

Technology and Quality in Educational Scholarly Communication

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.

Technology has transformed the way information is accessed and transferred. For personal communications there are blogs, wikis, and instant messaging. New software—like Blackboard or Angel, and podcasting—impacts the way instructors interact with classes. It is useful to 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 by recommending specific journals or 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 impact. The process of doing a literature review is vastly different than it was 20 to 30 years ago. There is an increased focus on journal literature, and a concomitant interest in evaluating the quality of journal publications. Education is not alone, 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 through a look at how the presentation of educational information in published form has changed, both by looking at the instructions given to students for conducting a literature review and via a quick overview of the publishing record. This is followed by 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 Libraries 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 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 came 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 journal literature were the next group of resources covered. In 2003 Nancy O'Brien updated Buttlar's work. There are now hardly any bibliographies (literally only 2 titles) in the book. Indexes and Abstracts continue to play an important role and new to this edition is a section in most chapters on World Wide Web and Internet Sources.

This 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 are included simply to show that the changes are not uniform across 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%

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. There are currently about 8,000 active journals in the education subjects. Just over 1,000, or about 16% are listed as being refereed. Different disciplines have different patterns of publication. As a comparison, Physics has about 2,000 active journals, nearly 700 or 37% 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 Ulrich's; 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 in 2001. Clearly the trend is for an increasing number of journals being published.

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					

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 intradisciplinary change in relatively short timeframes. A reliance on journals changes the quality equation. 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 an item listed in such sources. Today these listings are viewed as being neither timely nor specific enough.

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—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*. These indexes cover only high quality—though

not necessarily only peer reviewed–publications. Their use was meant to supply a few 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 bring order to the chaos by labeling everything: this tab for newspapers, that one for peer-reviewed journals. Although imperfect the labels help students choose appropriate sources. As the demand for only peer reviewed items has grown; the discipline specific indexes–ERIC, PsycINFO, etc.–are also getting on the labeling bandwagon. Because 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 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 electronic subscription content 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 are reluctant to take on the role of technology guru as well as instructor. It is tempting load up courses with readings but 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 being instructed to find articles in JSTOR (thus sacrificing currency) or WilsonSelectPlus (sacrificing depth) for their “research.” These resources, while they supply ready links to the results generated, are not the quality indexes education students need to know. With so many sources of information at their disposal students require expert guidance in which to choose. Certainly at the graduate level, using indexes whose goal is to cover the field being researched should be a basic criterion.

Labeling results or using only full text databases can be helpful for the freshman doing a paper, but does little for the grad student or new professional looking for a place to

submit a paper that is going to impress a promotion and tenure committee a few years later. How do scholars learn this type of information?

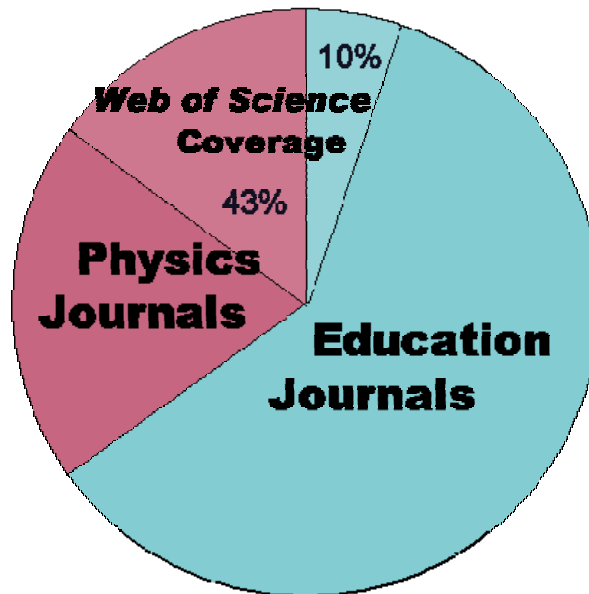
A librarian's personal vignette

A few weeks ago I had a doctoral student ask 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 listings, which try to give data like acceptance rate. I also pointed to several university web pages that make a stab at listing this for their tenure track faculty. We talked about the limitations, particularly for education researchers, of 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 were not an identifiable thing? The woman has a point. We put a good deal of importance on 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

Just as 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, 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.

