Literature Searching

What is meant by **literature**?

Literature refers to a collection of scholarly writings on a topic - the major academic publications that address the research and scholarship about an idea or topic.

This may include books, journal articles, conference papers, government reports and other publications.

A Literature Search is identifying existing research and information about your chosen topic.

Part of the scientific research process is looking at relevant data and information to educate yourself before launching your own research or an experiment.

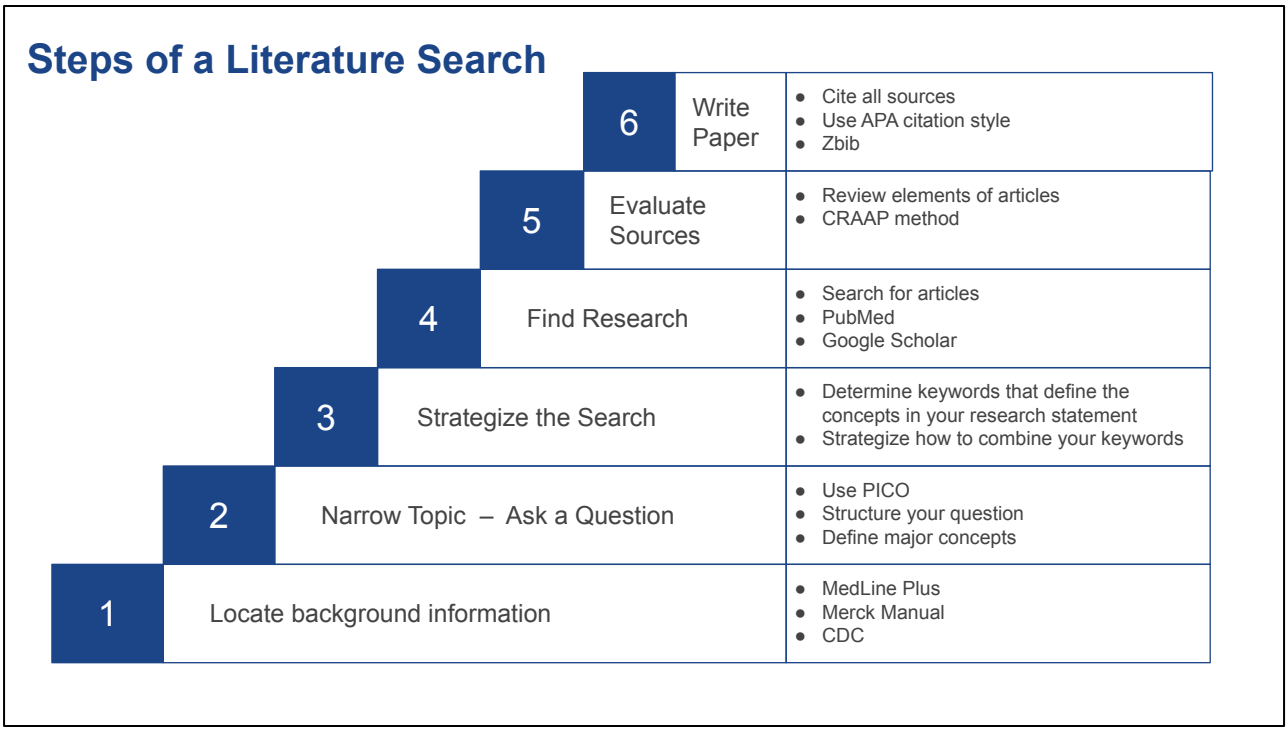
You gather information from credible sources to inform your research question, design, and methodology. This is your literature search: the process of finding and reviewing existing books, articles, or reports related to a specific research topic to gain an understanding of what is already known about the subject and to identify gaps in knowledge that your research might address.

There are many types of literature searches and reviews, some more lengthy and in-depth than others.

The purpose of your search defines the method of it. How many research articles do you need? What type of research studies or reviews will best answer the question you are asking?

In this case - the **BRAINSTEM after school projec**t - the activities related to the **Clinical Simulation Experience** ask you to find content to support a proposal poster presentation. You will do a literature search to find **review articles** related to the topic you want to explore.

