

Technology and Quality in Educational Scholarly Communication

Kate Corby

ABSTRACT. The move to electronic forms of communication has changed the way educational research is communicated. In particular, it has led to an increased reliance on journals. This change has been more precipitous than one might expect. As journals become a larger proportion of the body of current scholarship, authors and readers seek new methods of determining and communicating journal quality. Methods that have worked for researchers in the sciences are not directly transferable to the education discipline. This paper examines existing tools and looks for new methods of assessing quality in journal publishing. This article was developed from a paper presented at the Society for Information Technology in Teacher Education (SITE) conference in Spring 2007.

KEYWORDS. communication, research, journal quality, citation indexes, scholarship

Technology has transformed the way information is accessed and transferred. For personal communications there are blogs, wikis, and instant messaging. Software like Blackboard or Angel, and techniques-like podcasting—impact the way instructors interact with classes. It is useful to

Kate Corby is Reference Librarian/Education and Psychology Bibliographer, Michigan State University Libraries, 100 Library, East Lansing, MI 48824-1048.

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consider to what extent these new venues of communication change professional assessments of the value and quality of educational information. Instructors have always endeavored to lead students to high quality information, often recommending specific journals or the work of individual researchers. For research assignments, where students are expected to explore a particular topic and produce a synthesis product, the types of materials recommended as high quality sources of information is evolving. Libraries note such changes, to the extent that they impact collections use and materials selection budgets, but teaching faculty may be less aware of the broader impact. The process of doing a literature review is vastly different than it was twenty to thirty years ago. There is an increased focus on journal literature, and a concomitant interest in evaluating the quality of journal publications. Education as a field is not alone in this—these changes have happened in most academic disciplines to some degree. This paper is an attempt to assess the extent and impact of literature format changes in the field of education: first, an examination of how the presentation of educational information in published form has changed, by looking at the instructions given to students for conducting a literature review and via a quick overview of the publishing record, second, through a discussion of how these new emphases have led to new demands on the ability to assess quality.

CHANGES IN TEACHING ABOUT LIBRARY USE

Books of advice about library research aimed at college students have long been a popular mainstay on college campuses. In 1969, Brogan and Buck published *Using Libraries Effectively*. The book was aimed at the “post secondary” audience and suggested researchers use the card catalog to find books on their subject. The next step in finding materials would be bibliographies, which might be found at the end of encyclopedia articles, in one’s textbook, or in other specialized reference books. In chapter seven (of twelve) the authors suggest using indexes to articles, but discuss only the *Readers’ Guide to Periodical Literature* in any depth. The *Readers’ Guide* is an index to popular magazines. They mention in passing the other specialized indexes of the day, such as H. W. Wilson publications *Education Index* and *Social Science and Humanities Index*. Not until chapter 10, in a discussion of Reference Guides to Special Subjects do the authors mention such specialized resources as *Psychological Abstracts*. Almost 15 years later, in 1983, in the fifth edition of the classic *Guide to the Use of Li-*

braries and Information Sources, Jean Key Gates continues the focus on the book by devoting the first eight chapters to discussing its role in library research. Chapter nine is devoted to indexes and here again the emphasis is on the Wilson indexes, but not exclusively the *Readers' Guide*. There is no mention of abstracting services, which are relegated to a section near the end of the book dealing with resources in special subject areas. By contrast, the 2005 edition of the *Oxford Guide to Library Research*, while it offers a couple of chapters on books, gets quite promptly and thoroughly into discovery of journal articles. It discusses the various vendors of indexing systems, has entire chapters on keyword searching and Boolean searching, and devotes a pair of chapters to citation and related record searching.

