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Citation searching for tenure and promotion: an overview of issues and tools

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Citation searching for tenure and promotion: an overview of issues and tools

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Abstract

Purpose – While the primary importance of citation searching continues to be connecting researchers to highly-related literature, additional uses for the data have developed. For example, academic institutions frequently recommend that faculty include a citation analysis in their tenure and promotion (t & p) dossiers as a way of demonstrating the value of their research. Due to the limited number of tools available for this type of analysis in the past, Librarians were unable to help faculty create an exhaustive accounting of citations to their work. The aim of this paper is to provide examples of the growing number of tools that now exist to assist librarians and faculty in locating citation information for t & p dossiers.

Design/methodology/approach – An in-depth survey of both free and subscription resources to identify those that offered options for citation searching was conducted.

Findings – Commercial vendors, organizations and researchers are developing a wide variety of tools that help track the impact of a faculty member's research.

Research limitations/implications – The list of resources surveyed is not comprehensive. The research was focused on those available, and most relevant to the author's institution.

Practical implications – Based on the results of this investigation, a web page was created to help direct faculty and librarians to a large number of resources for citation searching (available at: <http://libresources.wichita.edu/citationsearching>).

Originality/value – Librarians have prepared numerous web guides to assist faculty in conducting citation searches. Few offer links to as wide a variety of resources as this research presents.

Keywords Citation analysis, Bibliometrics, Reference services for faculty, Citation searching, Tenure and promotion

Paper type General review

Introduction

Assisting faculty in the compilation of supporting documentation for tenure and promotion (t & p) dossiers is an annual ritual for many academic librarians. Evidence of research productivity, and the impact of that research on the faculty member's field, is a critical component of the dossier. Librarians help t & p candidates locate information about journals (such as circulation figures, acceptance rates, and impact factors), provide information about the quality and reputation of publishers, and, perhaps most importantly, help them conduct citation searches in major citation indexes such as the *Web of Science* or *SciVerse Scopus*. A citation search provides candidates with bibliometrics, the “statistical analysis of books, articles, or other publications” (Oxford University Press, 2013), that include the number of times other authors cite their publications. In addition, the citation search documents who cites the candidates, and in which publications. In their efforts to provide faculty with high



quality assistance, it is important for librarians to be aware of the burgeoning number of resources available for locating citation data. This paper includes a survey of a broad range of tools that provide this information. The majority of the paper is comprised of tables that list subscription databases, journal packages, electronic book collections, and open access web-based databases useful for finding citation data. The tables include a description of the data-mining methodology for each resource. The paper concludes with a discussion of recently developing impact measures which faculty may want to consider including in their t & p dossiers. Because it is also important for librarians to be aware of some of the concerns surrounding the use of citation data in t & p decisions, the paper begins with a discussion of several important issues related to this practice.

Issues with using citation information for t & p

When Eugene Garfield introduced his idea for a “citation index” that would provide a new type of access to the scientific literature, he envisioned it as an alternative, or supplement, to the subject-based indexes available at the time. In a 1955 article in *Science*, he described his citation index concept as:

[...] a new approach to subject control of the literature of science. By virtue of its different construction, it tends to bring together material that would never be collated by the usual subject indexing. It is best described as an association-of-ideas index, and it gives the reader as much leeway as he requires. Suggestiveness through association-of-ideas is offered by conventional subject indexes but only within the limits of a particular subject heading (Garfield, 1955, p. 108).

Garfield visualized the citations in article reference lists as links between a single paper and others that were closely related to it. An index based on those connections, including both cited publications and citing articles, could lead researchers to additional highly-relevant studies not discoverable through traditional subject indexes. At the time, Garfield probably did not imagine that his idea would evolve from a single citation index into a suite of important online databases known collectively today as Thomson Reuters’ *Web of Science*. Nor did he likely guess that his “association of ideas” index would become an indispensable and fundamental tool for guiding scholars to closely related research.

In addition, Garfield probably did not envision some of the secondary, unintended, uses that researchers now find for his citation index. The Journal Impact Factor (JIF), for example, is one of the measures available in Thomson Reuters’ *Journal Citation Reports*, a component of the *Web of Science*. The Journal Impact Factor is simply “a measure of the frequency with which the ‘average article’ in a journal has been cited in a particular year or period” (Thomson Reuters, 2013e). Its original purpose was to provide comparative data about journals to aid librarians in making decisions about subscription purchases for their collections (Thomson Reuters, 2013e, f). Even though the Journal Impact Factor is a quantitative measure, it is still used in tenure and promotion decisions by some universities to evaluate the quality of journals in which faculty publish (the assumption being that a higher impact factor denotes higher “quality”). Despite the fact that Thomson Reuters warns against using this metric to evaluate specific papers, authors, or institutions (Thomson Reuters, 2013b, e), this continues to be a common practice. Fortunately, there is an increasing recognition from the scientific community about the inappropriate use of the Journal Impact Factor in

funding, hiring and promotion decisions. A large group of individual researchers, publishers, scholarly societies and others recently joined together to advance the San Francisco Declaration on Research Assessment (DORA) pledge, which encourages the community “to reduce the dominant role of the JIF in evaluating research and researchers and instead to focus on the content of primary research papers, regardless of publication venue” (Fleischman, 2013).

Another common use of data from the citation indexes, and the subject of this paper, is to require faculty applying for tenure and/or promotion to provide “counts” of the number of times their papers are cited. Again, these counts represent a quantitative evaluation of the work rather than a qualitative one. There is a misunderstanding that the number of times a paper is cited is an accurate representation of impact or value. Papers are cited for a variety of reasons, some of which are not related to the quality of the research. For example, there are gratuitous citations (citing friends or colleagues), honorific citations (citing certain authors to show respect for their work), negative citations (a paper with errors may be cited heavily), and excessive self-citations (to inflate personal citation counts). Even Eugene Garfield warns against using this type of citation data as the sole measure to evaluate an individual’s scholarship (Garfield, 1985, pp. 403, 405). However, unlike the movement towards recognizing the problems with using Journal Impact Factor data to assess the quality of journals, there is not a parallel move towards acknowledging the similar issues with universities’ use of citation counts to assess individual faculty research quality. Perhaps this will follow in the wake of the DORA pledge. In the meantime, however, faculty at many universities continue to be required to provide citation counts in their tenure and promotion dossiers, and librarians continue to facilitate that effort.