A **review article** is a type of academic writing that summarizes and analyzes existing research (other articles) on a specific topic. They provide and overview of the current understanding of a topic without presenting new original research findings.



So, how do you do that?

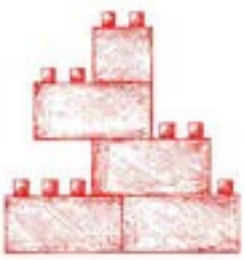
The steps of a literature search follow a basic process and it starts with asking: What do you want to learn more about?

Then:

- Find a bit of background information on that
- Ask a specific question that relates to your topic
- Develop search terms that related to the concepts of your question
- Select a search resource
- Execute the search
- Access the results
- Evaluate and improve your search if needed
- Apply the research you found to answer your question

1 Locate Background Information

Gather background information to get an overview of the basic theories and major themes on your topic as well as become familiar with the terminology.



Gathering background information about a topic is an important first step of the research process. If you are not yet familiar with a topic, you'll want to get an overview of the basic theories, become familiar with the terminology that's used to talk about it. This may seem obvious (maybe even unnecessary?) but it is important and useful.

Resources that cover background or factual information can give you a good foundation to launch from: textbooks, handbooks and manuals, dictionaries, and drug references. For health and medical topics, use resources like MedlinePlus, the Merck Manual, and the CDC.

Or explore some of the websites listed under *Addiction* or *Concussion* resources on the BRAIN-STEM website resource pages.

2 Ask a Question

P	Population Patient
I	Intervention Exposure Test
C	Comparison Control
O	Outcome
T	Time

The first stage of any search should be to define what it is you are looking for.
The best way to define your search topic is to ask questions. Turn your topic into a question that you need the literature to answer. Then ask more questions about the type of information you want to find to answer this question.

One way of breaking down a research question involving medicine or patient care starts with the patient and is known as **PICO(T)**. (caveat: **Some research topics do not lend themselves to the PICO method**. In some instances this may be too complex a process for what you are searching for, but it does provide a good structure for thinking through your question and the components of the literature search that follows.

P= Patient or Population or Problem
Who or what is the question about? What is the disease or condition you need to research? How would you describe a group of similar patients? Do you need to consider age, sex, or any other characteristics? Does the patient have any other conditions or medications that they take?

I=Intervention, Exposure or Prognostic Factor
What is the plan for the patient – the main intervention or treatment you are considering? Think about the type of treatment (diagnostic test, drug, procedure, therapy), the intervention level (dosage, frequency), the stage of intervention (preventative, early, advanced) and the delivery (who delivers the intervention? Where?)

C=Comparison(s)
This compares the effect of an intervention to no intervention or an alternative treatment. Sometimes a ‘gold standard’ treatment exists that you might compare to. And, there may not always be a comparison.

O=Outcome(s)
What are the intended and potential outcomes? What are you trying to accomplish, measure, improve or affect? What are you trying to do for the patient? What do you expect to see? Relieve or eliminate the symptoms? Reduce the number of adverse events? Improve function or test scores?

T=Time
The time involved to demonstrate an outcome or the duration defined for your data collection.

You can then use the elements of your PICO to create an effective search strategy: identify appropriate search terms for each element to take to a relevant database, determine what limits you might set on the search, and how you filter your search results.

TIP: Use a worksheet to keep track of your terms – PICO worksheet can be found under Tip Sheets in Lit Research Guide on the BRAIN-STEM website

3 Strategize the Search

Determining Search Terms

- Identify the main concepts of your topic from your PICO
- What are the keywords that describe those concepts?
- Brainstorm synonyms
- Spell out abbreviations
- "Think like the author"

NEXT: identify the key concepts within your PICO. Which concepts must every paper that you find address in order for it to be relevant to you? Identifying these concepts makes it easier to determine and combine the appropriate search terms. You will use the search terms to retrieve information that addresses your question

If you type your question straight into a database LIKE YOU MIGHT IN GOOGLE you will not get very good results. Databases don't work like Google. It is essential to break your question down into its component parts and develop a search strategy. It's a word game!