In the discipline of education, where the ERIC system highlighted gray literature and began bringing journal article abstracts to its *Current Index to Journals in Education* in 1969, journals and journal indexes were more prominent in the research guides, but books were still a clear focus. In 1975, Dorothea Berry wrote a short tome called *A Bibliographic Guide to Educational Research*. In it she directed researchers first to the library catalog—she spent 8 pages discussing how to fully utilize the information on the 3x5 catalog cards. Next there was a chapter on subject bibliographies, and then one on indexes. That was followed by a discussion of abstracting services. In 1989, Lois Buttlar wrote *Education: A Guide to Reference and Information Sources*, and organized the book by subject area within the discipline. The suggestions started with bibliographies, but indexes and abstracts to the journal literature were the next group of resources covered. In 2000, Nancy O'Brien updated Buttlar's work. There are hardly any bibliographies (literally only two titles) in the book. Indexes and abstracts continue to play an important role; new to this edition is a section in most of the chapters on World Wide Web or Internet sources.

The progressively increasing importance of journal and online resources will not surprise many, but the extent to which books were central to research in the fairly recent past may be a surprise. The publishing record bears out the picture of transformation.

BOOK PUBLISHING RELATIVE TO JOURNAL PUBLISHING

In the field of education, books are decreasing in importance. WorldCat lists almost 22,000 English language records for books about some aspect of education in 1995. In 2005 there were about 13,000, not quite halved but a sharp decline in 10 years. Figures for other disciplines

TABLE 1. WorldCat Data on Book Cataloging

	Education books	Physics books	Psychology Books
1995	21,937	2,616	9,868
2005	13,212	1,689	10,608
Difference	-8,725 or -40%	-927 or -35%	+740 or +7%

TABLE 2. Ulrich's Data on Journal Publishing

	Education Journals	Refereed in Education	Percent Refereed	Physics Journals	Refereed in Physics	Percent Refereed
Current data	7,930	1,298	16%	1,891	697	37%
39 th /2001	6,720	828	13%	1404	432	31%
28 th /1989-90	4,050					

are included simply to show that the changes are not uniform across disciplines.

The rise in journal importance was not simply a result of decreases in book publishing. Throughout the period when new communication tools were increasing in popularity, journal publishing increased. *Ulrich's International Periodicals Directory* and its online equivalent UlrichsWeb.com provide data to investigate journal publishing levels in recent years. This series lists journals by subject. Of course, different disciplines have different patterns of publication. There are currently about 8,000 active journals in the education subjects. Just over one thousand titles, or about sixteen percent, are listed as being refereed. As a comparison, physics has about two thousand active journals, nearly seven hundred of which, or thirty-seven percent, are refereed.

The practitioner interest in the field of education is reflected in the journal publication profile. A check of the Directory of Open Access

Journals (DOAJ) for these two disciplines revealed that the number of journals listed there (177 in education and 39 in Physics) worked out to about 2% of the total in both. It is difficult to draw comparisons across time using *Ulrichweb*; the online version is merely a current listing. Earlier printed volumes provide earlier figures to estimate the number of entries. There were about 4,000 education journals in the 1989/1990 volumes of Ulrich's and 6,700 titles listed in 2001. Clearly the trend is for an increasing number of journals being published.

Why go to so much trouble to document what has become conventional wisdom? The numbers document an unexpected diversity between disciplines and a great deal of intra-disciplinary change in a relatively short time-frame. A reliance on journals changes the quality equation—that is, when books were the primary source of information, recommendations in bibliographies and encyclopedia articles served as a means of explicitly designating quality. A student could feel confident using items listed in such sources. Today these listings are viewed as being neither timely nor specific enough to be of support to research.

DETERMINANTS OF JOURNAL QUALITY

What is a quality journal? As journal literature has become a more important part of the literature review, peer review has been the most easily identified standard. How does an instructor communicate to students what to look for—and how to identify high quality information? In an era when most journals are available online, telling them to look for a 'non-glossy publication without much advertising' doesn't work anymore. In the days when books were the basis of research, instructors relied on the disciplinary indexes, like *Education Index* or *Social Sciences Index* to give citations to reputable or recommended journals. These indexes cover only high quality—though not necessarily only peer-reviewed-publications. Their use was meant to supply a limited number of journal resources to supplement the core reference list of books. Today, many of the readily available indexes are a hodgepodge of everything from newsletters to top tier journals. Often these new products try to bring order to the chaos by labeling everything: this tab for newspapers, that one for peer-reviewed journals. Although imperfect, the labels help some students choose appropriate sources. As the demand for peer-reviewed items has grown, the discipline-specific indexes—such as *ERIC*, *PsycINFO*, etc. and other databases—(depending in part on the database provider) are increasingly likely to label their sources. When

journals were not such a central resource for earlier generations of researchers, being able to quickly identify peer review status was not as crucial. As indicated by the guides mentioned above, citations from the *Readers' Guide*, which would have included popular magazines from *Newsweek* to the *New Yorker*, were considered acceptable articles to supplement books for undergraduates. Now even freshman writing projects often stipulate the use of articles from peer-reviewed journals.

