Searching the Literature

Susan A. Fowler, MLIS
Medical Librarian
Systematic Review Services Coordinator
Washington University in St. Louis
School of Medicine
Bernard Becker Medical Library
Objectives

• Types of Searches
• Clarifying Your Research Question
• Search Tools
• What to Look For
• Resources for Preliminary Searches
• Guidelines
• Exhaustive Database Searches
• Library Services and Resources
Definition

A Systematic review “attempts to **collate all** empirical evidence that fits pre-specified eligibility criteria in order to answer a specific research question. It uses explicit, systematic methods that are selected with a view to **minimizing bias**, thus providing more **reliable findings from which conclusions can be drawn and decisions made.””*

“If we pull this off, we’ll eat like kings.”

Types of Searching
<table>
<thead>
<tr>
<th>Type of Search</th>
<th>Purpose</th>
<th>Sources</th>
<th>Document</th>
<th>Skill Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preliminary Search</td>
<td>• Identify existing reviews</td>
<td>• Scopus</td>
<td>Sources searched and terms used for research notes and to share with librarian</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>• Assess volume of potentially relevant studies</td>
<td>• Cochrane Library</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Locate at least 2-4 example articles that meet your review criteria</td>
<td>• PubMed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exhaustive Database Search</td>
<td>Identify all publications and as much grey literature as possible that meet study requirements</td>
<td>• Scopus</td>
<td>*Sources and Platforms *Dates *Applied Database Supplied Limits * # Search Results * Completely Replicable Search</td>
<td>Advanced</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Cochrane Library</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Ovid Medline</td>
<td>* = required for reporting in publications</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Embase</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• CINAHL</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Subject Specific Databases</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Trial Registries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hand search</td>
<td>Identify grey literature like conference proceedings abstracts for posters and presented papers not indexed in online databases</td>
<td>• Subject specific professional association websites</td>
<td>*Sources searched *Dates *# Search Results * = required for reporting in publications</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Major relevant journals</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Bibliographies of all included studies</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Bibliographies of on topic reviews</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact Experts</td>
<td>Identify unregistered studies with unpublished results or potential results</td>
<td>• Names, dates, and methods of contact</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• All responses</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Preliminary Searches

• Purpose
  – Identify existing reviews
  – Assess volume of potentially relevant studies
  – Locate at least 2-4 example articles that meet your review criteria

• Sources
  – Scopus
  – Cochrane Library
  – PubMed

• Document
  – Sources searched and terms used for research notes and to share with librarian
Exhaustive Database Searching

• Purpose
  – Reduce bias as much as possible by identifying all publications and as much grey literature as possible that meet study requirements

• Sources
  – Major databases, Subject specific databases, Grey literature databases, Trial Registries

• Document
  – Sources and platforms, dates covered by the sources and dates the platforms were searched, any applied database supplied limits, any previously published and validated filters used, number of search results, search strategy such that it can be replicated
Clarifying Your Research Question

Knowing how it could change the lives of canines everywhere, the dog scientists struggled diligently to understand the Doorknob Principle.
PICO

• Problem or Patient
• Intervention
• Comparison (when applicable)
• Outcome
PICO cont...

Is social media an effective tool in medical education?
What are the concepts here?
P =
I =
C =
O =
PICO cont...

Is cpap more effective then weight loss in treating hypertension in patients with sleep apnea?
What are the concepts here?

\[
\begin{align*}
P &= \\
I &= \\
C &= \\
O &= 
\end{align*}
\]
Inclusion and Exclusion Criteria

• Typical examples...
  – Age limits
    • Include children aged 0-18
    • Exclude adults age 19+
  – Study types
    • Include RCTs
    • Exclude letters
  – Humans
    • Include humans
    • Exclude animal only studies
"So what's this? I asked for a hammer!
A hammer! This is a crescent wrench! ...
Well, maybe it's a hammer... Damn these stone tools."
Boolean

George Boole (1815 –1864) was an English mathematician and philosopher.