Think of a variety of ways each of your concepts could be described in a paper. It's worth spending some time generating this list – and there are some tips for expanding the way a concept is described (re: seed articles and subject tags - more on this later - as well as synonyms)

In a database, a keyword search looks for the exact word or words you typed, exactly as you typed them. This means that it is important to be accurate, beware of spelling errors, include synonyms, and remember to include both the singular and plural forms of a word when necessary.

This is not the case with Google Scholar – there's more flexibility there.

3 Strategize the Search

Executing Your Search

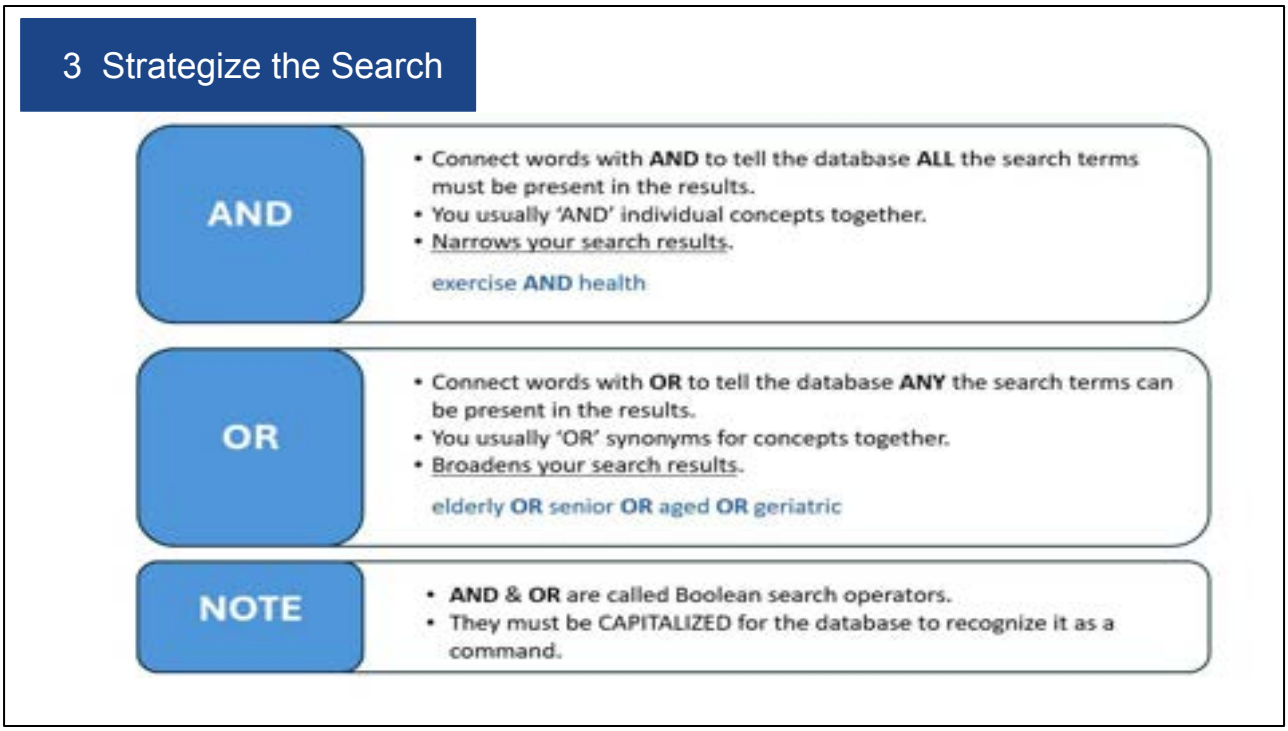
You've formulated a question. You've broken down your question into component concepts. You've figured out words to describe those concepts.

How do you now put it all together to search for (and FIND!) the articles or answers you are looking for? What limits or parameters might you set on your search?