The tools

Since the introduction of the *Science Citation Index* (SCI) in 1964, followed thereafter by the *Social Sciences Citation Index* (SSCI) and the *Arts & Humanities Citation Index* (AHCI), the three *Citation Indexes* remain the predominant, and, until relatively recently, only tools for collecting the type of bibliometric information faculty need for their dossiers. The citation indexes, together cover over 12,000 journals (Thomson Reuters, 2013g) so it is not surprising that many faculties have the impression that a citation search in these databases is comprehensive. A good number of faculty are disappointed when a citation search retrieves a smaller number of citations than anticipated. They question the search results, especially when they are aware of additional citations that the search did not find. And, those in the Social Sciences and Humanities wonder why the search does not provide them with citations that have appeared in books. Clearly, many faculties are unaware of the numerous well-documented limitations of the citation indexes with which librarians are very familiar. Those limitations include the indexing of journal literature to the exclusion of books (Meho, 2007, p. 32; Neuhaus and Daniel, 2008, p. 195; and Reed, 1995, p. 504), a strong English language bias and limited coverage of foreign language journals (Bence and Oppenheim, 2004, p. 359; Cameron, 2005, p. 110; Meho, 2007, p. 32; Nisonger, 2004, p. 162; and Reed, 1995, p. 504), an emphasis on journals published in the USA, UK and Western Europe (Andersen, 2000, p. 678; Lariviere *et al.*, 2006, p. 998, Meho, 2007, p. 32; Nederhof, 2006, p. 91; and Nisonger, 2004, p. 162), and coverage of a greater number of

science journals than social science or humanities journals (Nederhof, 2006, p. 90; Thomson Reuters, 2013a, c, and d).

While the evidence is clear that there are drawbacks to relying solely on the citation analyses available through the citation indexes for the evaluation of a t & p candidate's work, the fact remains that many colleges and universities continue to depend on citation counts in the assessment of the quality of a candidate's scholarship. With so much riding on the outcome of a citation search, t & p candidates have high hopes and expectations that librarians will be able to help them turn up large numbers of citations to their work. In fact, it sometimes seems that they would like librarians to be bibliomagicians as well as bibliometricians. Since librarians want to offer the best possible assistance to faculty, an investigation into alternative, or additional, sources for citation information could provide both librarians and faculty with more options for locating citation data.

Fortunately, there is evidence of a growing number of new tools for citation searching that complement the traditional citation indexes. For example, *SciVerse Scopus* (an Elsevier subscription database) debuted in 2004, and is a direct competitor to the citation indexes. Elsevier states that over half of the content in *SciVerse Scopus* comes from Europe, Latin America and the Asia Pacific region, and that, in addition to indexing peer reviewed journals, it also includes conference papers, Web pages, patents, articles in press, book series, institutional repositories and other resources the citation indexes do not cover (Elsevier BV, 2011, pp. 6-7, 10, 19). *Google Scholar* also appeared in 2004, and provides users with a free option for searching the web for cited references. While *Google Scholar* continues to be evasive about exactly which resources it indexes, its web page indicates that it covers a wider range of publication types than the citation indexes, including journal articles, conference papers, web pages, theses, dissertations, books, preprints, court opinions, technical reports and patents (Google, n.d.).

Even the *Web of Science* is expanding its coverage to include non-journal materials. Two *Conference Proceedings Citation Indexes* covering 148,000 conferences (Thomson Reuters, 2011) and a *Book Citation Index* which currently indexes a growing collection of over 30,000 books (Thomson Reuters, 2011) were recently developed as optional supplements to the database. In addition, many commercial vendors such as EBSCOhost & ProQuest now offer citation searching as a feature of many of their databases. Some electronic journal packages, such as *SAGE Journals Online*, also provide a way to search cited references. A number of electronic book collections, like *Gale Virtual Reference Library* and *Knovel Library*, now offer options for searching the contents of books for citations, and an increasing number of free web-based resources are also available for citation searching (e.g. *BioMed Central*). Information on conducting citation searches in a variety of these newer resources is detailed in this paper with the goal of providing a broader range of commercial and free tools that both librarians and faculty can use to locate citations to an author's work.

The survey

To identify additional sources for citation searching, the author surveyed the resources available through her library at Wichita State University (WSU). Because the library serves faculty in departments across campus, the author attempted to identify resources useful to a broad range of disciplines. The Wichita State University Libraries

provide research support to a population of nearly 15,000 students and over 500 full- and part-time faculty. WSU is a public, four-year, urban serving institution located in the largest city in Kansas. It is a Carnegie foundation doctoral granting, high research institution offering 70 undergraduate, 41 master, and 12 doctoral degrees. WSU is particularly noted for its Health Professions and Engineering programs. Many students come to WSU for its Aeronautical Engineering degree, National Institute for Aviation Research (NIAR), and close ties to the aviation industry in Wichita.

The WSU Libraries offer technology equipped group workspaces for students and over 180 wireless PC and Mac workstations. Laptops and iPads are available for checkout and use within the libraries. Librarians support teaching and learning by providing library instruction, course-specific web guides, and a presence in the Blackboard learning management system. Librarians also develop online tutorials and other learning objects as needed. The libraries' collections contain more than three million books, periodicals, government publications, scores, video tapes, and audio recordings, as well as over 100 electronic databases and more than 55,000 e-books. Librarians serve as liaisons between the library and the academic departments.