• Invented Boolean logic which is the basis of modern digital computers.
  - AND
  - OR
  - NOT
Boolean

strawberry OR vanilla OR chocolate

Boolean and Nesting

\[(\text{strawberry OR vanilla}) \text{ NOT chocolate}\]

Quotation Marks

Using quotation marks for a phrase forces the database to return results where those words appear together.

Without Quotations = 57,360 results

With Quotations = 13,180 results
Boolean and Nesting Applied to PICO

P: “medical education” OR “clinical teaching” AND
I: “social media” OR “podcast” OR twitter OR
C (not required) AND
O: “effectiveness” OR “self efficacy”

P AND (I OR C) AND O
Boolean and Nesting Applied to PICO

P : “Sleep apnea”

AND

I : “continuous positive airway pressure”

OR

C: “Weight Loss”

AND

O: “hypertension”

P AND (I OR C) AND O
Preliminary Search

What to Look For...
In Light of Your Search Results You May...

- Broaden or Narrow your PICO
- Change your inclusion and exclusion criteria
- Change your whole question

That is all fine but when you are done with your preliminary searching your question needs to stay firm to avoid “scope creep.”
<table>
<thead>
<tr>
<th>FINER</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Feasible</td>
<td>Adequate # of studies</td>
<td>Adequate technical expertise</td>
<td>Affordable in time and money</td>
<td>Manageable scope</td>
</tr>
<tr>
<td>Interesting</td>
<td>Who will be interested in the answer?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Novel</td>
<td>Confirms/refutes previous findings</td>
<td>Extends previous findings</td>
<td>Provides new findings</td>
<td></td>
</tr>
<tr>
<td>Ethical</td>
<td>Time &amp; money spent on project appropriate use?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relevant</td>
<td>To advance scientific knowledge</td>
<td>To clinical/ public health policy</td>
<td>To future research directions</td>
<td></td>
</tr>
</tbody>
</table>

Resources for Preliminary Searches

"Whoa! That was a good one! Try it, Hobbs — just poke his brain right where my finger is."
• Limit to Controlled Clinical Trials and Randomized Controlled Trials to assess volume

• Multiply what you find by 5 to get a sense of how much you will be looking through from the Exhaustive Search
Cochrane Library

- Locate
  - Systematic reviews
  - Protocols
  - Cochrane groups
  - Clinical trials (CENTRAL) not published elsewhere
Scopus

- Sort by number of times cited to find landmark papers
- See “cited by” to find more on topic papers
- Use hyperlinked bibliographies
“Well, here we go again. ... Did anyone here not eat his or her homework on the way to school?”
Working with a Librarian

• Systematic Review Guidelines recommend working with a Librarian trained in Systematic reviews. To do that, the librarian needs your...
  – PICO Question
  – Cochrane Search and any systematic reviews you found
  – Inclusion and Exclusion Criteria
  – Benchmark/Example Articles
Guidelines

Suddenly, Professor Liebowitz realizes he has come to the seminar without his duck.
Reporting guidelines have been developed for different study designs; examples include **CONSORT** for randomized trials, **STROBE** for observational studies, **PRISMA** for systematic reviews and meta-analyses, and **STARD** for studies of diagnostic accuracy. Journals are encouraged to ask authors to follow these guidelines because they help authors describe the study in enough detail for it to be evaluated by editors, reviewers, readers, and other researchers evaluating the medical literature. Authors of review manuscripts are encouraged to describe the methods used for locating, selecting, extracting, and synthesizing data; this is mandatory for systematic reviews.
PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses)

• Following PRISMA guidelines creates a thorough reporting of each element of a systematic review or meta-analysis*

• Journals like BMJ, The Lancet, and Chest endorse the use of PRISMA guidelines for publishing systematic reviews and meta-analyses.**


**Source: http://www.prisma-statement.org/endorsers.htm
<table>
<thead>
<tr>
<th>Eligibility criteria</th>
<th>6</th>
<th>Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information sources</td>
<td>7</td>
<td>Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.</td>
</tr>
<tr>
<td>Search</td>
<td>8</td>
<td>Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.</td>
</tr>
</tbody>
</table>
2.6.4 Describe the search strategy for identifying relevant evidence