You'll need to combine terms in a way databases will understand: again, unlike Google and AI generators, databases don't like sentences! Long phrases or sentences will confuse the database and lead to disappointing results. Databases have useful tools to help you craft your search and refine your results for better output.

We'll take a quick look at a few things that can help - some of this will make more sense one we look at a specific database search example.

The ideas posted in the next slides are also outlined in the 'Some Search Strategies' handout you can find under Tip Sheets on the BRAIN-STEM Lit Research guide.

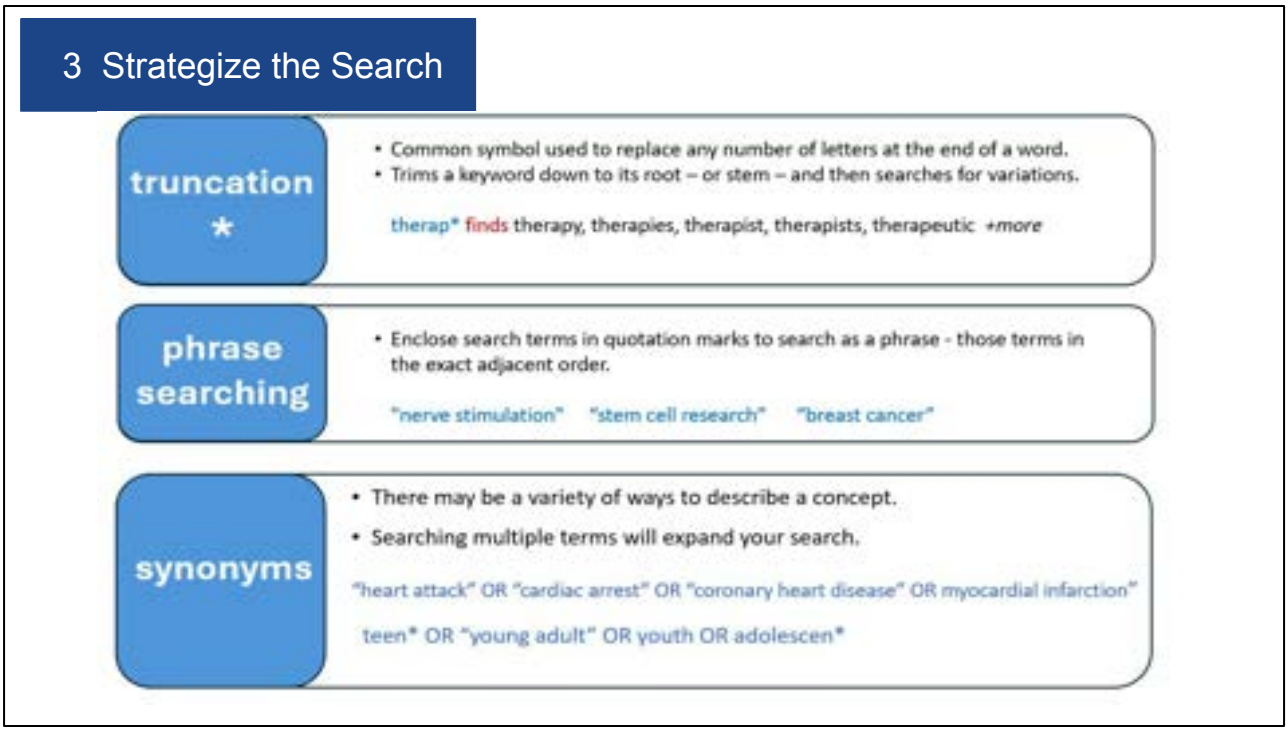


AND & OR are called Boolean operators and they serve as symbols to connect your search terms to either narrow or broaden your set of results.

Use **AND** in a search to connect each of your PICO concepts. This tells the database that ALL the search terms must be present in an article to show up in your results.

Use **OR** in a search to connect two or more similar words (synonyms) for a concept. This tells the database that ANY of the search terms can be present in an article to show up in your results.

These connectors must be CAPITALIZED when you type them out in order for the database, or Google Scholar (or even Google) to DO something with them, not just search for the word.