For the survey, the author first systematically examined the majority of databases to which the library subscribed to see if a method for citation searching was offered. Only databases that included academic content were selected for the survey. Some databases (such as those that indexed newspapers) did not meet this criterion, and were not considered. At the time the survey was undertaken, the library subscribed to around 100 databases with academic content.

Next, the author reviewed electronic journal package subscriptions such as *Wiley Online Library* and *Oxford Journals Online* for citation searching options. Since many faculty in the Social Sciences and Humanities ask for a way to search the contents of books for cited references, the author also explored electronic book collections for the availability of citation searching. And, finally, through the process of reading many articles on citation searching, the author learned about a number of free, open access resources beyond *Google Scholar* that are also available for this purpose. These resources have been organized into tables similar to those shown later in this paper. The tables include the search method for each resource since it varied from one to the next.

The next step was to then use the tables to create handouts of citation searching resources for faculty in departments with which the author was liaison (Education, Social Work, Sport Management, etc.). These guides, called "Tip Sheets", were created by copying and pasting pertinent resources from the original tables into two-page handouts, and were shared via e-mail with faculty preparing for tenure and promotion. Each summer, the library offers a number of workshops on using the *Web of Science* for citation searching for faculty. The author began receiving requests from librarians teaching the workshops to create customized Tip Sheets for faculty in additional departments, such as Engineering, Chemistry and Nursing. Creating these new guides "on-demand" became somewhat time-consuming, but it was clear that there was a need for this type of information by faculty across campus. Providing faculty with up-to-date information on the available resources was often challenging since interfaces were "upgraded" frequently and options for citation searching came and went.

To better accommodate the changing nature of the electronic databases and other online resources, and to provide an easy access point for *all* faculty, the author ultimately created a web page available at: <http://libresources.wichita.edu/citationsearching> (accessed 22 July 2013) that lists the resources included here. Unlike some of the tables in this paper, which are arranged by vendor to allow for grouping databases with the same search method together, the web page is arranged by discipline (Business, Education, Engineering, etc.). Each faculty member can now click on his/her discipline to access the resources most applicable to that subject area. The first four resources are the same for each discipline (*Web of Science*, *Google Scholar*, *Google Books*, and *Journal Citation Reports*) since these are the most commonly used resources indexing the largest numbers of publications. After that, the resources are divided into those that index journals, those that index books, and those that index both. A small blue ribbon icon is placed after the names of those resources that offer a direct method for citation searching to alert faculty to those that are likely to offer the speediest results.

The web page continues to grow. For example, when several faculty asked for help in locating book reviews of their work, the author added a section of links to book review and other evaluative sources on a separate page called *More Tools for Evaluation*. It appears that the page is being heavily used overall. Since the page was completed in the summer of 2011, it has been accessed over 2,900 times.

The resources

The items listed in the following tables are limited to those that are either available through the author's library or are free. Tables are included with this paper because search methods among databases vary widely, and it is not possible in most cases to make general statements about search techniques. While the tables do not include every resource available, they are representative of databases owned by many libraries, and should offer ideas on how to approach citation searching in a variety of products. Since vendors frequently revise and/or update their interfaces and search functions, the methods described here are subject to change. While none of these resources is exhaustive, when used in tandem they may help faculty locate citations to their work that supplement those found in the *Citation Indexes*. Table I covers a variety of subscription databases that can be used for citation searching. Table II lists electronic journal packages and other collections that can be searched for cited references, Table III includes purchased electronic books collections, and Table IV provides open access web-based databases that offer citation searching. Table V lists supplementary resources to aid in finding journal rankings and other evaluative information. The tables describe the specific search method for each resource.

Subscription databases

Many of the databases available from commercial vendors now offer options for citation searching. While most of these databases primarily index the journal literature, some also index books and offer researchers, particularly in the social sciences and humanities, new tools for identifying monographs that include citations to their work. Several vendors, such as ProQuest and EBSCOhost, offer a specific method for citation searching.

Vendor/database(s)	Search method
American Mathematical Society <i>MathSciNet</i> (Mathematical reviews on the web)	Click on <i>Citations</i> tab. Using <i>Author Citations</i> tab, enter author's name. If there is more than one match for author's name, make a selection from the drop-down list. Retrieves author's ten most-cited publications in the database, and shows number of times author has been cited. Click on item number at beginning of a record, and then click on <i>From References</i> link in small <i>Citations</i> box to access bibliographic information for the citing article(s)
Chemical Abstracts Service <i>SciFinder</i>	Click on <i>Explore References</i> link at top of page. Then, click on <i>Author Name</i> link on left-hand side of page. Type author's name in search box. Select appropriate name variations from <i>Author Candidates</i> screen if necessary, and click on <i>Get References</i> button. In results list, click <i>Citing</i> link below a single record, or click in check box in front of several references, and click <i>Get Citing</i> link at top of page
CQ Press <i>CQ Global Researcher</i> <i>CQ Researcher</i>	Click on <i>Advanced Search</i> link near top center of screen. Type author's name in search box, and keep default search option of <i>Keyword/all text</i> . Scroll down, and under <i>Search only specific report sections</i> , select <i>Bibliography</i> . On results screen, click on <i>title</i> of a report to view bibliography. Use <i>FIND</i> to locate name
EBSCOhost <i>America: History & Life</i> <i>CINAHL with Full Text</i> <i>Communication & Mass Media Complete</i> <i>Criminal Justice Abstracts</i> <i>Library, Information Science & Technology Abstracts</i> <i>Literary Reference Center</i> <i>SPORTDiscus with Full Text</i> Note: Not all EBSCOhost databases offer this method for citation searching	Click on <i>Cited References</i> link above search boxes. Type author's name in <i>Cited Author</i> search box. Results will show a list of articles by the author, with number of <i>Times Cited in this Database</i> (if any). <i>Check box next to a record</i> , and then click on <i>Find Citing Articles</i> button to see bibliographic information for citing article(s). Click on <i>Cited References</i> link below a record to view reference list of citing article
FirstSearch (OCLC) <i>ECO (Electronic Collections Online)</i>	Use <i>Advanced</i> search to search author's name in <i>Reference</i> field. Click on a title from results list, and scroll down to see name highlighted in yellow in reference list
Oxford University Press <i>Oxford Art Online</i> <i>Oxford Music Online</i>	Click on <i>Advanced Search</i> link under search box near top of screen. Click on <i>Bibliography Search</i> tab. Under <i>Options</i> , type author's name in <i>Author/Editor name</i> box. Click on a title in results list, and author's name will be highlighted in bibliography of article