STANDARD 3.1
Conduct a comprehensive systematic search for evidence

3.1.1 Work with a librarian or other information specialist trained in performing systematic reviews to plan the search strategy
3.1.2 Design the search strategy to address each key research question
3.1.3 Use an independent librarian or other information specialist to peer review the search strategy
3.1.4 Search bibliographic databases
3.1.5 Search citation indexes
3.1.6 Search literature cited by eligible studies
3.1.7 Update the search at intervals appropriate to the pace of generation of new information for the research question being addressed
3.1.8 Search subject-specific databases if other databases are unlikely to provide all relevant evidence
3.1.9 Search regional bibliographic databases if other databases are unlikely to provide all relevant evidence

STANDARD 3.2
Take action to address potentially biased reporting of research results

3.2.1 Search grey literature databases, clinical trial registries, and other sources of unpublished information about studies
3.2.2 Invite researchers to clarify information about study eligibility, study characteristics, and risk of bias
3.2.3 Invite all study sponsors and researchers to submit unpublished data, including unreported outcomes, for possible inclusion in the systematic review
3.2.4 Handsearch selected journals and conference abstracts
3.2.5 Conduct a web search
3.2.6 Search for studies reported in languages other than English if appropriate
How Librarians Design Exhaustive Searches

It was a tough case. Plenty of witnesses, but no one was talking.
PICO Translated to Search Plan

“Medical Education” AND “Social Media” AND effectiveness
Harvesting Terms
Term Harvesting

• Natural language terms can be harvested from...
  – Synonyms in standard index entries and thesauri
  – Dictionaries
  – Wikipedia entries
  – Titles and abstracts of key articles
Synonyms in Indices

Social Media
Platforms that provide the ability and tools to create and publish information accessed via the INTERNET. Generally these platforms have three characteristics with content user generated, high degree of interaction between creator and viewer, and easily integrated with other sites.
Year introduced: 2012

PubMed search builder options

Subheadings:

- classification
- economics
- ethics
- history
- instrumentation
- legislation and jurisprudence
- organization and administration
- standards
- statistics and numerical data
- supply and distribution
- trends
- utilization

- Restrict to MeSH Major Topic.
- Do not include MeSH terms found below this term in the MeSH hierarchy.

Tree Number(s): L01.224.230.110.500.750

Entry Terms:

- Media, Social
- Social Medium
- Mediums, Social
- Social Mediums
- Web 2.0
- 2.0s, Web
- Web 2.0s
2. E-learning vs lecture: which is the best approach to surgical teaching?

Bhatti I, Jones K, Richardson L, Foreman D, Lund J, Tierney G.

Author information

Abstract

AIM: Most medical teaching is still delivered by traditional face-to-face interaction. E-learning has the potential benefit of instilling deeper learning of topics by virtue of repeated and convenient access to content presented in a range of media. We aimed to evaluate objectively the benefit of educating medical students on a common surgical topic (haemorrhoids), through a website and podcast package vs a traditional lecture.

METHOD: Baseline knowledge was established by a questionnaire given to two different groups of third-year medical students starting their first clinical attachment. Group A (n = 73) was given a lecture and group B (n = 75) was asked to use a website containing text and pictures augmented by a podcast. Students were reassessed using the same preintervention questionnaire, and satisfaction was acquired from details given in a feedback form.

RESULTS: There was no difference in knowledge between the two groups at baseline. Both groups demonstrated significant gains in knowledge after intervention (P < 0.0001). Group B (Web/podcast) showed a significantly greater increase in knowledge (P < 0.05) than group A (lecture). Preintervention subjective assessment of knowledge rated by the students showed no difference between the groups. Both groups of students were equally satisfied with the educational method.

CONCLUSION: E-learning supplemented with a podcast results in greater knowledge acquisition when compared with a traditional lecture, without a loss of satisfaction with teaching. Using augmented Web-based educational tools reduces demands on teaching time with no decrease in quality for selected parts of the curriculum.
The effectiveness of streaming video on medical student learning: a case study.

Bridge PD, Jackson M, Robinson L.