Other tricks you can use with database searching include:

Truncation
Most database search interfaces are not sophisticated enough to search for all variants of a term automatically (the way Google Scholar and Google do). You could combine them all in a search string using OR but an easier way is by the use of truncation - truncate (or shorten) search terms to their base form to retrieve all variants of a term. Using the truncation symbol will allow you to broaden your search to include any variant of a term. Caution! Use truncation carefully. You may end up with variations that you didn't anticipate and therefore increasing your results with irrelevant records.

Phrase Searching
Use a phrase search when you want to search for words together in the order in which you've entered them. Enter phrases within quotation marks. This will force the database to search the words together. Most databases will accept a phrase in quotes. Google and Google Scholar will also. BUT…some do not handle phrases well and will automatically break them up – usually 'AND'-ing the terms. If you searched a phrase and you think that you should have more results, use AND between your search terms instead of phrase searching.

4 Find Research

Google	vs	Google Scholar	vs	Databases
				
ANY internet content		Offer results from publications based on the results of **research** - academic publishers, professional societies, online repositories - books, articles, theses, patents, scientific data		
		• Searches a very broad scope of subjects. • Limited options for sorting and filtering results.		• Can focus your search to a narrower subject area. • Provide a structure for searching. • Many options for sorting results. • Some are free to use - **like PubMed**. Others require subscriptions and can be used through a library.

Where are you going to look for the information to answer your research question?

Databases are your portal to searching for and accessing articles. There are A LOT - but for this project we're just learning to use two.

PubMed = a portal into the National Library of Medicine's Medline database, the largest biomedical library in the world.

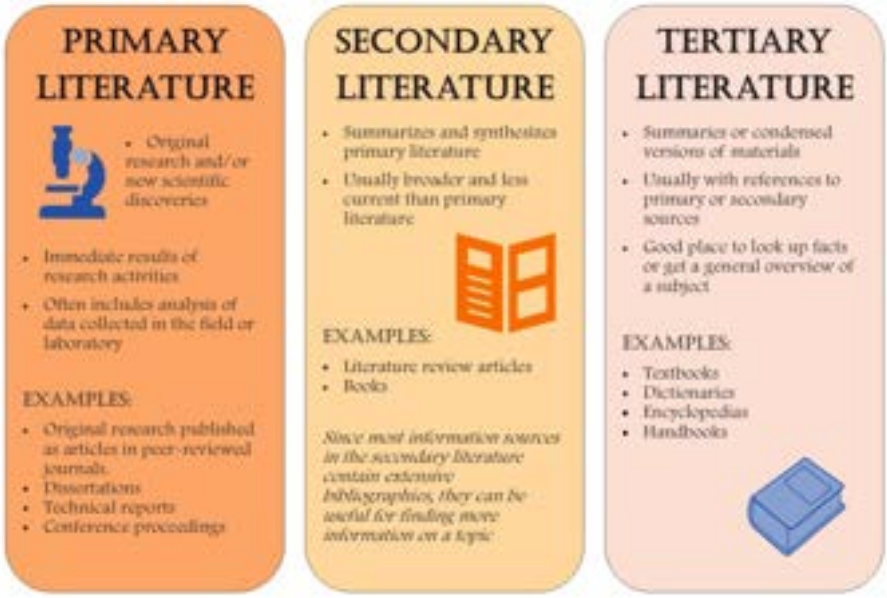
Google Scholar = a web search engine that provides a simple way to broadly search for scholarly literature and academic sources. A great "umbrella" over a variety of disciplines and resources; does not offer some of the tools that academic databases provide.

No one database or search engine looks at everything.

Google returns results on the basis of their popularity - and doesn't have a particular focus (actually, none at all!) - it's ALL the things, but not usually academic/scholarly articles.

You can also use books, or other authoritative and reliable websites to find research information, but these are not likely to yield the review articles you are looking for.

4 Find Research



Sources of information or evidence are often categorized as primary, secondary, or tertiary material. These classifications are based on the originality of the material and the proximity of the source or origin. This informs the reader as to whether the author is reporting information that is first hand or is conveying the experiences and opinions of others which is considered second hand. Determining if a source is primary, secondary or tertiary can be tricky.

