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Using Evidence in Practice

Unpacking your literature search toolbox: on search styles and tactics

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Introduction

'Building Blocks', 'Berry Picking' and 'Successive Fractions'—although these sound like activities from a kindergarten picnic, in fact, they represent potential tools from your literature search toolbox. Is it not surprising therefore that, with information retrieval such an important feature of the health information professional's repertoire, we pay little attention to the conceptual level of the literature search process? In other words most librarians simply engage in literature searching at a pragmatic 'get the job done' level. Does it matter whether information professionals can describe these search tactics and assign a label to them? Well, let us consider if you were visited by an allegedly qualified carpenter who asks you to pass 'that thingummyjig with a head and a claw at the end' or that 'thingy with the jagged teeth'. It would hardly inspire you with confidence in their ability, wouldn't it?

Furthermore, as I have argued elsewhere, it is engagement with the evidence base—that corpus of professional knowledge—that distinguishes the professional from the practitioner. The analogy is between the surgeon and the barber:

> Whereas the art of the barber has remained essentially unchanged over many millennia, the profession of the surgeon continues to evolve, stimulated by technical improvements and technological innovation. Wherein lies the difference between these two activities? Is it not in the building up and transmission of an evolving body of knowledge?[1]

Of course, more important than placing an appropriate label on a specific search tactic is judicious selection and use of such techniques to match a corresponding information need. Could it be that many librarians demonstrate the 'art' of the searcher without it being underpinned by their professional evidence base?

Knowledge support or decision support?

A useful distinction, in a book describing systematic review-type information products, is between 'knowledge support' and 'decision support'.[2] This distinction applies equally well to the main applications of literature searching. At the knowledge end of the continuum (Fig. 1) is the 'classic' systematic review which synthesizes and summarizes current knowledge in a specific field. Search techniques for

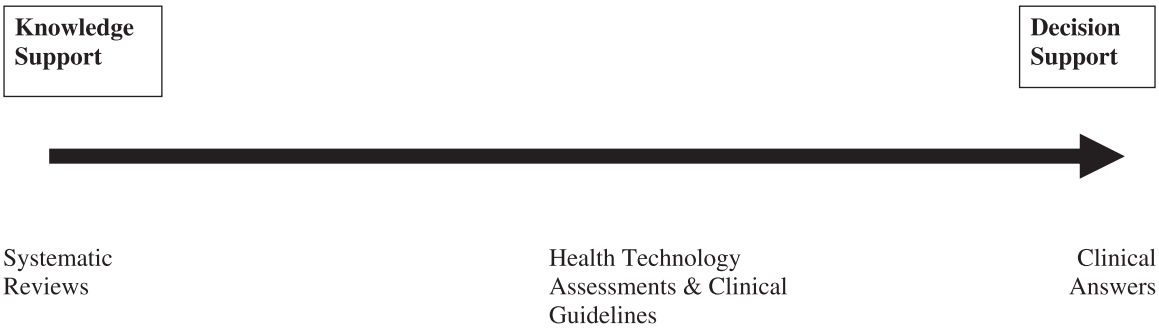

Figure 1 From knowledge support to decision support

this must be comprehensive and exhaustive. Towards the middle, inclining slightly towards the decision side, are health technology assessments and clinical guidelines. These aim to give a fairly complete picture but their emphasis is on multiple types and sources of information to inform a specific clinical decision or context. Search techniques for these are typically systematic and reproducible and yet their quest for answers also justifies use of creative and imaginative strategies that are less systematic but address an otherwise unanswered question. At the decision end of the continuum is search support for clinical question answering. Searches to inform clinical answers or evidence digests must be specific and relevant. They do not claim to be exhaustive; indeed they cannot do so because of time constraints. Nevertheless they follow a searching protocol to increase the likelihood that they have covered all major potential sources. Thinking of our searching in these contexts helps to inform selection of appropriate search styles and tactics.