As an aside, the problem of appropriate sources is compounded for online courses, which add access issues into the mix. The increased amount of electronic subscription content available can be both a blessing and a curse. On the plus side, it makes it easier to assign a broad spectrum of readings to online students. But many faculty members are reluctant to take on the role of technology guru as well as instructor. It is tempting to load up courses with readings but also to avoid assigning actual library research projects to students, due to a fear of technical questions or access problems. Even when student investigation is required, instructors sometimes chose to sacrifice some aspect of quality to minimize access problems. I know of graduate level courses where students are being instructed to find articles in JSTOR (thus sacrificing currency) or WilsonSelectPlus (sacrificing depth) for their "research." With so many sources of information at their disposal, students require expert guidance in which ones to choose. These resources, while they supply ready links to the results generated, are not the quality indexes education students need to know about; certainly, at the graduate level, using indexes whose goal is to cover the field being researched in depth should be a basic criterion.

Labeled results, or using only full text databases, can be helpful for the freshman students doing papers, but do little for the grad student or new professional seeking places to submit papers (with the long-term intention to impress promotion and tenure committees a few years later). How do scholars learn to identify appropriate journals for their submissions? Where can they find this type of information?

A LIBRARIAN'S PERSONAL VIGNETTE

A few weeks ago a doctoral student asked me for a "listing of the Tier I and Tier II journals in education." I explained that while we talk about such categories there is no formal listing. I offered her the O'Brien book mentioned above, which does a good job of listing top journals. I pointed out the Cabell directories, which attempt to list data like accep-

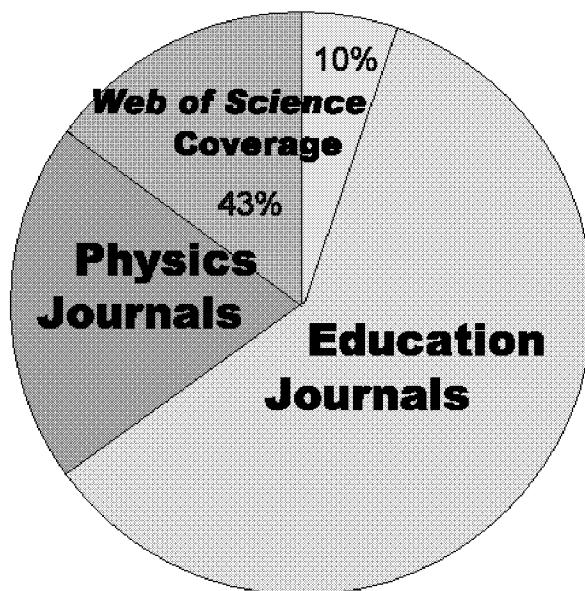
tance rates. I also pointed to several university departmental Web pages, listing this for their tenure track faculty. We talked about the limitations, particularly for education researchers, of the ISI Citation Indexes and their calculation of an impact factor. She was pretty indignant: “How could universities require publication in top tier journals if that is not an identifiable thing?” She has a point. We allocate a good deal of importance to publication record while asserting that quality is a matter of judgment. Some might argue it is professional consensus, but if so, it is an unspoken consensus. Reputation or prestige has become increasingly elusive, not only because of the growing number of journals, but also because the community of scholars has diversified around the globe.

