Citations searching in Literature Reviews

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SPECIAL ARTICLE

Abstract

The burgeoning wealth of available scientific information – aided in part by (a) expansion in the definition of "literature", (b) dramatic increase in the scientific output available for the scientific community's perusal, and (c) ease of access afforded by various databases and search engines – poses several challenges to researchers and to the credibility of their research findings. One method to discourage reference to "fraudulent, incomplete, or obsolete data" in the literature is citations searching. This paper presents a short overview of citations searching, its advantages and disadvantages, as well as its implications for stakeholders in the academic community.

Keywords: *Information storage and retrieval/methods, Research design, Review literature as topic*

Introduction

The aim of this paper is to describe citations searching, along with its advantages and disadvantages, as a potential response to some challenges posed in the usual conduct of literature reviews. The purpose is to initiate discussion within the Philippine academic community on how this practice can be integrated in the teaching and practice of research in the local setting.

Literature review in research

The literature review constitutes a substantive portion of the academic research process and output, and consequently demands a significant portion of a researcher's time and effort, especially during the conceptualization and design stage of a project.

The value of literature is manifold but can be summarized into three main purposes: (a) gain in-depth understanding of the topic of study (*theoretical literature*); (b) obtain an overview of the landscape of research conducted on a specific topic and relevant fields (*empirical literature*); and (c) identify approaches that may be used in designing the research (*methodological literature*) [1]. Compiling a literature review, then, is about examining the existing body of evidence to support the pursuit of a research question and justify the investment and commitment of resources (human, material, financial, time) to support the conduct of a research undertaking [2].

Challenges in the conduct of literature reviews

While traditionally confined to journal articles, books and theses reports, what counts today as published and 'grey", or unpublished, literature has expanded to cover electronic books, electronic journals, conference proceedings, government reports, and various forms of media (i.e., podcasts, videos, blogs, digital repositories) [3, 4].

Along with the expansion in the definition of "literature", there has also been a dramatic increase in the scientific output available for the scientific community's perusal. It has been estimated by Larsen and Ins [5], for instance, that the overall growth rate of scientific publications across all disciplines over the past fifty years is around 4.7% annually. Another report noted that there were over a million articles catalogued in the Science Citation Index database in 2014, a substantive portion of which can be attributed to two geographic regions: the European Union (34%) and the United States (25.3%) [6].

The burgeoning wealth of available information poses several challenges to researchers, among which are (a) potential exclusion of important or seminal works, and (b) inclusion of materials that contain irrelevant or trivial information [7]. Further compounding the issue is the ease of access afforded by various databases and search engines that allow for a perusal of practically the whole human research output from the convenience of a computer screen. An attitude devoid of criticality and discrimination in approaching

the literature review [8] will result to something akin to an annotated bibliography of a research field, which defeats the purpose of conducting the review to begin with. At worst, an ill-conceived literature review may even mislead researchers and readers in arriving at a diametrically-opposed conclusion [9,10].

Better literature reviews

In response, a growing field of scholarship is advocating for better literature reviews for quantitative [11], qualitative [12, 13], and even mixed methods researches [14, 15]. The most predominant paradigm is the one proposed by the Cochrane Collaboration in the conduct of a systematic review [16], although other techniques have been offered as alternatives. Common to all these research synthesis methods are, among others, (a) systematic search for, and critical appraisal of, literature, and (b) transparency of the retrieval and synthesis process [17].

Systematic search for literature is generally understood to mean a retrieval of (mostly) published works in generic and discipline-specific literature databases (e.g., Pubmed, Embase, Scopus, ProQuest, etc.) using a replicable process guided by keywords and index terms (e.g., Emtree or Embase Subject Headings; MeSH or Medical Subject Headings) combined using Boolean operators (i.e., AND, OR, NOT). This part of the process can be referred to as "semantic search". At a later step, researchers are encouraged to peruse the works cited in the list of references of retrieved records to identify other potential sources. This process is termed citations searching, alternatively called "reference chasing", "footnote chasing" or "citation pearl growing".