Search styles and tactics

Several authors characterize certain 'search styles' or 'search tactics'—sometimes described as 'search strategies' although these now more commonly signify the specific syntax and keyword combinations that operationalize retrieval. We might speculate that emphasis on the latter, in searching for systematic reviews, may explain the apparent neglect of equally important techniques practised at a more strategic level. My introduction to these search styles and tactics came from a book purchased when my institution first embarked on systematic reviews; Online Searching: Principles and Practice.[3] In fact this book gave quite sparse attention to search styles and tactics. Nevertheless it was influential enough to influence a colleague of mine in her chapter on searching the library literature in our text on Evidence-based Practice.[4] Subsequently I discovered the origin for five such styles (Building Blocks, Citation Pearl Growing, Successive Fractions, Most Specific Facet First and Lowest Postings Facet First) in a 1978 manual for the ERIC educational database.[5] The book on Online Searching[3] identifies one further style (Drop a Concept). Two further styles derive from an influential article by Bates (Berry Picking)[6] and a 25-year old article by Hawkins and Wagers (Interactive Scanning).[7]

Building blocks

Our first style needs little introduction as it is most commonly used by literature searchers—often at the expense of a more extensive repertoire. Dividing a query into Facets A, B, and C, complete with variants and synonyms, and then adding these concepts together using the Boolean AND operator has become particularly popular when used with the Patient-Intervention-Comparison-Outcome (PICO) formulation of Evidence-based Medicine.[8] Typically, focused questions for systematic reviews through to clinical question answering require the Patient/Population (Facet A) and the Intervention (Facet B). However the specific contribution of Evidence-based Medicine is frequently in replacing Facet C, formerly a third topic area, with a methodological hedge or filter.

Citation pearl growing

Many librarians continue to confuse citation pearl growing with citation searching. Notwithstanding its name, citation pearl growing utilizes bibliographic databases not citation indices. The technique involves starting with a very precise search to find one key relevant citation. You then examine index terms and free text terms found in the relevant citation. Any new terms, not in your initial strategy, are incorporated into a new strategy. This continues until you have identified all additional relevant terms and included them in your strategy. This technique is intuitive to many searchers although I suspect even experienced searchers do not use it routinely or as a systematic prelude to the building blocks approach. Citation pearl growing is appropriate for generating the comprehensive and exhaustive lists of terms required for systematic review searching and the precise and specific terms required for an answer to a clinical question. The evidence base for citation pearl growing is limited and colleagues have been experimenting with its utility for a systematic review of workplace-based e-learning.[9]

Related articles features

Comparatively recent developments, such as 'Related Articles' features on PubMed and commercial databases, exploit a machine equivalent of 'citation pearl growing'. One limitation of this automated approach is that articles may be related across multiple characteristics, not simply those that are the focus of our search. For our *Making the Most of PubMed* courses we developed an exercise that involves taking the search statement for a Related Articles query from the PubMed History (e.g. '#4 Related Articles for PubMed (Select 12666641)') and combining the result set with one of our original search facets ('#4 and qualitative'). In essence this tactic is an innovative derivative of citation pearl growing and building blocks approaches. It has particular applicability to clinical question answering.

Successive fractions

Successive fractions (also known as 'divide and conquer' or 'file partitioning') is another tactic that elicits 'I know it when I see it' reactions from experienced searchers. In this case the first facet represents a major topic from the initiating question. Each subsequent facet is added as an AND condition to the results set. Each result set thus becomes progressively smaller until either the number of retrieved references becomes manageable or the result becomes zero hits (in the latter case a further tactic, 'Drop a Concept', becomes useful). A variant is where a large result set of very relevant articles (e.g. Facet A AND Facet B AND Facet C) is 'fractionated' by specific terms in turn (e.g. Facet A AND Facet B AND Facet C AND Facet D; then Facet A AND Facet B AND Facet C AND Facet E; then Facet A AND Facet B AND Facet C AND Facet F and so on). This approach is suitable for a health technology assessment or a clinical guideline where there are neither resources nor time to sift through every single abstract but where we are prepared to look through a number of smaller result sets of higher relevance.

