

Approaches for Improving Literature Review Methods

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The goal of *The Journal of School Nursing* is to enhance the health of schoolchildren and the school community by providing evidence for practice. Literature reviews are an important manuscript type for providing evidence because they can describe previous work, synthesize and critique work that has been done, and draw on summarized findings to inform practice (Cowell, 2012). Recently, a literature review was submitted on the role and impact of school nursing. The databases searched were clearly described, EBSCO online (Cumulative Index to Nursing and Allied Health Literature), Educational Resource Information Center Database (ERIC), Medline, and Academic Search Elite. The search terms were also described: school nurse, school nursing, primary school, elementary school, and child. The author reported had clear research questions.

The problem I immediately noticed was several authors who have published intervention work in *The Journal of School Nursing* were not included in the review. Other researchers whom I am familiar with and who have published research outcome articles in other journals were not included in the review. My thought was that the problem was with the key words that authors use. None of the articles published in *The Journal of School Nursing* that I was thinking of included the key words school nurse, school nursing, primary school, elementary school, and child. The key words in the articles that I knew about that were not included in the review were focused on the problems and methods such as physical activity, intervention effects, exercise, obesity, and depression.

Many of us now, jump onto a database, insert some key words then think we have an extensive listing of the literature we are seeking. For experienced researchers and authors, we may know about foremost experts in a field, and if the expert is not included in the search, we search by author. Beginning researchers may not know the expert field.

I invited Rachel Jaffe, a metadata librarian at the University of California Santa Cruz, to provide some directions, not only for those searching the literature but also authors who are interested in having their work reviewed, cited, and translated into practice. The information and directions can also help The Journal reviewers by informing them of important strategies to look for in review methodologies.

Rachel Jaffe

The problem Dr. Cowell identified is not uncommon: When users fail to recall all of the literature relating to a given

topic, there are two things to look at: (1) how are they are searching and (2) how are the resources, which in this case are scholarly articles, being described? The problem is 2-fold: There is an issue of information retrieval and one of metadata creation. If information retrieval is the process of discovering and getting resources out of a database, metadata creation is the work of adding descriptive information to facilitate that process.

Literature searching is as important as the work of evaluating, comparing, and forming conclusions about the literature identified; the resources found form the foundation of the literature review. However, despite the importance of evidence to evidence-based practice, we find that authors mistakenly assume that searching for scholarly articles is as simple as dropping key words into search box.

Beneath the interfaces, algorithms and talk about the semantic web, databases and search engines are still fairly unintelligent (Badke, 2011). We tend to ascribe them a mystical omniscience when in fact they are tools. While masters at matching strings of text, databases do so without reference to meaning or to an individual user's idea of what may or may not be relevant. Therefore, it is up to the user to be smart and to think strategically.

Academic and professional databases are designed to provide for two different types of searching: key word and metadata-driven searching. A key word search matches words or phrases against the full text of a resource; whereas a metadata-driven search matches words and controlled terms within a predefined category of information, such as author, title, or subject. While commonly defined as "data about data," descriptive metadata is better understood as the elements (author, title, subject headings, etc.) used to describe resources for the purposes of discovery and identification (National Information Standards Organization, 2004). When searching or retrieving information—even when key word searching—it is helpful to have an understanding of what metadata is, what metadata is available about a resource, how that information is assigned and indexed.

We are all familiar with search engines like Google and Google Scholar in which we can enter a natural language key word query and receive millions of hits. As a result, many users approach specialized databases as they would a search engine (Grey & Hurko, 2012). They do not realize that metadata-driven search options exist or that they can be used to produce higher quality and more manageable sets of results. When discussing information retrieval and search

strategies, librarians talk about recall and precision. Recall is the ratio of relevant resources retrieved to all relevant resources within a database and precision represents the ratio of relevant resources retrieved to the total number of resources retrieved (both relevant and irrelevant). While one is able to recall a large, diverse set of resources using a key word search, it is also common that a significant number of results are irrelevant (low recall) or that the most relevant resources are missing from the result set (low precision). In considering the advantages and limitations of key word and metadata-driven searching, the most successful search strategies employ a combination of both.

