptions per scientist to 2.7 subscriptions. Nearly all of these readings have shifted to library provided journals. That is, in 1977 the proportion of readings from libraries was 15 percent, but this has risen to 55 percent in recent years. The amount of reading from separate copies of articles has remained about the same over this period. Currently about ten percent of readings are from online sources, but it is not known if these are from subscriptions or separate copies.

There has been a substantial flow of separate copies of articles over the years. In 1977 scientists are estimated to have received 38 million copies of articles in the form of preprints (2 million), reprints (27 million), and photocopies provided to readers by interlibrary loan (4 million), colleagues (3.5 million), and authors (1.5 million). In 1984 the total was estimated to be 47 million and it is thought to be well over 100 million currently. The distribution of scientific articles through interlibrary loan and document delivery has increased from 4 million in 1977 to nearly 45 million currently. Availability of separate copies of articles is an essential aspect of the scholarly journal system because it provides economic stability through a relatively inexpensive alternative to journal subscriptions.

IMPLICATIONS FOR THE FUTURE

Several implications for future electronic journals and digital full-text article databases are as follows:

- Scientific scholarly journals are well read, useful and valuable and, therefore, must be tampered with carefully to avoid damaging this important communication channel.
- Future systems must continue to provide adequate browsing capabilities.
- Future systems must continue to provide high quality searching tools.
- Older articles must be archived and continue to be provided in an accessible manner.
- Scientists' time is a critical factor in choosing among alternative sources of information and must be carefully considered in the future.
- Reading and information seeking patterns vary considerably among readers and, therefore alternative media may continue to be necessary.

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