Table I.
Databases

(continued)

Vendor/database(s)	Search method
ProQuest ABI/INFORM Aerospace Database ERIC MEDLINE Nursing & Allied Health Source PAIS International PsycARTICLES PsycINFO Research Library Social Services Abstracts Sociological Abstracts Note: Not all ProQuest databases offer this method for citation searching	Use <i>Advanced Search</i> . Click on <i>Command Line</i> link above search boxes. In search box, type <i>CAU(last name)</i> to search for author's name as a <i>cited author</i> , or <i>REF(last name)</i> to search for author's name in the <i>references</i> . In results list, click on the <i>References</i> link below a record, and then use <i>FIND</i> to locate name in reference list
Thomson Reuters <i>Web of Science</i>	Click on <i>Cited Reference Search</i> link. At bottom of screen, click on plus sign (+) in front of <i>Citation Databases</i> and select one or more to search. Type author's name in <i>Cited Author</i> search box. At next screen, click in boxes next to citations that refer to author (there may be other authors with same name & initials). Click on <i>Finish Search</i> . Results will display articles that have cited the author

Table I.

Like the *Citation Indexes*, all of the databases have limitations in the selection of journals indexed and time periods covered. Some offer the option to search a cited author's name only, and it is necessary to experiment in each database with the most effective format for entering an author's name in the search box (last name only, last name first initial, first name last name, etc.). Using last name only will frequently result in numerous false hits, especially if the author's name is common, so use this as a starting point, and then try variations to refine or narrow the search if too many results are retrieved. In some databases, it is also possible to search for the title(s), or multiple words from the title, of a cited work. This method may be more productive, especially if the author has a common name that is likely to retrieve a large number of results, or has only a few publications to be searched. If the database allows, a cited author's name along with keywords from the cited article title can be searched together.

Some vendors have not yet developed a way to search for citations, but librarians and faculty can still mine their databases for citations. Databases from *Gale Cengage*, for example, require a more creative and time-consuming approach for citation searching – searching the full text of articles in the database for the appearance of the author's name. Peter Jacso (2004, p. 456) refers to this technique as “citation rummaging”. To use this technique, look for an advanced search option which will allow searching the full text of documents. Use the Find on Page function (hereafter referred to as *FIND*) in the browser or PDF reader to search the document for the appearance of the search term(s). Next is a list of a number of databases in which the “citation rummaging” technique can be used. For detailed searching instructions for each database, please refer to the web page:

Source/publisher and description	Search method
ACM Digital Library (Association for Computing Machinery) “A vast collection of citations and full text from ACM journal and newsletter articles and conference proceedings”	Click on <i>Advanced Search</i> link on right-hand side of screen. In search box, under <i>Names</i> heading on right-hand side of screen, choose <i>Authors</i> from drop-down list, and type in author's name. In results list, note <i>bibliometric</i> information: <i>number of downloads in last 6 weeks</i> , <i>number of downloads in last 12 months</i> , <i>number of downloads overall</i> , and <i>Citation Count</i> . If there is a number greater than zero listed after <i>Citation Count</i> , click on title of article, and then click on <i>Cited by</i> tab on lower portion of screen for a list of citing articles
ACS Publications (American Chemical Society) “More than 40 peer-reviewed journals . . . stretching across chemistry, physics, and biology”	In tan search box on upper right-hand side of screen, choose <i>Anywhere</i> search, and enter author's name. In results list, click on <i>Full Text HTML</i> or <i>PDF</i> link in a record to bring article to the screen. Then, use <i>FIND</i> to locate name in text/references
Annual Reviews (Annual Reviews) “Authoritative reviews in 41 focused disciplines within the Biomedical, Life, Physical, and Social Sciences”	Click on <i>Advanced Search</i> link in upper right-hand corner of page (under orange <i>SEARCH</i> button). Enter author's name in first search box on left-hand side of page, and select <i>Cited Author</i> from drop-down list. From results list, bring an article to the screen (if library subscribes), and use <i>FIND</i> to locate name in text/references
ingentaconnect (Publishing Technology) Comprehensive collection of academic and professional research articles in all subject areas	Use <i>Advanced search</i> . Type author's name in <i>Search for</i> box-choose either <i>In article title</i> , <i>keywords or abstract</i> , or <i>In article fulltext</i> . In search results, click on a title to view abstract (when available). If author's name appears in abstract, it will also likely appear in references. Some articles free or open access; majority available through subscription or individual article purchase
IOPscience (Institute of Physics Publishing) All journal content hosted by IOP Publishing. Includes more than 60 titles in science and engineering	Type author's name in search box in center of page, and select <i>Fulltext</i> from drop-down list. In search results, click on <i>title</i> of a record, and then click on blue <i>References</i> tab just beneath the citation information. Use <i>FIND</i> to locate name in <i>References</i>
Oxford Journals Online (Oxford University Press) “Over 230 academic and research journals covering a broad range of subject areas, two-thirds of which are published in collaboration with learned societies and other international organizations”	Click on <i>Advanced Search</i> link to right of search box. In <i>Keywords</i> section of page, enter author's name in <i>Text/Abstract/Title</i> box. In results list, author's name is shown in context – frequently in the <i>References</i> . Click on <i>PDF</i> or <i>Full Text</i> link to bring an article to the screen, and use <i>FIND</i> to locate name