Most specific facet first

One issue to which information professionals do not give sufficient attention is the order in which they select the facets to search. This relates to the next two search tactics. In this first instance you start the search with the most specific aspect of the query—usually selected where there is particular precision (e.g. the name of a test or a named relatively uncommon drug). For example, the new drug Maraviroc yields just over one hundred references to examine on PubMed so why bother to add a second facet related to HIV infections? This search technique is appropriate for very narrow pharmacological systematic review topics or for clinical questions relating to a new named treatment.

Lowest postings facet first

A related tactic is where you anticipate the facet with the lowest number of postings. If you are prepared to look through the total number of references resulting from this lowest postings facet then, the argument goes, why add a more sophisticated search strategy? The MeSH thesaurus on several commercial versions of MEDLINE does indicate how many records have been assigned to a particular term. If this term is likely to yield < 100 records then time is better spent on sifting rather than adding additional search terms with the danger of a loss of relevant references.

Drop a concept

The Drop a Concept tactic can be used in conjunction with many of the above search tactics. When the number of references in a result set falls below an acceptable level (or indeed reaches zero) you can choose to drop the least relevant facet. This yields a more sensitive result set that is less vulnerable to the vagaries of abstracting or indexing practice.

Berry picking

The 'berry picking' model of information retrieval was proposed by Marcia Bates in 1989.[6] It reflects the natural interactions of the end-user whose information needs constantly change as they examine and process the results of each search set. You might start with a general query, equivalent to evidence-based medicine's 'background question',[10]

such as 'what are the available treatments for influenza?' As you examine results you may identify names of specific treatments or of members of a research team working in this area. You might then follow up with a more specific search query or an author or citation search. If you find an answer or a partial answer you may cease or refine your search. While such a method falls short of the rigour and auditability required for an already-defined and explicit systematic review question it is potentially useful for the preliminaries of scoping a review question, for defining concepts or for searching for specific information to inform an economic model. It would also be appropriate for finding clinical answers. Bates' model of 'berry picking' is actually a meta-strategy, including six specific tactics:

1 Footnote chasing (or 'backward chaining'). This involves following up references (footnotes) in books and articles of interest, and moving backward through a chain of reference lists.
2 Citation searching (or 'forward chaining') where you begin with a citation, find out who cites it by looking it up in a citation index, and follow the chain in a forwards direction.
3 Journal run (hand searching relevant journals).
4 Area scanning (browsing materials physically collocated with materials located earlier in a search).
5 Subject searches in bibliographies and abstracting and indexing (A & I) services.
6 Author searching.

While such tactics are now prominent in systematic review methods they are rightly viewed as supplementary, and not alternative to, a rigorous and systematic subject search using building block techniques.

Interactive scanning

As with berry picking, interactive scanning is suitable for users who are unfamiliar with a topic.[7] It is differentiated in that you start with a large set of results retrieved on a broad concept on a particular topic. Although this may be the case with 'berry picking' it is not necessarily so as berry picking could start with a very specific search for a known item. As you scan retrieved items, the concept becomes progressively clearer. You throw out redundant terms and include in relevant terms. Berry picking and interactive scanning require close proximity to the origin of the information query, preferably with the requester sitting alongside the searcher to allow ongoing feedback and interaction. They may be particularly suitable for 'live' clinical questions.

Conclusion

The above brief survey illustrates a significant evidence base describing different search styles and tactics. Is this evidence used in practice? Some techniques undoubtedly have become encapsulated in the 'lore' of librarianship or are carried out intuitively. Nevertheless other techniques appear underutilized or absent from the consciousness of even experienced searchers. Furthermore we do not possess a consistently-derived and accumulated evidence base of which techniques to use and when—i.e. we have unanswered questions regarding appropriateness. For evidence-based practice to impact on our day-to-day literature searching requires that we develop and disseminate a codified body of knowledge of what works best under what circumstances. It is hoped that by documenting the 20 years plus legacy of literature on search styles and tactics this feature makes the first tentative steps on a long, and yet ultimately fruitful, journey to improved searching practice.

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