Key Word Searching

Key word searches are “designed to scour full-text resources for the presence of keywords regardless of context or meaning and bring back results based on the string of characters that was typed in” (Grey & Hurko, 2012, p. 17). Most databases will match any key words entered against the full text of a resource and any associated metadata; however, databases do not match words as we understand them. They are not matching the concept “baby;” they are matching the characters b-a-b-y to resources that contain the string b-a-b-y. It is important to understand that the natural language used in a key word search does not control for variations in form (baby vs. babies), spelling (color vs. colour), context, homonyms, and synonyms. A search for “depression” is just as likely to yield results for the mood disorder as it is for the landform. It may also miss resources where the term “mental illness” is used instead of “depression.”

Key word searching enables users to include a variety of terms in one query and combine concepts using Boolean operators. Boolean operators form the basis of database logic and define the relationship between search terms (MIT Libraries, n.d.). In basic Boolean searching, the operators “and,” “or,” and “not” are used to broaden or narrow a search. It is interesting to note that Boolean operators can exist in a search even when they are not visible. For example, the default Boolean operator in most databases is “and.” So the search “how to treat colds and the flu” is understood by the database as “how+treat+colds+flu.” It will then look for resources that contain all of these words thereby inadvertently limiting the search. Resources concerned only with colds or only with flu will not appear in the result set. In general, when building a key word search, best practice is to start with one or two terms or concepts at a time, and use Boolean operators to restrict, grow, and shape the results as you add to the search query.

Unlike Google, the resources in databases are already filtered, sorted, and vetted. Academic and professional databases contain literature from trustworthy sources. They also contain features like facets, which can be used to narrow search results by type of literature, whether or not it is peer reviewed and so forth.

The flexibility of key word searching is both its weakness and its strength. It is a great way to build a familiarity with a topic and to begin identifying common terms, themes, authors, and journal titles. It is also a useful strategy when searching for new terms and emerging concepts. However, overreliance on key word searching can lead to frustration, information overload, or a literature review that is missing key resources (Grey & Hurko, 2012).

Metadata-Driven Subject Searching

The author is often the first person to describe or assign metadata to the resource they have produced. Information typically includes title, abstract, and author-supplied key words like “Diabetes Mellitus type I” or “autoimmune diabetes.” This author-generated metadata along with the resources themselves are then reviewed by professional indexers who verify this information and assign additional metadata like controlled subject headings and descriptors.

Controlled vocabularies—lists of subject headings that are maintained by information professionals—and other thesauri provide for shared understandings of terms and prescribe the hierarchical relationship between broader and narrower terms. For example, looking at the Medical Subject Headings (MeSH) heading “Diabetes Mellitus, Type 1,” within the thesaurus, there is a scope note describing the term along with a series of cross references. The primary benefit of controlled vocabularies like MeSH is that it doesn’t matter which term or how an author decides to use a term within work or to add to their author-supplied key word (e.g., autoimmune diabetes or diabetes mellitus, insulin dependent), within the database, every resource on this topic should contain the same standardized MeSH heading within its descriptive metadata. Thus, when subject searching using controlled terms, one can expect to return a cleaner set of results that not only match a string of characters (as key word searching does) but are germane to the concept being searched (Badke, 2012). The downside of using controlled terms is that they are not always intuitive and we are also assuming that each resource within a database has been described accurately and completely.

Controlled vocabularies and author-assigned key words differ in that the latter are generally not controlled. Author-generated key words can give insight as to how authors think about and describe their work, but they do not always account for how others might think about, categorize, or search for their work. These additional metadata also help give subject coverage to new and emerging areas of discourse for which controlled terms may not yet exist, moreover they’re useful when tracking trends or the rise and fall of jargon within a discipline. However, as with other natural language key words, inconsistencies in the meaning, context, spelling, and the form of author-assigned key words can lead to information retrieval problems (Badke, 2011).