Primary Sources

These sources are records of events or evidence as they are first described or actually happened without any interpretation or commentary. It is information that is shown for the first time or original materials on which other research is based. Primary sources display original thinking, report on new discoveries, or share fresh information.

Examples of primary sources:

Theses, dissertations, scholarly journal articles (research based), some government reports, symposia and conference proceedings, original artwork, poems, photographs, speeches, letters, memos, personal narratives, diaries, interviews, autobiographies, and correspondence.

Secondary Sources

These sources offer an analysis or restatement of primary sources. They often try to describe or explain primary sources. They tend to be works which summarize, interpret, reorganize, or otherwise provide an added value to a primary source.

Examples of Secondary Sources:

Textbooks, edited works, books and articles that interpret or review research works, histories, biographies, literary criticism and interpretation, reviews of law and legislation, political analyses and commentaries.

Tertiary Sources

These are sources that index, abstract, organize, compile, or digest other sources. Some reference materials and textbooks are considered tertiary sources when their chief purpose is to list, summarize or simply repackage ideas or other information. Tertiary sources are usually not credited to a particular author.

Examples of Tertiary Sources:

Dictionaries/encyclopedias (may also be secondary), almanacs, fact books, Wikipedia, bibliographies (may also be secondary), directories, guidebooks, manuals, handbooks, and textbooks (may be secondary), indexing and abstracting sources.

4 Find Research

What does peer review mean?

You can think of peer review as a "stamp of approval" from academic experts. When an article is published in a peer-reviewed journal, you can be certain that experts in the relevant field have read it and, independent of their own particular opinions, verified it to meet a high standard of scholarship.

Scholars rely on peer review to ensure that the scholarship they exchange with each other is always based in good research and the established standards of their discipline.

4 Find Research

TIP! Use a 'Seed Article

- Look BACK at references in an article bibliography - works cited - reference list
- Look FORWARD at who cites the article
- Find *Similar* or *Related* articles
- Look at the keyword and subject 'tags' assigned to an article.

If you find one or two articles that are really useful, you can launch from them to find more that might address your research topic.

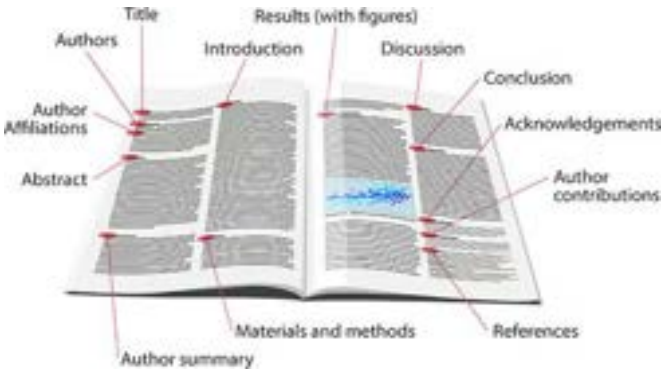
PubMed and Google Scholar both provide links to an article's reference list (or it might be called 'works cited' or 'bibliography') and to other articles that cite the article you are reading, as well as to similar or related articles. They might be worth exploring.

Keywords or 'subject headings' are really just tags (like social media hashtags) that journals and publishers assign to articles to identify what the article is about.
These might prove useful as additional search terms.