Table II.
Journal packages

(continued)

Source/publisher and description	Search method
SAGE Journals Online (SAGE Publications) “Search and browse more than 560 journals by discipline—including journals in business, humanities, social sciences, and science, technology and medicine”	Click on small <i>Advanced Search</i> link under search box on upper right-hand side of page. Type author’s name in search box, and choose <i>References</i> from drop-down list of fields. Click on <i>References</i> link, when available, below a record to view article’s reference list, or bring full text to the screen. Use <i>FIND</i> to locate name
ScienceDirect (Elsevier BV) “Journal articles and book chapters from more than 2,500 peer-reviewed journals and more than 11,000 books”	Click on <i>Advanced search</i> link in gray bar in upper right-hand corner of screen. Type author’s name into <i>Search</i> box in center part of screen, and select <i>References</i> from drop-down list of fields. In results list, click on <i>Show preview</i> link, and then on <i>References</i> . Name is highlighted in <i>References</i> . References are only available for journals to which your library subscribes
Wiley Online Library “Access to over 4 million articles across nearly 1,500 journals and 11,500 online books, and hundreds of reference works covering life, health and physical sciences, social science, and the humanities”	Use <i>Advanced Search</i> to search author’s name in <i>References</i> field. In results list, click on <i>References</i> link to view reference list. Use <i>FIND</i> to locate name in <i>References</i>

Table II.

- (1) *BioOne*:
 - BioOne.
- (2) *EBSCOhost*:
 - Applied Science & Technology.
 - Full Text.
 - Art Full Text.
 - Business Abstracts with Full Text.
 - Education Full Text.
 - General Science Full Text.
 - Humanities Full Text.
 - Library Literature & Information.
 - Science Full Text.
 - Mental Measurements Yearbook.
 - OmniFile Full Text Mega.
 - Readers’ Guide Full Text.
 - Social Sciences Full Text.
- (3) *Gale Cengage Learning*:
 - Academic OneFile.
 - Business Insights: Essentials.

Vendor/database	Search method
American Council of Learned Societies <i>ACLS Humanities E-Book</i>	Click on <i>Search</i> link, and use <i>basic search</i> . Choose <i>full text</i> in the <i>Search in:</i> box, and type in author's name. On results page, click on <i>Results details</i> below a citation to see links to page(s) on which name appeared. Text surrounding name is provided. Click on a page number to view full page on which name was found
American Society for Metals International <i>ASM Handbooks Online</i>	Click on <i>Advanced Search</i> link on upper right-hand side of screen. Type in author's name and select <i>References</i> under <i>Select a field</i> heading. Results screen shows an excerpt of the context in which author's name appeared in the <i>References</i> of a <i>Handbook</i> entry. Click on author's name to view page on which name was found
Ebooks Corporation <i>EBL (EBook Library)</i>	Use <i>Advanced</i> search. Type author's name into the <i>Full text has</i> search box. In results list, click on the <i>Read this Book</i> link under an entry. Click on the <i>Search</i> tab on the left-hand side of the page and enter author's name to see links to pages where author's name appears
EBSCOhost <i>eBook Collection</i>	Use <i>Advanced Search</i> , and choose <i>TX All Text Fields</i> in drop-down box. Type in author's name. In results list, click on a title to see <i>Most Relevant Pages From This Book</i> . An excerpt of the context in which the author's name appeared will be displayed, along with links to view the full pages
Gale Cengage Learning <i>Gale Virtual Reference Library</i>	Use <i>Advanced Search</i> to search author's name in <i>Entire Document</i> field. After clicking on the full text link of a document in results list, use <i>FIND</i> to locate name in text/references
Knovel Corporation <i>Knovel Library</i> Electronic reference books in Engineering	Type author's name into search box at top of page. Searches full text of content to which your library subscribes. Results list identifies location of name in text (References, chapters, etc.). Most records in results list are collapsed; click on <i>magnifying glass</i> on left to expand record. Click on <i>Text</i> link on far right of screen to display full text. Name will typically be highlighted, but, if not, use <i>FIND</i> to locate name on page
ProQuest <i>ebrary</i>	Use <i>Advanced</i> search. Select <i>Text</i> from the drop-down list, and enter author's name. In results list, click on a book title to view the first occurrence of name in book. Right-hand side of page shows chapters where name appears. Click on magnifying glass to go the page containing name