Recommendations

When searching for resources on a particular topic, it is essential that one develops a robust search strategy. Some recommendations:

1. Be prepared: Before you start entering key words into a search engine, take a moment to identify appropriate databases. Information about databases can be gathered from library resource guides, from the products themselves, or from product-related websites. Some questions to consider are as follows: Which disciplines are related to your topic? What kind of materials are you looking for? What journal titles are represented in the database? As a rule, it is necessary to consult more than one database to catch everything (Facchiano & Snyder, 2012; McFadden, Taylor, Campbell, & McQuilkin, 2012).
2. Have your research question ready: Using the Patient, Intervention, Comparison, Outcome (PICO) model, you can begin to derive search queries from your research question. A well-constructed PICO breaks down the clinical guiding question into individual concepts by using words or phrases to describe the concepts and establishes an inclusion or exclusion criteria before searching (Facchiano & Snyder, 2012; Melnyk & Fineout-Overholt, 2005). Min-Ling E. Fan, Education and Information Consultant for Nursing and Social and Behavioral Sciences at the University of California San Francisco, uses the following example in her presentation on evidence-based practice and literature searching: In African American female adolescents with hepatitis (Patient), what is the effect of acetaminophen (intervention) compared with ibuprofen (comparison) on liver function (outcomes)? (Fan, n.d.). Each piece of the PICO presents a key word that can be searched or a term to be looked for in a database's thesaurus. Make note of synonyms and alternative terms for each concept. For example, when searching for "acetaminophen" you may also want to try "paracetamol" or "APAP."

Use a multipronged approach: Employ multiple search queries; no single query or search strategy will yield 100% recall or 100% precision. When used effectively, key word searching is a good way to maximize recall, whereas metadata-driven subject searching is helpful when focusing or increasing the precision of a search. Start big and go small: Key word searching can give a big picture view and then use Boolean operators and controlled terms to drill down and refine your results. Another strategy for limiting results is to restrict key word searches to specific metadata fields. For example, you can search for "young adults OR adolescents AND eating disorders" in just the abstract or just the title.

Familiarize yourself with the thesauri in use within the database to identified controlled terms; a good way to do this is to run a key word search, look at the subject headings for relevant results, and click on or search on those terms to view related resources. Other strategies include citation chaining or the ancestry approach—a process of reviewing citations from relevant resources in order to identify key works, authors, and journal titles within the area of interest. You can then search for those items specifically or use these as factors to narrow your search.

1. Keep a record of your queries and your search strategy: Many databases have this functionality built in. At the end of a session, you can print, save, or e-mail your search history. Having this record makes it easier to rerun a search, execute it within another database, and report your search strategy.
2. Give yourself enough time: Be patient and practice. As recommended by McKibbin et al. (2002), you want to operate in a problem-solving mode. Think about your research question from different angles and don't hesitate to experiment with different approaches or combinations of search terms. Each time you formulate a query or take a moment to explore or experiment with the functionality of a database, you are adding to your skill set (Facchiano & Snyder, 2012).
3. Ask for help: Librarians are information retrieval experts; they are trained to provide specialized research services. They can also assist you in appraising the quality of resources.

The success of the search affects the quality of the literature review. Returning to the idea of metadata creation, database searching is improved by the existence and use of descriptive metadata. Several studies have shown that approximately one third of relevant resources returned on a successful key word search are recalled based on matches with expert-assigned controlled vocabulary terms (Gross & Taylor, 2005). These resources would not have been discovered without metadata in a full-text search alone. The intervention of information professionals is as key to information retrieval as a thoughtful and comprehensive search strategy. And who better to aid you in locating resources than those who describe them?

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