5 Evaluate Sources

Understanding the Parts of a Scientific Article

- Abstract = summary
- Introduction = background information
- Literature Review = previous research
- Methods = how research was performed
- Results = findings
- Discussion = interpretation of findings
- References = the articles the authors cite



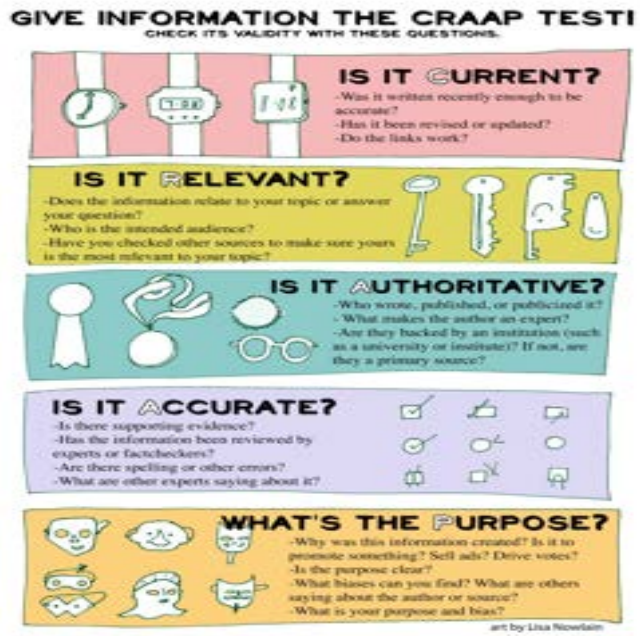
There are many parts to a research or review article. Understanding what they are can help you navigate reading the article and undera bit better.

These sites help explain them in an understandable way:

- Anatomy of an Article (from Arizona State University)
- How to Make Sense of a Scientific Journal Article (from the National Institutes of Health)

5 Evaluate Sources

The CRAAP TEST!



It is VERY important that you think critically about where the information you are reading and maybe using is coming from and if it is 'good'!

The CRAAP Test is a method for evaluating the quality of information sources. It helps you ask the kinds of questions that help evaluate the information.

CRAAP stand for:
C = currency : the timeliness of the information
When was the information published or posted? Has the information been revised or updated? Is the information current or out-of-date? If it's a website, are the links functional?

R = relevance : the importance of the information to your needs
Does the information relate to your topic or answer our question? Who is the intended audience? Is the information at an appropriate level for your needs? Have you looked at a variety of sources?

A = authority : they source of the information
Who is the author/publisher/source/sponsor? Are the author's credentials or organizational affiliations given, and what are they? What are the author's qualifications?

A = accuracy : the reliability, truthfulness, and correctness of the content
Where does the information come from? Is it supported by evidence? Has it been reviewed? Can you verify any of the information in another source? Does the language seem unbiased?

P = purpose : the reason the information exists
What is the purpose of the information? Do the authors make their intentions clear? Is this information fact/opinion/propaganda? Is it objective, impartial, unbiased?

6 Write!

When you quote or use information from an article in YOUR paper or poster or proposal, you must cite it.
Citing a source means acknowledging where you got a specific quote, fact, graphic, photo, illustration, data, or idea from. A citation is all the information needed to describe a source, such as (but not limited to) the author, title, publisher, page numbers, and publication date. Information in citations follows a specific format or style.

Plagiarism is using someone else's ideas or words without giving them proper credit. Plagiarism can range from unintentional (forgetting to include a source in a bibliography) to intentional (buying a paper online, using another writer's ideas as your own to make your work sound smarter) you must give credit any information that you use (statements, data, graphics, photos, info from articles, books, websites)