Author information

Abstract

Information technology helps meet today's medical students' needs by providing multiple curriculum delivery methods. Video streaming is an e-learning technology that uses the Internet to deliver curriculum while giving the student control of the content's delivery. There have been few studies conducted on the effectiveness of streaming video in medical schools. A 5-year retrospective study was conducted using three groups of students (n = 1736) to determine if the availability of streaming video in Years 1-2 of the basic science curriculum affected overall Step 1 scores for first-time test-takers. The results demonstrated a positive effect on program outcomes as streaming video became more readily available to students. Based on these findings, streaming video technology seems to be a viable tool to complement in-class delivery methods, to accommodate the needs of medical students, and to provide options for meeting the challenges of delivering the undergraduate medical curriculum. Further studies need to be conducted to continue validating the effectiveness of streaming video technology.
How we use social media to supplement a novel curriculum in medical education.

Bahner DP, Adkins E, Patel N, Donley C, Nagel R, Kman NE.

Author information

Abstract

BACKGROUND: The millennial learner is reliant on technology to gain knowledge. Social media in the form of Twitter and Facebook provide a unique way to reach these learners.

AIMS: To demonstrate a supplement to a curriculum using "push technology" via Twitter and Facebook to deliver educational content to mobile devices.

METHODS: A curriculum consisting of high-yield ultrasound concepts was developed and posted to Twitter @EDUltrasound daily. Followers received tweets "pushed" directly to their mobile devices. Following the year-long program, followers were surveyed regarding the program's effectiveness. To determine the ways in which tweets were reaching users, followers were categorized demographically.

RESULTS: Daily "tweets" were posted each morning beginning on July 1, 2010. By the end of the year, there were 87 followers on Twitter and 78 on Facebook. The majority of followers (55.6%) had not previously used Twitter. The majority of followers (88.9%) found Twitter user-friendly, while most (81.5%) found the information useful.

CONCLUSIONS: Due to ease of use and widespread applicability, Twitter and Facebook are excellent applications of "push technology" as a means to deliver educational content. This pilot project demonstrates the potential of social media to both supplement and enhance traditional educational methods.
### List of social networking websites

From Wikipedia, the free encyclopedia

This is a list of major active social networking websites and excludes dating websites (see Comparison of online dating websites). For the list of defunct social networking websites, please visit the [defunct social networking websites page](https://example.com/defunct-social-networking-websites).

This list is not exhaustive and is limited to notable, well-known sites.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description/Focus</th>
<th>Date launched</th>
<th>Registered users</th>
</tr>
</thead>
<tbody>
<tr>
<td>43 Things</td>
<td>Goal setting and achievement</td>
<td>1 January 2005</td>
<td>3,000,000[2]</td>
</tr>
<tr>
<td>Academia.edu</td>
<td>Social networking site for academics/researchers</td>
<td>September 2006</td>
<td>211,000[4]</td>
</tr>
<tr>
<td>Advocato</td>
<td>Free and open source software developers</td>
<td>1999</td>
<td>13,675[12]</td>
</tr>
<tr>
<td>allodii</td>
<td>Books</td>
<td>2006</td>
<td></td>
</tr>
<tr>
<td>AsianAvenue</td>
<td>A social network for the Asian American community</td>
<td>1997</td>
<td></td>
</tr>
<tr>
<td>aSmallWorld</td>
<td>European jet set and social elite world-wide</td>
<td>March 2004</td>
<td>550,000[10]</td>
</tr>
<tr>
<td>Athinks</td>
<td>Running, Swimming</td>
<td>2001</td>
<td>139,455[12]</td>
</tr>
<tr>
<td>Audimatred.com</td>
<td>Independent music</td>
<td>2010</td>
<td></td>
</tr>
<tr>
<td>Bebo</td>
<td>General</td>
<td>July 2005</td>
<td>117,000,000[15]</td>
</tr>
<tr>
<td>Biip.no</td>
<td>Norwegian community</td>
<td>1 June 2005</td>
<td>430,000[17]</td>
</tr>
<tr>
<td>BlackPlanet</td>
<td>Black Americans</td>
<td>1 September 1999</td>
<td>20,000,000[19]</td>
</tr>
<tr>
<td>Blauk</td>
<td>Anyone who wants to tell something about a stranger or acquaintance.</td>
<td>2010</td>
<td></td>
</tr>
<tr>
<td>Blogster</td>
<td>Blogging community</td>
<td>24 November 2006</td>
<td>85,670[22]</td>
</tr>
</tbody>
</table>
Combine standardized terms with harvested terms and variations...

