LIBRARY 160: INTRODUCTION TO COLLEGE-LEVEL RESEARCH

IOWA STATE UNIVERSITY LIBRARY INSTRUCTION SERVICES

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CHAPTER 1: GETTING STARTED WITH RESEARCH

Learning Objectives

After completing this chapter, you should be able to…

- assess your research needs and use them to determine the scope of your research,
- recognize the purposes of different types of information sources,
- differentiate between a clear, focused research question and one that needs more work, and
- refine your research question into key concepts and use them to develop effective search terms.

1.1 STARTING YOUR RESEARCH

Getting a good grade in college often relies on finding and using the best and most authoritative information on a topic. To do this, you have to think critically, work through the resources you find, and construct your own ideas. In this course we focus on developing research skills, which include finding information appropriate to your needs, evaluating that information, and using it ethically. These skills take time, effort, and reflection to acquire.

What is research?

When you read the word **research**, you might think of the quick web searches we all do every day when we need basic information: a good recipe for Vietnamese bánh mì sandwiches, what are the top 100 movies of all time, what is Tourette syndrome, and so on. You might also think of writing a lengthy paper and the resources you'll need to find and use within it.

Both of these processes are examples of seeking out information, but as you tackle more projects in college, your instructors will frequently use the word research to mean the process of finding and using authoritative resources. Thinking through the research process can help you be more efficient and effective, not only as it relates to coursework, but also when you're researching for your personal needs. Research is an ongoing cycle of questions and answers, which can quickly become very complex. Here are some important areas to think about when starting your research:

- Determining the scope of your research
- Developing your topic and research question
- Identifying key concepts for your topic

1.2 DETERMINING YOUR SCOPE

The first thing you need to do is determine the scope of your research. Take a few minutes to think about your topic and the kind of information you might need. You can define your research scope by thinking about the following:

- Amount: how much information you need
- Content: the types of information you need
- Format: the configuration of the source (e.g., books, articles, videos, etc.)

Establishing the boundaries for your research may come from your instructor's assignment guidelines. By carefully reviewing your assignment requirements and your instructor's expectations, you can refine what research question you're trying to answer and determine where you need to look for sources, what types and formats to use, and what content within your sources will be helpful.

Information that is appropriate for one research project may not be appropriate or relevant for another. For example, if you need to give a five minute class presentation on the pros or cons of an issue, you probably need a few sources that cover the key aspects of the issue and not every paper that's ever been written on the topic. If you were writing a lengthy class paper, you would want more comprehensive coverage of your topic.

Amount of information

Sometimes your instructor will require that you use at least a specific number of sources for a project, but you won't always have that as a guideline. If you need to determine the number of sources to use on your own, you can base it on what seems to be enough to fully answer your research question. Keep in mind that this might be more sources than the minimum you're required to use.

Types of information

Knowing what types of information you need will help you be more efficient and successful in your research. Some common types of information are listed below.

Background information

This kind of information gives you a basic understanding and vocabulary surrounding a topic. Background information is broad and tends to be general. This is helpful when you don't already know a lot about your topic. Examples of where you can find background information include encyclopedias like *Encyclopaedia Britannica* and Wikipedia or introductory textbooks.

News sources

News reports can provide information on an event or perspectives from a given point in time. They're intended to keep us informed about current events and popular topics, and rarely go in depth or provide sources for further reading. News sources can help illustrate your points with timely examples or historical perspectives on a topic. They include historical or current newspapers, news websites, and some magazines. The *Des Moines Register* and *Time* magazine are examples of news sources.

Statistical information

Statistical information includes data and reports produced by research groups, associations, governmental organizations, non-profits, and more. These are helpful for making comparisons between groups, showing changes over time, and making predictions. Statistical databases and government websites, like the U.S. Census website, are examples of sources that contain statistics.

1.3 POPULAR AND SCHOLARLY INFORMATION

Popular information

Popular information is found within publications written for the general public rather than for scholarly audiences. They have not gone through a rigorous review process, and are less technical than scholarly materials. Articles found within popular sources may not include citations; instead they often offer a less-detailed, more surface-level summary of their topic. They might not even list an author. *People* magazine, *Vogue*, and *Rolling Stone* are examples of popular publications. These sources can be helpful if your topic has to do with recent events, popular culture, or hobbies.