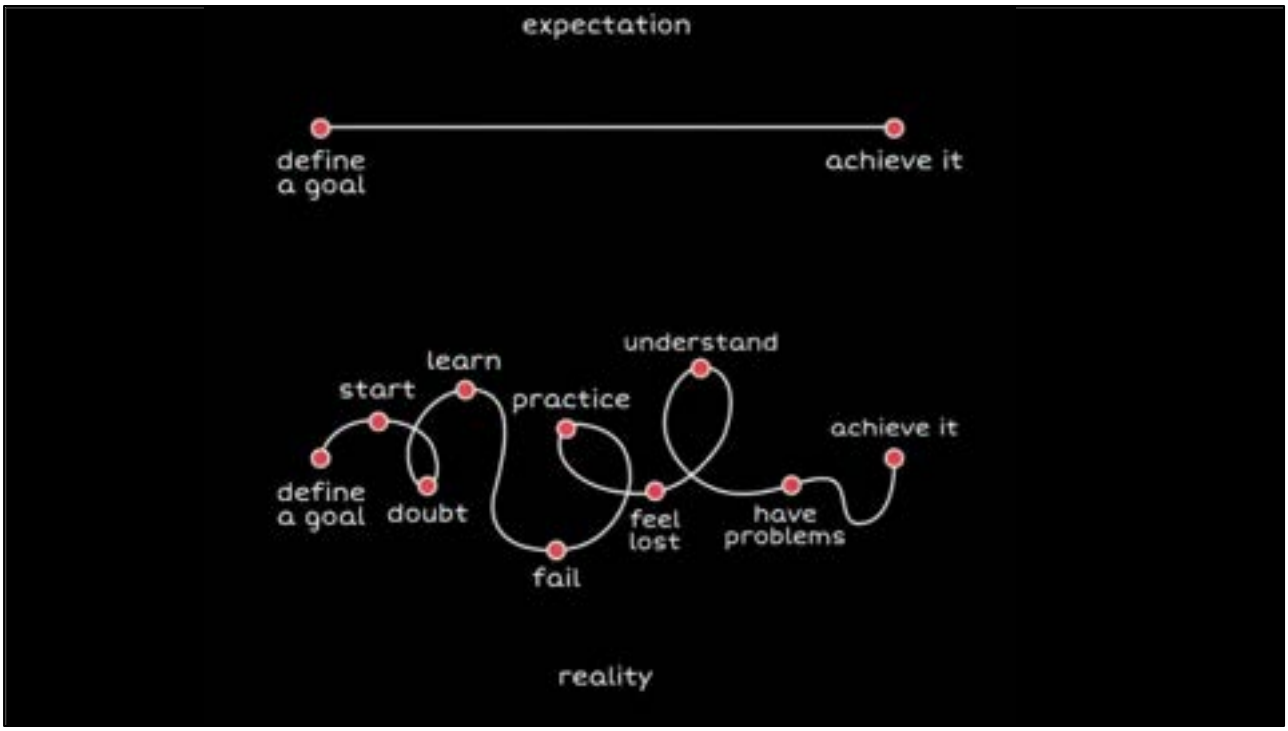
Why Cite? Give credit, share a resource, become part of the scholarly conversation.

There are some good websites that can help you understand about plagiarism that are linked under the 'Citing Sources' tab on the BRAIN-STEM Lit Research guide

It's a good idea to understand what the elements are that go into creating a citation for a source.

The **Purdue University Online Writing Lab(OWL)** offers good, easy to understand information about this.

BUT - there are also tools that can help you automatically cite sources properly in a variety of citation styles.
ZoteroBib or **Zbib** is good and easy to use - it is a free service that helps you quickly create a citation and bibliography in any citation style.



We might have outlined it simply at the start, but the search process is not always nicely streamlined producing one right answer. Using a combination of searching techniques generates the most relevant results. Remember this is an iterative process that requires flexibility. **Be willing to adapt!**
Consider your initial search strategy to be a first draft – sometimes you have to do a little search exploration before you really formulate the kind of question you want to answer. Use it to search a database, check the results, then adjust the strategy as needed. You may produce a number of drafts before the search strategy is in its final form.
Not enough results? Too many results? Not getting the right kinds of results? Then change something in your search:

- try different databases
- change up your search terms – different words / add/ delete
- Or how they are combined
- Or the limits you placed on the search - how you filtered your results

Above all, **be flexible** in your searching. If one term doesn't work, try a different one. Approach your topic using as many search strategies as you can think of.
There will never be one perfect search for your topic. It may take dozens of searches to retrieve all the necessary information.

The process of finding and using scientific research can be hard, but you will improve as you practice it over time - don't worry!
If you get stuck, don't spend all day with a futile search. Instead, **ask for assistance**.

Questions or Need Help?

Contact Mary Librarian

mcabral@clarkson.edu

Check out the Literature Research Guide on the BRAIN-STEM website - listed under the Resources tab

bit.ly/CUbrainstem

This presentation will also be linked on the BRAINSTEM website under Resources