PubMed Medline
1/25/2016
1,917 Results

Test Full Search Strategy Against Bench Mark Articles

PubMed Medline
1/25/2016
1,917 Results


OR

20041922[uid] OR 20165525[uid] OR 22449268[uid]
We also...

• Translate the search into all agreed upon databases
• Remove most duplicates with EndNote
• Create an EndNote Library of Search Results
• Create an Excel workbook loaded with search results to aid in tracking what you do with citations and data for your PRISMA flow diagram and other tables and charts
• Write a Methods section regarding the Exhaustive Search process according to PRISMA and IOM Guidelines
Library Resources and Services for Systematic Reviews

• Librarian designed search strategies
• Written methods section regarding search
• Database access and recommendations
• Grey literature access and recommendations
• Citation Management
• Inter-library Loan
• Trained librarian expertise
Full-text Retrieval

• 1. Use EndNote to automatically retrieve all online articles held by Becker. Instructions below.

• 2. Check to see if Olin Library has remaining articles online.

• 3. Look in Becker's catalog for print copies which you can scan into PDFs using Becker's scanners. *Note – If you send the staff at the Health information Resources desk a list of the articles you need to pull, they can pull the actual volumes for you and have them waiting for you so all you have left to do is make copies or scans. You can email this request to askbecker@wustl.edu. Be sure to give them two days advance notice.

• 4. Request remaining articles through Interlibrary Loan. There is a charge per article so be sure to plan for that in your grant.
Interlibrary Loan

- $6.00 per article
- Check Olin Library first, they have a large collection that includes medical journals: library.wustl.edu
popular resources
- AccessMedicine
- Clinical Pharmacology
- CINAHL Plus (EBSCO)
- Embase
- Interlibrary Loan
- Ovid

discover becker
- PubMed
- SCOPUS
- StatRef
- Subject Guides
- UpToDate
- Web of Science

news & information
FROM BECKER BRIEFS
- Make your own medical apps: Resources to get you started
- Most Popular e-Books
- Scholarly Publishing Round-up: Article Metrics
Interlibrary Loan and Document Delivery Account

ILLiad is the electronic system for requesting Interlibrary Loan and Document Delivery Services.

Accessing ILLiad:

- Registered Users
- First Time Users

* If you are not sure if you have an account, select “First Time Users.”

With an ILLiad Account you can:

- Request materials not owned by the Becker Medical Library (interlibrary loan).
- Request photocopies of articles owned by Becker Medical Library (document delivery).
- Request a book owned by Becker Medical Library. The book will be pulled and held at the Information Services Desk in the library. There is no charge for this service.
- Revise your requests.
- Check request status.
- Renew Interlibrary Loan materials before they are due.
- Resubmit cancelled ILLiad requests.
- Update your ILLiad account information.

Helpful Links:

- First Time User Registration for ILLiad
- ILLiad FAQs
- Interlibrary Loan Services and Fees
- Interlibrary Loan Policies
Research Pod Computers

• A cluster of Macs and PCs with a core set of statistical, research, and presentation software

  • Adobe Creative Suite
  • EndNote
  • GraphPad Prism
  • JMP Pro
  • Mathematica
  • MATLAB

  • Microsoft Office
  • SAS (PC only)
  • SPSS

For other data analysis tools for free or discounted licensing check out:
https://becker.wustl.edu/services/science-support
Citation Management

• Using a Citation Management program is highly recommended for systematic reviews (Endnote, Reference Manager, etc.)

• Endnote available via WUSTL software catalog: $90 for Perpetual license, $37.00 for renewable license

• Use Excel or some other spreadsheet to track what you do with your citations for your PRISMA flowchart...
Questions?

“Mr. Osborne, may I be excused? My brain is full.”