BEYOND PEER REVIEW: CITATION COUNTS

Getting current publishing figures from WorldCat or UlrichsWeb.com was as easy as doing a quick search; the availability of online information makes quantifying the answer to questions of quality increasingly possible. Citation counts are one area that may become more important for education. For many years the best and nearly the only source of citation counts was the ISI product now called *Web of Science*. The *Social Sciences Citation Index* portion of that product covers education, but not well. In 2005 it covered 124 education journals; compare that to the *Science Citation Index*'s coverage of 297 physics journals. Remember—there are currently 1,298 peer reviewed education journals being published and only 697 such journals in physics.

In other words, the ISI citation indexes are covering less than ten percent of the journals in education, but almost forty three percent of physics journals. Perhaps as a result of this poor coverage, citation counts and impact factors did not become as central to the definition of “quality” in the field of education as they have in some of the sciences. In part, this is because journal publication has not been the exclusive mode of publication (education relies more on reports, conference proceedings, and other publications than does physics) but also this reflects the relatively poorer job that ISI has done in covering the field. Now citation indexing, as provided by Google Scholar, shows promise of covering the social sciences, including education, in greater depth than ISI has provided. Below are citation counts for nine articles from each of five different leading education journals, using three articles each from volumes for 1998, 2002 and 2004. While not a thorough comparison, it does give a sense of the relative strength of the two resources. Google

TABLE 3. ISI Web of Science Citation Indexing Coverage



Scholar is doing a significantly better job. For most of the journals, ISI had slightly less than half of the citations Google found. Two caveats: first, citation counts are not impact factors¹; they indicate quality at the article level, not the journal level. Google is not yet aggregating data on journals.² Second, the Google product is pulling in citations wherever it finds them, while ISI pulls them in only from printed, peer-reviewed journals, but education as a field has never relied solely on journals. In an era of expanding publication platforms, the ISI reliance on refereed print journals becomes less defensible.

BEYOND PEER REVIEW: USE STATISTICS

Another yardstick of quality that is becoming more important is use. Certainly citation counts have a similar basis but in an impatient, fast-moving era, why wait years for citations to appear when use counts are increasingly both readily available and arguably valid, at least at the institutional level? As journals become an online resource available via

TABLE 4. ISI/Google Scholar Comparison

Journal	ISI Citations	Google Scholar	Difference	ISI citations as a percentage of Google's
	3 articles in 9 issues 1998-2004	citations same articles		
Journal of the Learning Sciences	209	611	402	34%
Review of Educational Research	238	505	267	47%
Learning and Instruction	129	281	152	46%
American Educational Research Journal	292	695	403	42%
Sociology of Education	158	225	67	70%

institutional subscription, they present another way to quantify quality. Once again, the mechanical ability to count online activity provides both the basic information of use, and aggregates journal importance in a profile customized to the institutional subscriber. The much-discussed tendency of citation counting to favor less specialized journals can be overcome by use statistics that will reflect the institution's emphases. How can this be valid? Studies show that researchers are relying on institutional subscriptions to an ever-greater degree. Carol Tenopir and Donald King have been studying reading patterns in academe for thirty years. Their most recent study of faculty and students found that people are reading more and faster. Tenopir says:

We first started noticing a strange phenomenon in the mid-1990s, where the growth rate of articles read and growth rate of total time spent reading that had pretty much followed each other proportionately, began to diverge. More reading on average was occurring, but the total time spent reading was not increasing as much as

would be expected. Reading now is much more likely to be skimming or scanning, as subject experts are reading more, but spending less time per reading. (Tenopir, 2006a, p.3)

Where are readers getting this increased reading material? In another paper Tenopir notes: "The number of articles that they report reading has gone steadily up as e-journal collections grow. Over half of all article readings by faculty and up to three-quarters of readings by students are now from library e-collections. This willingness and need to read many articles is one measure of the value of e-collections" (Tenopir, 2006b).

So far, use statistics for mainstream commercial journals are only reflective of use at a particular institution and are probably only seen by librarians unless there is a need to evaluate subscriptions. "Born digital" journals, which have had to fight for respect, are not always so reticent to tout their use. Many have counters or other similar indicators of the popularity of their articles posted on their Web pages.

ARE USE STATISTICS A RELIABLE MEASURE OF QUALITY?

