

# Guide to Literature Reviews for Engineering

## Research Process

The research process is a repeating cycle with various stages - very similar to the scientific method. *See Fig. 1.*

This pattern is reflective of the fact that new studies are based off previous studies – the phenomena that we make progress by standing on the shoulders of giants.

## Literature Reviews Defined

A literature review is simply a review of literature - the body of published work.

They are an integral component of the research process because new studies are based on older ones - very comparable to an ongoing conversation or lineage.

Literature reviews serve several purposes: confirmation of need, establishment of focus, identification of specific subject and context, identification of theoretical base, and identification of methodological base.

Every project is different, but generally literature reviews are conducted at the origin, planning/design, and often data gathering stages.

Conducting a literature review entails finding resources pertaining to a topic, evaluating them and reading them.

Examining the literature almost always leads to some reassessment of the research question. The main purpose of research is to discover and communicate something new, filling a knowledge gap, and during the search you reevaluate ideas.

## Method

### Identifying Search Terms

This is an important first step as it helps you think about your topic and break it down into searchable terms. *See Fig. 2.*

Step 1: Articulate your central topic in a sentence or two.

Step 2: Break down the sentences into three broad concepts. Two is not very specific; four is too specific.

Step 3: For each concept or topic, identify synonyms or related terms. These will be your keywords, which can be combined in different ways to pull up search results that are relevant to your research. You might discover additional terms during your searching.

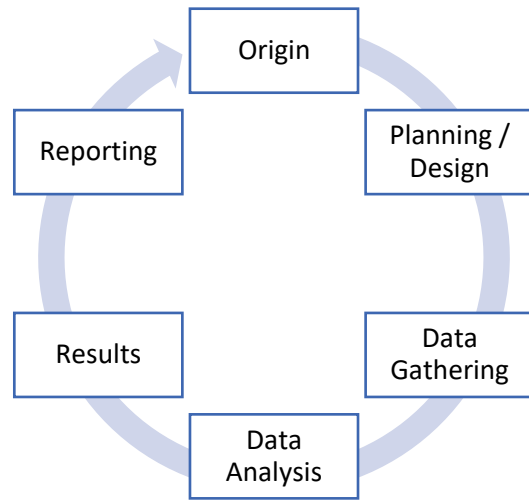


Figure 1. Diagram of the research cycle

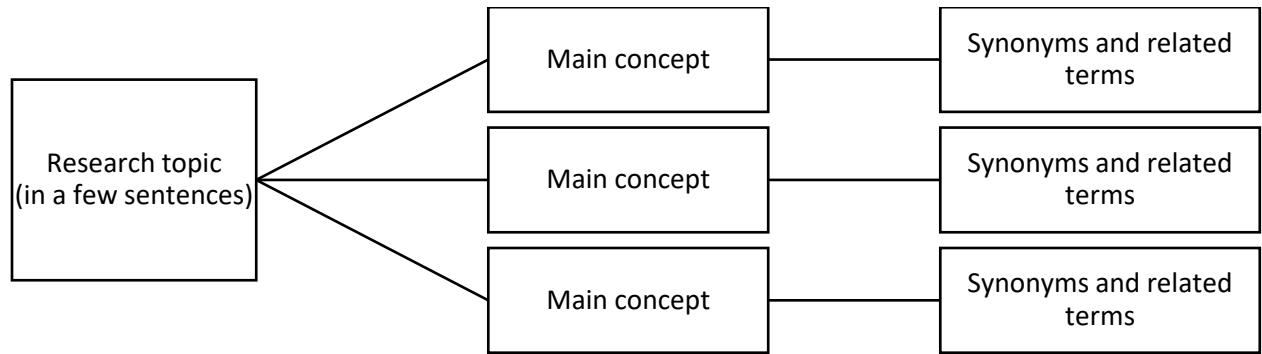


Figure 2. Diagram of a research topic broken down into concepts with related terms

### Navigate to a library database

Begin at Miami University Libraries: [www.lib.miamioh.edu](http://www.lib.miamioh.edu).

Go to the *Database A-Z* list and filter by subject or go to the *Subject Guide* for MME to find applicable databases. The A-Z list and subject guides are very common features on university library websites, so this step is still applicable even if you aren't using Miami resources. The majority of these databases will have journal articles and book chapters in them, but some have other content such as engineering standards and material properties.

There are three types of databases you'll encounter.

- Those that house articles, so the PDF button is right on the article page.
- Those that index resources but don't store the content, so you'll see a yellow button that says "Find it" which will direct you to the database the article is stored in.
- Hybrids with some stored content and some linked content.

There is some overlap in the content of these databases, but also some that is exclusive, so it's beneficial to use several databases during your literature review.

In addition to library sources, your topic may call for a patent search. The [USPTO](http://www.uspto.gov) is the US Patent & Trademark Office and the [EPO](http://www.epo.org) is the European Patent Office. Their sites used to search have special names and address - [PatFT](http://www.patft.com) for US and [Espacenet](http://www.espacenet.com) for EU. These are quite different to conduct searches in than library databases, so ask for help if you need it.

### Do a search and filter results

Try a keyword search with the terms you came up with. In most databases you can and should enter the terms in their own separate boxes.

#### Initial search results

Check how many results you got. Did you get enough, but not too much to look through?

Skim through these titles. Did you get relevant results to your topics?

This initial search usually needs refined by using the filters and/or adjusting keywords. See Fig. 3.

