How Scientists Use Journals: Electronic and Print

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For several years, Carol Tenopir and Donald W King have been collecting and analyzing comprehensive, detailed data on the professional reading patterns of scientists. Their findings have been published in, among other places, a recent book, *Towards Electronic Journals: Realities for Scientists, Librarians, and Publishers* (Washington, DC: Special Libraries Association, 2000). Their database contains information from about 15,000 scientists in all fields (including the social sciences) working in university and nonuniversity settings. In this CSE session, Tenopir and King summarized the information as a series of "lessons" learned about scientists' reading habits.

Lesson 1 was that more scientists means more literature and more options. Although the number of journal titles and the number of pages per journal article are decreasing, the number of articles per journal has doubled since the 1970s. Journal articles also have more authors than previously.

The second lesson was that despite some opinions to the contrary, scientists read a lot. Moreover, a surprising 70% of all reading by scientists is done by scientists who are not academicians. Citation counts greatly underestimate the number of articles read by scientists. In surveys, Tenopir and King found that university medical faculty members read more articles than chemists, physicists, astronomers, or engineers, but they spend substantially less time in reading each article (22 minutes compared with, for example, 81 minutes for engineers). That reflects the physicians' habit of reading many articles to keep up with the literature and the engineers' habit of studying a few selected articles in depth.

Another lesson was that the information in journal articles is essential for scientists. About 50% of pieces read contain something new to the reader, and scientists feel that reading articles increases their productivity and the quality and timeliness of their work. Most scientists consider journals either the most important or the second most important resource they consult. Interestingly, older articles tend to be more valuable to a scientist's work, and more than 35% of pieces read are articles more than a year old.

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Tenopir and King also found that scientist-readers are price-sensitive. The increase in the price of subscriptions to scientific journals since the 1970s has been accompanied by a dramatic decline in the average number of personal subscriptions to such journals, with an estimated total loss of revenue to publishers of about $1 billion. Scientists are increasing their use of sources of "separate copies" of articles—libraries, department collections, electronic journals with links, and electronic print servers—although they do not do much reading directly on the screen; instead, they download and print about 80% of the articles they acquire online. The total number of separate copies of articles received by scientists has increased from about 43 million in 1977 to more than 100 million today. Scientists read separate copies of articles from an increasing number of journals each year, but half those journals are read from fewer than five times. However, scientists do read a large number of articles in the two to six core journals in their fields.

According to Tenopir and King, scientists use electronic databases and journals when they are convenient, familiar, and respected and do not have higher financial or time costs than print resources. A strong, linked database increases use of journal articles; an example is PubMed, in which 500,000 to more than 1 million searches are done each day. Tenopir and King concluded that for the near future, print and electronic sources will probably be used in combination.

During the postpresentation discussion, one audience member mentioned the online Manchester Information & Associated Services at the University of Manchester (*www.superjournal.ac.uk*) as an example of a multimedia electronic resource for researchers. The number of currently active journals was also discussed and estimated to be about 14,000 to 17,000. In response to a question, Tenopir and King said that they will soon prepare an analysis of the ratio of number of hits to number of downloads of articles available electronically.