Most established researchers view journal quality as a balance between editorial reputation, history of publishing highly useful articles, and perhaps the publisher, particularly if published by a scholarly association. Their assessments of particular titles develop over time. The suggestion that raw use numbers, especially those collected as online hits, indicate quality, may border on the offensive. Newer scholars do not yet have the same level of experience, a "personal history" with a variety of publications to use as a basis of judgment. They are understandably reluctant to be completely reliant on the word of advisors. Unless one wishes to argue that scholars do not try to use high quality material, separating quality and use is difficult. Although the concept of high use as a basis of determination of quality is uncomfortable at the individual level, it is less problematic in the aggregate. For individual institutions, a particularly troublesome point may be the extent to which availability drives use. One recent article shows that at the institutional level use (as measured by library holdings statistics) correlates more closely with local citation counts than with the ISI impact factor (Duy & Vaughan, 2006). When institutional holdings change significantly, local citation counts (what that institution's faculty actually use and cite) change to reflect holdings (Taylor 2007).

Technological change will put some traditional measures of quality on the wane. As more journals dispense with paper publication and become online-only products, acceptance rates will decline in importance. Without the page limits of print, editors can publish every acceptable article. There will certainly be an incentive for them to do so, since the more activity a site attracts, the more likely its use, citation counts, and importance will rise. One could argue that high use, at least immediately after publication, can also mean the article is controversial, and this would need to be factored into use statistics. The same phenomenon would also impact citation counts.

Publishers seem to be reacting to the increased importance of use levels. Scholars have documented how some journals in the sciences changed their article mix in ways meant to enhance their impact factor (Cameron, 2005). Now some commercial publishers are changing their online presence in ways that will enhance their journals' use levels. Many publishers signed with aggregators when ejournals first became popular. ProQuest, EBSCO and to a lesser extent other vendors made their reputations by providing not just indexing—in fact one could argue that their indexing is generally inferior to that found in discipline-specific databases—but the full text of the journals they were indexing. Now many commercial publishers are pulling their content out of the aggregator databases and providing unique interfaces to their journals. By providing an interface that searches only their journals, they vie to keep users within their product line. Many work to pull in other content to make their sites attractive and keep users from going elsewhere. The recent agreement between Sage Publications and the American Educational Research Association to publish the Association's journals is an example.

GLOBAL QUALITY MEASURES ON THE HORIZON

The increasing importance of research voices from around the globe is a factor that will impact how quality is defined. The twentieth century publishing model tended to keep journal prices high and quality synonymous with exclusivity. The increasing trend toward open access will bring in new voices from other parts of the world. John Willinsky is one prominent voice on this front. Willinsky's book *The Access Principle* (2005) is available online. His ideas about quality are rather compellingly intertwined with social justice issues. Willinsky believes firmly in value as indicated by use. Citation counts can be one measure, but he

sees them as rather passé. If an item does not reach a large audience, how can it be valuable? He feels that scholarship can only impact society if it is read and used. So he speaks out against high priced journals and restrictive copyright agreements. In theory, if we put it all up on the Web, in open access journal articles or institutional repositories—it will be found, and not just by researchers at the high prestige and well-funded institutions, but by researchers all over the world.

I believe it is inevitable that use will be an increasingly important indicator of journal quality. Willinsky's analysis of the economics of publishing have convinced me that our current system of high profit commercial publication needs reform and that open access is an important component of that reform. It remains to be seen whether the system of peer-reviewed journals will adapt to meet changing needs or be superseded by a new model.

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NOTES

1. Impact factor is defined as the average number of times articles from the journal published in the past two years have been cited in the given year. The impact factor is calculated by dividing the number of citations in a year by the total number of articles published in the two previous years. An impact factor of 1.0 means that, *on average*, the articles published one or two years ago have been cited once in the time period.

2. Publish or Perish at <http://www.harzing.com/resources.htm#pop.htm> offers free software that will do personal or journal level citation analysis from Google Scholar. It is not yet particularly easy to use—even by citation analysis standards—but shows that such capabilities are imminent, not in the distant future.

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