Remember that different databases have different content, so it's worth trying several.

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### Refining the search by format/type

Most databases contain conference papers, technical briefs, and book chapters in addition to journal articles. If you just want to view journal articles, use the limiters - usually adjacent to the results and or in the advanced search options. *See Fig. 3.*

If you have a lot of results – narrow it down

There are multiple strategies to combat this issue.

Use filters to limit results. The kinds of filters vary quite a bit from database to database. Use this to your advantage. Some examples include: journal, author, subject, language, physical property, year, country, author affiliation, associated data, and funder. Not all of these are helpful all the time, but they do help cut down the results list to a manageable number.

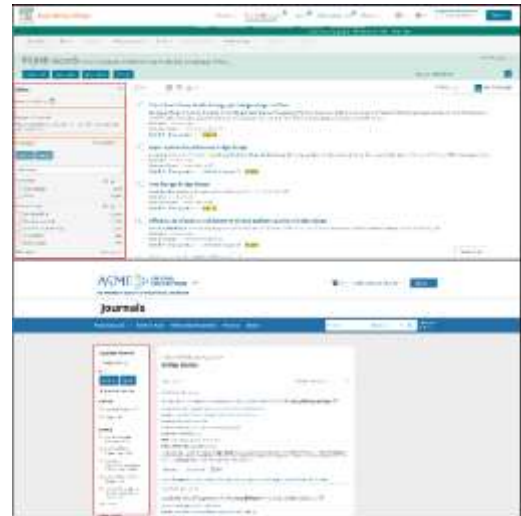


Figure 3. Samples of limiters on the left in both.

Try more specific keywords to focus the scope of the search. Be creative and look through the keywords, controlled vocabulary, or subjects (different databases have different words for this) for ideas.

Ask a librarian if you need help.

If you don't have many results – broaden the scope

There are a number of reasons this can happen. Be persistent and flexible.

Try more general keywords to broaden to the scope the search. Be creative and look through the keywords, controlled vocabulary, or subjects (different databases have different words for this) for ideas.

Pay attention to authors, citations and journal titles. If you find a few good sources, try an author search to see what else that person has written, look at the bibliography to see what related papers of interest you can find there, you can also browse journals which generally publish similar areas of research.

In some situations, even using the suggested strategies, there still might not be much literature on your topic, but there are some that truly needs more research. Ask a librarian if you need help.

### Evaluate the citation information

On the search results page and the articles' page, you'll be presented with some citation information.

Look at not only the titles, but also the authors, author affiliations, journal name, and year of publication. Do you keep seeing the same authors? Which institutions are the authors affiliated with? Is this a team of researchers at the same place, an international and or interdisciplinary team? How current is the research, and does that matter to your project?

Read the abstract. This is like reading the summary on the back of a book before you decide to read the whole thing.

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Increasingly you'll see funding information on the article's page. Who funded this work? What if any interests might they have, especially if it's a company? Is it the same entity that the authors work for? If it is, ask if this poses a conflict of interest and if so might it affect the content of the article?

### Evaluate the article itself

Time to click either the PDF or *Find It!* button.

### Issues getting to the PDF?

If you click the *Find it!* button, you'll be sent to a library page with usually a few choices of databases that have the PDF.

If you get a page that says the we don't have access to it, follow the Inter Library Loan link. This just means we are going to ask another library who has it to send us/you a PDF. This usually takes 3-5 days. Don't discard sources the library doesn't have access to. Librarians want to you have what you need. Do not pay for an article from a publisher's website – you pay tuition and part of that is for library materials so librarians are happy to help you with InterLibrary Loan.

### Read before reading in full

Before you spend time reading the entire thing, skim it - especially sections that are interesting, perhaps the introduction, methods, or conclusions. Check out the data, figures, diagrams, and charts. The references are also worthwhile; just like when you write papers for class, they should have a decent number of references for their work – this also is a great place to find other sources for your research. Check the *acknowledgements* section, it will tell you who else helped with the publication and in what capacities, including funding.

### Sharing and saving the article

After all that work of finding resources, be sure to save and or share them. Often times you can email the citation information with the permalink to yourself or others.

### Permalinks

Permalinks (permanent link), or sharable links, are available in most databases. This is different than the typical link you grab from the address bar those in library databases are tied to your session, so won't work later. The icon for permalinks varies, see *fig. 4* for examples.

### Email it

A common feature in databases is to email the citation, sometimes even the abstract, and the permalink to yourself or others.

### Citation managers

For larger solo or group projects, using a citation management software like Zotero or Mendeley (both free), can be beneficial. With a browser plug in it's easy to add resources, which you can store and



Figure 4. Some examples of icons in different databases, all on the article's landing page. Those highlighted are to save or share a resource.

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organize, take notes in and share with others. When it comes time to write, another plugin for Word or Google Docs, will auto format in-text citations and bibliographies for you.

### Recommended Reading

[D. Deb, R. Dey, and V. E. Balas, "Literature review and technical reading," in Intelligent Systems Reference Library, vol. 153, Springer Science and Business Media Deutschland GmbH, 2019, pp. 9–21.](#)

[R. Subramanyam, "Art of reading a journal article: Methodically and effectively," J. Oral Maxillofac. Pathol., vol. 17, no. 1, p. 65, 2013.](#)

[H. R. Maier, "What constitutes a good literature review and why does its quality matter?," Environmental Modelling and Software, vol. 43. pp. 3–4, May-2013.](#)