Table3: ISI Web of Science Citation Indexing Coverage



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. Partly this is because journal publication has not been the exclusive mode of publication 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. 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 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 not the journal level. Google is not yet aggregating data on journals.² Second, Google 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 ever less defensible.

Table 4: ISI/Google Scholar comparison

Journal	ISI Citations 3 articles in 9 issues 1998- 2004	Google Scholar citations same articles	Difference	ISI citations as a percentage of Google's
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%

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 available and arguably valid, at least at the institutional level. As journals become an online resource available via institutional subscription they present another way to quantify quality. Once again the mechanical ability to count online activity provides the basic information, 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 cancel. 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 scholarly association publisher. 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 a personal history with a variety of publications to draw upon. 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 quality determinations 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 names 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 for Sage 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 intertwined with social justice issues rather compellingly. 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? Scholarship can only impact society if it is read and used. So he speaks out against high priced journals and restrictive copyright agreements. If we put it all up on the web, in open access journal articles or institutional repositories – it doesn't much matter how we make things available – it will be found. 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.

Reference List:

- Berry, D. M. (1975). *A bibliographic guide to educational research*. Metuchen, NJ: Scarecrow Press.
- Brogan, G.E. & Buck, J. T. (1969). *Using libraries effectively*. Belmont, CA: Dickenson Publishing.
- Buttler, L. J. (1989). *Education: A guide to reference and information sources*. Englewood, CO: Libraries Unlimited.
- Cabell's directory of publishing opportunities in ...* (several titles available). Beaumont, TX: Cabell Publishing.
- Cameron, B. D. (2005). Trends in the usage of ISI bibliometric data: Uses, abuses, and implications. *portal: Libraries and the academy*, 5(1), 105-125.
- Current index to journals in education*. (1969-2001). Phoenix, AZ : Oryx Press
- DOAJ: Directory of open access journals. (website) (2003 -). Lund, Sweden : Lund University Libraries. Online at <http://www.doaj.org/>
- Duy J. & Vaughan, L. (2006). Can electronic journal usage data replace citation data as a measure of journal use? An empirical examination. *Journal of Academic Librarianship* 32(5). 512-517.
- Education index*. (1929-). New York: H. W. Wilson.
- Gates, J. K. (1983). *Guide to the use of libraries and information sources*. 5th edition. New York: McGraw Hill.

- Mann, T. (2005). *Oxford guide to library research*. 3rd ed. Oxford, New York: Oxford University Press.
- O'Brien, N. P.. (2000). *Education: A guide to reference and information sources*. 2nd ed. Englewood, CO: Libraries Unlimited.
- Psychological abstracts* now PsycINFO (1927-). Washington, D.C.: American Psychological Association.
- Readers' guide to periodical literature*. (1900 –). New York: H. W. Wilson.
- Social science and humanities index*. (1965-1974). New York: H. W. Wilson.
- Taylor, D. (2007) Looking for a link: Comparing faculty citations pre and post ig deals. *Electronic Journal of Academic and Special Librarianship* 8(1). Retrieved April 27, 2007, from http://southernlibrarianship.icaap.org/content/v08n01/taylor_d01.htm
- Tenopir, C. (2006a). How electronic journals are changing scholarly reading patterns. Paper presented at the CONCERT 2006 annual meeting Taipei, Taiwan. Retrieved February 7, 2007 from <http://web.utk.edu/~tenopir/speeches/index.html>.
- Tenopir, C. (2006b). Perception of library value. *Library Journal*, 131(20), 36.
- Ulrich's international periodical directory* now also Ulrichsweb (1932-) New York: Bowker.
- Willinsky, J. (2005). *The access principle*. Cambridge: MIT Press. Available online at <http://mitpress.mit.edu/catalog/item/default.asp?tid=10611&tttype=2>
- WorldCat* Online database from OCLC Firstsearch.

Endnote:

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 one time.

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