Citations searching: An overview

The use of citations was first proposed by Garfield [18] as a means of discouraging reference to poor research, or what he described as "fraudulent, incomplete, or obsolete data". It has gained traction recently as a method and discipline due to the development of powerful citations databases such as Web of Science (https://www.webofknowledge.com/) and Scopus (https://www.scopus.com/) [19-21]. Emerging technology even allows for discerning "strong" from "weak" citations through analysis of influence of a citing paper [22].

Other newer citations databases include PsycINFO (http://www.apa.org/psycinfo), Sociological Abstracts (https://www.proquest.com /products-services/socioabs-set-c.html), Cumulative Index to Nursing and Allied Health Literature (http://www.cinahl.com), and Google Scholar (https://scholar.google.com/) [23].

The underlying logic of citations searching is best described by one online source; "Scholarship is a conversation, and citations are the thread of that conversation. Learning how to follow citations will help you track down those hard-to-find resources and broaden your search strategy for very current or very specific topics" [24].

In other words, citations searching allows a researcher to obtain an overview of the relevant works on a topic by method of "association", building a network (or web) of literature that are cited by ("backward citation"), and that are citing ("forward citation") a particular paper [25]. In addition, second-order relationships, or papers related to a cited paper ("co-citations"), can also be discovered through this process [22].

Advantages and disadvantages of citations searching

Citations searching is, in the perspective of some sources, a more intuitive and efficient means of searching the literature especially for topics where key words are not standardized across the discipline [20]. However, some authors contend that citations searching should be viewed as a supplement , and not a replacement, to keyword and index term searching as citing literature is done by authors to pursue different ends [26, 27]. Indeed, combining semantic or keyword searches with citations search is deemed a better approach as it is able to generate a higher yield of literature [28].

Researchers, then, need to be aware of the strengths and limitations inherent to the method of citation searching. Among its vaunted strengths are that (a) citations searching allow researchers to identify seminal works, or pearls, in the research topic; and (b) the process may lead to identification of parallel fields of inquiry relevant to the research topic but previously unknown to the researcher [19, 21]. However, the process may be tedious as researchers will have to peruse and critically appraise individual citations for relevance to the topic, something which cannot be determined through a glance at the citations list alone [21]. Furthermore, citation of an article may either be because of support or refutation of certain findings or stance enunciated in a paper [26]. Another disadvantage of citations databases is that access to most of these is usually by subscription only, which means institutional affiliation is usually required to be able to search these [23].

Individual databases are also populated using proprietary algorithms, which means the output of one citations database will be most likely different from another. One example was presented by Levay et al [29], in which they compared the output of Web of Science and Google Scholar in generating literature for public health. The authors concluded that Google Scholar search was less effective and less efficient compared to Web of Science [29]. This finding can be attributed to the fact that the scope of Google Scholar is much wider (i.e., practically everything online) [23].

Implications for the academic community

All in all, however, the value of citations searching as a supplement to index search is beyond question. Researchers conducting literature reviews should carry out citations searches in relevant databases to be able to paint a more comprehensive picture of the theoretical, empirical and methodological landscape of the topic or field to be examined.

On a more practical note, the following recommendations are directed to various stakeholders in universities who wish to generate evidence-informed scholarship:

(a) University administrators will need to consider subscription to citations databases relevant to the major fields of study in their institution. As was noted earlier, some databases such as Web of Science and Scopus, among others, require subscription. Therefore, institutions need to make an investment to remove the physical and financial barrier to access these databases if it is to encourage sound research among its staff and students. Further, subscriptions must be kept up-to-date since the content of databases continually expand alongside the growth in scientific literature.

(b) A trained cadre of information specialists, usually attached to a university's library service, should be able to provide guidance to faculty and students on citation searching through formal seminars or one-on-one consultations [25]. This includes determining the appropriate databases for one's discipline or field of study, as well as carrying out the search process itself.

(c) Faculty, research staff and students should be introduced to the citations databases early in their career or stay in an academic institution, and thereafter updated through retooling or refresher courses. This, of course, is in addition to the proper ways of searching for literature using keywords and index terms (or what I referred to previously as "semantic search").

Students undertaking research should be encouraged, if not required, to incorporate citations searching as a technique in building their literature review. Consequently, faculty-supervisors may need to include this aspect of the research process in their coaching sessions.

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