Table III.
Purchased electronic
book collections

Resource/description/URL	Search method
<p><i>Amazon</i> Books in all subject areas www.amazon.com</p>	<p>Select <i>Books</i> search. Type author's name into search box. For books that are part of Amazon's <i>Look Inside!</i> program only, click on title of book. Then, hover over book cover and type name into pop-up search box to search book's content. A list of pages on which name appears will display on left-hand side of screen. Click on an entry to view the page with author's name highlighted</p>
<p><i>arXiv</i> e-Print Archive "Open access to 807,732 e-prints in Physics, Mathematics, Computer Science, Quantitative Biology, Quantitative Finance and Statistics" http://arxiv.org</p>	<p>Click on <i>Advanced Search</i> link in upper right-hand corner of page. Scroll down to gray <i>Experimental full text search</i> box. Enter author's name; choose subject area from drop-down list if desired. In results list, name may appear as the author of a work. In other cases, name appears in an excerpt below the article title. For these, click on article <i>title</i>, and then click on <i>PDF link</i> on upper right-hand corner of screen under <i>Download</i>. Use <i>FIND</i> to locate name in document/references</p>
<p><i>BioMed Central</i> "STM (Science, Technology and Medicine) publisher of 220 open access, online, peer-reviewed journals." www.biomedcentral.com</p>	<p>Click on <i>Advanced search</i> link under search box on top right-hand side of page. Choose <i>References</i> field from drop-down list, and enter author's name in first search box. In results list, click on <i>PDF</i> or <i>Full Text</i> link within a record, and then use <i>FIND</i> to locate author's name in text/references Note: Must complete free registration to search site</p>
<p><i>CiteSeerX</i> (currently in beta) "Scientific literature digital library and search engine that focuses primarily on the literature in computer and information science" http://citeseerx.ist.psu.edu</p>	<p>Click on <i>Advanced Search</i> link under main search box. Type author's name into <i>Author Name</i> search box. Under <i>Range Criteria</i>, click box next to <i>Include Citations?</i> to add records for which only the citation is available, but not the full text. Under <i>Sorting Criteria</i>, choose <i>Citations</i> to view results sorted by number of citations received. <i>Number of citations</i> (including self-citations) is displayed below each record in results list. Click on <i>Cited by</i> link to display citing articles (total number not always displayed)</p>
<p><i>Cogprints – Cognitive Sciences E-Print Archive</i> Self-archived book chapters, journal articles, conference papers, theses, and more in Psychology, Linguistics, Computer Science, and other areas of the physical, social and mathematical sciences relevant to cognition http://cogprints.org</p>	<p>Click on <i>Search Repository</i> link on right-hand side of page. Type author's name in <i>Documents</i> search box. Set other parameters as desired. In results list, click on <i>PDF</i> or <i>HTML</i> icon for a record, and use <i>FIND</i> to locate name in document</p>

(continued)

Table IV.
Open access web-based
databases

Resource/description/URL	Search method
<p><i>Google Books</i> “Search the full text of books . . . if the book is out of copyright, or the publisher has given us permission, you’ll be able to see a preview of the book, and in some cases the entire text” http://books.google.com</p>	Type author’s name into search box, and click on <i>Search Books</i> . Majority of search results will be books written by that author, but look for <i>titles that are followed by a page number</i> – more likely to be ones in which name was mentioned in text or references. Click on title to view page, or piece of page, on which name was found (highlighted in yellow)
<p><i>Google Scholar</i> “Broadly search for scholarly literature . . . across many disciplines and sources,” including articles, theses, books and more http://scholar.google.com</p>	Click drop-down arrow in search box to access <i>Advanced Scholar Search</i> . Type author’s name into <i>authored by</i> search box. In results list, click on <i>Cited by</i> link to view references for publications in which document has been cited
<p><i>HighWire Press, Stanford University</i> Free Online Full-text Articles “Partners with independent scholarly publishers, societies, associations, and university presses to facilitate the digital dissemination of 1726 journals, reference works, books, and proceedings” http://highwire.stanford.edu/lists/freart.dtl</p>	Click on <i>Search</i> link in black box on left-hand side of screen. Type author’s name into <i>Anywhere in Text</i> search box. Results provide snippet of text in which name appeared. Click on <i>PDF</i> link to right of record, and, if library subscribes to that journal, use <i>FIND</i> to locate name. Some records have a <i>View Citation Map</i> link to right of record, which is a “picture based view of the reference section of an article” and “depicts the relationship between the citing and cited articles, indicating the most highly cited”
<p><i>IDEAS</i> (Internet Documents in Economics Access Service) Searches the RePEc database (Research Papers in Economics) of working papers, journal articles, books, book chapters, and more http://ideas.repec.org</p>	Click on <i>Advanced Search</i> link below search box. Type author’s name into <i>Search for:</i> box, and select <i>Author</i> from drop-down list in search <i>In:</i> box. Click on a title from results list, and scroll down to <i>Statistics</i> heading at bottom of screen. Click on <i>Access and download statistics</i> to see number of views and downloads over last several years. Some records also list citing articles under the <i>Citations</i> heading. Note: Some articles are available for free download; others may be accessed by subscription or purchase
<p><i>PLoS</i> (Public Library of Science) “A nonprofit organization of scientists and physicians committed to making the world’s scientific and medical literature a freely available public resource” www.plos.org</p>	Choose <i>References</i> from drop-down list in front of search box; type author’s name into search box. Results are sorted by relevance, but you can change the sort order to either newest or oldest first, or to most viewed articles in the last 30 days or in “all time” first, or to “most cited” articles first. Click on a title, and use <i>FIND</i> to locate name in text/references. For another type of search, choose <i>Author</i> from the drop-down list in front of search box, and type in author’s name. In results list, click on a title, and then click on <i>Metrics</i> tab to see <i>number of times article has been viewed and downloaded</i> over a period of time

Table IV.

(continued)

Resource/description/URL	Search method
<i>PROLA</i> (Physical Review Online Archive) “American Physical Society’s online archive for <i>Physical Review Letters</i> , <i>Reviews of Modern Physics</i> , and <i>Physical Review A-E</i> ” http://prola.aps.org	Click on <i>Journal Search</i> tab in search box in upper right-hand corner of page. Type author’s name in search box, and choose <i>Cited Author</i> from drop-down list. Searching is free, but a subscription is required to access full articles. <i>If</i> library subscribes, clicking on title of a record provides access to a <i>Citing Articles</i> tab
<i>PubMed Central</i> “Free archive of biomedical and life sciences journal literature at the U.S. National Institutes of Health’s National Library of Medicine (NIH/NLM)” www.ncbi.nlm.nih.gov/pmc	Click on <i>Advanced</i> search link below search box. Choose <i>Reference Author</i> from the drop-down list, and enter author’s name. In search results, click on <i>Full Text</i> or <i>PDF</i> , and use <i>FIND</i> to search for name in references
<i>Scirus</i> “Scirus, the search engine for science, focuses only on Web pages containing scientific content web information, preprint servers, digital archives, repositories and patent and journal databases” http://scirus.com	Click on <i>Advanced search</i> . Enter author’s name and select <i>The complete document</i> from the drop-down list. Click on a title from results list, and use <i>FIND</i> to locate name in document (when full text is available)
<i>USPTO</i> (US Patent & Trademark Office) Patent full-text and image database http://patft.uspto.gov	Click on <i>Quick Search</i> link under <i>PatFT: Patents</i> heading on left-hand side of page. Type a patent number into <i>Term 1</i> search box, and choose <i>Referenced By</i> field. This will find other patents that include the number in their full text

Table IV.

- Educator’s Reference Complete.
 - Expanded Academic ASAP.
 - Health & Wellness Resource Center.
 - Health Reference Center Academic.
 - Inform!
 - LegalTrac.
 - Literature Resource Center-LRC.
- (4) *IEEE*:
- IEEE Xplore.
- (5) *ITHAKA*:
- JSTOR.
- (6) *Johns Hopkins University Press*:
- Project Muse.
- (7) *ProQuest*:
- Literature Online (LION).

Resource/description/URL	Search method
<p><i>eigenFACTOR.org</i> Ranking and Mapping Scientific Knowledge (Open access) "Eigenfactor not only ranks scholarly journals in the natural and social sciences, but also lists newsprint, PhD theses, popular magazines and more. In so doing, it more fairly values those journals bridging the gap between the social and natural sciences" www.eigenfactor.org/</p>	<p>Search by journal name to view ranking information for a journal, select category (such as Anthropology or Business) from <i>Search by ISI Category</i> drop-down list to view ranked list of journal titles, or select a year for which you want data. Ranking information includes <i>Article Influence</i> ("a measure of a journal's prestige based on per article citations and comparable to Impact Factor") and <i>Eigenfactor</i> ("a measure of the overall value provided by all of the articles published in a given journal in a year"). Click on journal title for additional information</p>
<p><i>Google Scholar Citations</i> (Open access) "Google Scholar Citations provide a simple way for authors to keep track of citations to their articles. You can check who is citing your publications, graph citations over time, and compute several citation metrics... [which] are computed and updated automatically as Google Scholar finds new citations to your work on the web" http://scholar.google.com/citations</p>	<p>Fill out your <i>Profile</i>, selecting some, or all, of the publications you would like to track from the list provided. When finished, you will see a <i>My Citations</i> page with an analysis of citation activity related to your profile. Next time you go to Google Scholar, click on the <i>My Citations</i> link in the upper right-hand corner of the screen to see updated information related to your profile Note: You must have, or create, a Google account to use <i>Google Scholar Citations</i></p>
<p><i>Journal Citation Reports</i> (Requires subscription) Evaluate and compare journals using citation data drawn from over 11,000 scholarly and technical journals in all subject areas. Shows the most frequently cited and highest impact journals in a field</p>	<p>Select either <i>JCR Science Edition</i> or <i>JCR Social Sciences Edition</i>, and then choose whether to view information about a <i>group of journals</i>, a <i>specific journal</i> or <i>all journals</i>. Make further selections as required. Ultimately, a <i>Journal Summary List</i> page will provide information such as journal <i>Rank</i>, <i>Impact Factor</i>, <i>Article Influence</i> score, <i>Eigenfactor</i> score, and more</p>
<p><i>Journal Quality List</i> (Open access) "Collation of journal rankings from a variety of sources." Covers academic journals in Economics, Finance, Accounting, Management, Marketing, Communication, Psychology, Sociology, and more www.harzing.com/jql.htm</p>	<p>Updated in August, 2012, this list is available for free download. It is organized three different ways for download: by <i>journal title</i>; by <i>subject</i>; or by <i>ISSN</i></p>
<p><i>Publish or Perish</i> (Open access) Free, downloadable software which retrieves and analyzes academic citations from <i>Google Scholar</i> www.harzing.com/pop.htm</p>	<p>Analyzes citations from <i>Google Scholar</i> and provides statistics such as <i>total number of citations</i>, <i>average number of citations per paper</i>, <i>average number of citations per author</i>, <i>average number of papers per author</i>, <i>average number of citations per year</i>, and more</p>

Table V.
Other resources

(continued)

Resource/description/URL	Search method
<p><i>Science Gateway – Journal and Academic Rankings (Open access)</i> "A directory of links and resources for biomedical science and research . . . compiled by a group of scientists located in Europe and North America" www.sciencegateway.org/rank/index.html</p>	<p>A variety of rankings in a substantial number of subject areas (mostly sciences, but some social sciences included). Rankings include <i>High Impact Journals</i>, <i>Most Cited Authors</i>, <i>Most Cited/High Impact Institutions</i>, <i>Most Cited Countries</i>, <i>High Impact US Universities</i>, and <i>Most Prolific US Universities</i>. Click on a link to see rankings for that area</p>
<p><i>SJR – SCImago Journal & Country Rank (Open access)</i> "Includes the journals and country scientific indicators developed from the information contained in the SciVerse Scopus® database (Elsevier BV)" www.scimagojr.com/</p>	<p>Search for ranking information by <i>journal title</i>, <i>publisher</i>, <i>subject area/category</i>, <i>country</i>, or <i>compare specific journals or countries</i>. A <i>Map Generator</i> uses metrics to create "Maps of Science based upon national science indicators for 2 year periods between 1999 and 2011." Maps "reveal the existence of underlying scientific structures and plot science outputs and performance at a national level"</p>
<p><i>WorldCat (Open access)</i> OCLC catalog of books and other materials in libraries worldwide www.worldcat.org/ (Also available as a subscription database through OCLC FirstSearch)</p>	<p>For a different kind of metric, click on <i>Advanced Search</i> link under search box. Search on an <i>author's name</i>, a <i>book title</i>, or a <i>journal title</i> to see <i>how many libraries worldwide own a publication</i></p>

Journal packages

Librarians and faculty can also search the contents of collections of electronic journals for citation information (see Table II). A few offer a specific method for citation searching, but the majority will require use of the rummaging technique. While most focus on journals, some also index books, book chapters, and conference proceedings. The list in Table II is limited to journal packages available through the author's library, and is not comprehensive. Viewing the full text of articles and using some database features will be dependent on local library subscriptions. Descriptive information about each database comes directly from the resource. Instructions for basic cited author searching are provided. Again, experimentation with the best way to enter a name, along with a certain amount of "rummaging" in the results, should be anticipated.

Electronic books

Collections of electronic books may also be mined for citation information, and are particularly helpful for those who are looking for citations found in books. For most of these products, only books purchased by the local library will be searched.

Open access web-based databases

Over the last few years, many open access resources that can help authors locate additional citations to their work were developed. A selection of these resources is

listed in Table IV. While the majority focusses on the sciences, some (such as *Amazon* and *Google Books*) are more interdisciplinary. Again, techniques for searching for cited authors are described. A certain amount of experimentation with how best to enter an author's name will be required and "rummaging" should be expected. Database descriptions are taken from the resources' webpages.

Journal rankings and other tools

A number of interesting tools related to citation analysis are now available. Several of the resources listed in Table V provide information on journal rankings, while others (such as *WorldCat*) offer options for different kinds of bibliometric information that could be included in t & p dossiers.

Expanding options—webometrics and altmetrics

The list of resources available for citation searching has now grown far beyond the citation indexes alone, and the future promises to provide even more tools. The changing nature of "publication," as it continues to move from print to digital, brings with it changing ways of looking at "citations." A new field of study, called *Webometrics*, has developed around analyzing features of the Web that can be used to help determine the impact of an author or work. Mike Thelwall (2008, p. 611) says that "Webometrics was triggered by the realization that the web is an enormous document repository with many of these documents being academic-related". He describes Webometrics as being "concerned with measuring aspects of the web: web sites, web pages, parts of web pages, words in web pages, hyperlinks, web search engine results" (Thelwall, 2009, p. 1).

Two important aspects of Webometrics that Thelwall identifies in one study are link analysis ("the quantitative study of hyperlinks between web pages" (Thelwall, 2008, p. 611)) and *Web citation analysis* ("using the web to count how often journal articles are cited" (Thelwall, 2008, p. 612)). This second aspect especially has potential for helping faculty add another dimension of citation analysis to their dossiers. In a different study, Thelwall looked at other useful measurement techniques available through the Web, including server access logs, which "show how many times a page has been visited" (Thelwall, 2002, p. 415), and non-link invocations, "where research has been mentioned online without a link" (Thelwall, 2002, p. 415). Some researchers have even developed a Web Impact Factor (WIF), which is a parallel to the Journal Impact Factor (JIF) of the citation indexes. They defined the Web Impact Factor as the "number of pages linking to a site or area of the internet divided by the number of pages in that site. A high value of WIFs indicates a site with high impact because there are relatively many pages linking to the site" (Jalal *et al.*, 2009, p. 4).

Altmetrics includes even newer ways of looking at and measuring impact, and some see it as a natural offshoot of Webometrics. Altmetrics looks at the use of a variety of research outputs such as datasets, software, posters, slides, videos, websites and articles. Impact is measured by number of tweets, bookmarks, Likes on Facebook, blog posts, media mentions, etc. Altmetrics tracks how many times the outputs have been viewed, downloaded, cited, reused/adapted, shared, bookmarked, or commented upon (Konkiel, 2012).

A few examples of the rapidly growing number of new tools for measuring the impacts of these kinds of research outputs include: *Altmetric* available at: <http://>

altmetric.com (accessed 21 March 2013), which collects and analyzes postings about articles and datasets; *ImpactStory* available at: <http://impactstory.org> (accessed 21 March 2013), an aggregator of impacts for articles, datasets, blog posts, software, etc., from across the Web; *topsy* available at: <http://topsy.com> (accessed 22 March 2013), an index of the public social web; and *Slideshare* available at: www.slideshare.net (accessed 23 March 2013), which offers view, download and other statistics for videos, presentations, slides and documents posted to its website. Priem *et al.* (2011) suggest that one of the major advantages Altmetrics provides over traditional bibliometrics is the element of speed – “altmetrics typically accumulate in days or weeks rather than the years citations require”.

Conclusion

Both Altmetrics and Webometrics have the potential to become powerful tools for demonstrating the impact and value of one’s scholarly work. It may take some time, however, before they gain the wide-spread acceptance that traditional bibliometrics enjoy. It will be interesting to watch the development of these and other new impact measures. Librarians who would like to learn more about the evolving list of resources available for measuring scholarly impact would benefit from an informative article by Roemer and Borchardt entitled “From bibliometrics to altmetrics: a changing scholarly landscape” (Roemer and Borchardt, 2012). The article reviews numerous bibliometric and altmetric resources, as well as blogs, electronic lists, and more. The Altmetrics website available at: <http://altmetrics.org> (accessed 7 August 2013) provides helpful information about the altmetrics movement. Following the hashtag altmetrics on Twitter is another good way to keep up with developments in this area.

In the meantime, however, regardless of what methods of citation analysis are used, it will continue to be important for librarians to be aware of the most useful of these tools, provide easy access to them, and offer faculty assistance with their use. Librarians are in a unique position to provide this service to faculty because they are familiar with the complete range of resources the library has to offer for all subject areas. Faculty members may be most familiar with the smaller number of tools appropriate for their particular disciplines. Librarians can promote this important service and demonstrate their value to the campus community by offering workshops on citation searching, assisting faculty members one-on-one as they prepare their t & p dossiers, and creating webpages with access to a wide variety of resources that faculty can use on their own. The author suggests that it would be difficult for faculty to find another resource on campus that offers a more valuable service to them at such a critical point in their careers.

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