Scholarly information

Scholarly information gives you a more in-depth understanding of a topic. This type of information is often found within scholarly books and journal articles. Scholarly books and articles undergo **peer review**, a rigorous review process by subject experts before publication. They usually contain subject-specific, technical language, and refer to the resources the authors used by including citations. Scholarly materials are often the product of a specific research project and contain information about the methods the authors used to reach their conclusions. These are helpful for projects where it is important to build a strong research-based foundation for your ideas or interpretation.

Peer review

Because scholarly information is something your instructors expect you to use, it's important to have an understanding of how it's made. Here is the typical publication process for a peer-reviewed article:

1. A researcher submits their paper to a journal to be considered for publication.
2. The journal's editor reviews the paper and sends it to subject experts for peer review.
3. Those peer reviewers submit their feedback, including corrections and whether or not the article should be published.
4. The editor reviews peer reviewers' comments and sends them to the researcher.
5. The researcher makes corrections and resubmits their article to the editor.
6. The editor reviews and (maybe) accepts the corrected article for publication.
7. If it gets this far, the researcher's article is published!

Popular	Scholarly
written for the general public; language is clear, simple, and direct	written for specialists in the field; language is scholarly and often complex
articles may be short and unsigned; when signed, author credentials are usually missing	articles are longer and in-depth; author credentials and contact information are clearly listed
most articles are illustrated with photographs; online versions often have videos	most illustrations are charts, graphs, or other ways to present data
often no citations, footnotes, references, or bibliographies	thorough citations, footnotes and references are required
articles are proofread and copyedited	articles are peer reviewed by several subject experts as well as proofread and copyedited
include advertisements for commercial products of all kinds	if present, advertising focuses on publishing, professional societies, and conferences tied to the journal topic

Scholarly information can be published in a variety of formats, often determined by the author's subject area or discipline. Some disciplines prefer to publish research in peer-reviewed journal articles, while other disciplines prefer scholarly books. You might also

encounter scholarly papers presented at conferences. It's quite possible that you could find information on your topic in any of these formats, so you need to be familiar with each.

Check your understanding

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https://iastate.pressbooks.pub/lib160/?p=207#h5p-20

1.4 FORMATS

Certain formats tend to be used for specific purposes. Because of this, many instructors will tell you exactly what types and formats to use (or avoid) for research assignments. Alternatively, they may tell you to use only peer-reviewed sources without specifying a format. Review your assignment requirements and select sources that meet those requirements. Here are some examples of formats you may encounter during your research.

Books

Books tend to be much longer and, because of this, they can go into greater depth than articles. Books are great sources for providing a "big picture" perspective of a topic with background information and rich detail.

Book chapters

In a scholarly context, book chapters are typically research papers on a certain topic or theme that were written by different authors and brought together in a single book. Often there is an editor of the book who solicits and compiles chapter submissions. Many disciplines in the humanities and social sciences rely on book chapters for communicating their research findings and learning about their peers' work.

Newspaper and magazine articles

Newspaper and magazine articles tend to be brief and to the point. They're intended to keep us current with events and popular topics, and rarely go in depth or provide sources for further reading. Newspaper articles are a common example of a primary source, which we'll discuss in the next section.

Conference proceedings

Conference proceedings are the compiled presentations and papers published after a scholarly or professional organization's conference is over. This is done so there is a lasting record of the research ideas that were shared at the event. Some academic disciplines

rely heavily on scholarly conferences as a means of quickly sharing and discussing new research and creative contributions by scholars in that subject area.

Journal articles

Scholarly journal articles tend to be several pages long and focused on very specific facets of a larger topic or research project. These papers are written by subject experts and published in scholarly journals. In the course of your studies, your instructor may tell you to use "peer-reviewed journals" in a writing assignment. Most of the time, what your instructor means is that you need to use individual articles published in a peer-reviewed journal, not the entire journal and all its contents.

Articles and journals: knowing the difference

There are specific tools and search techniques that help you find articles, and others that help you find journals. For this reason, it's important to recognize the difference between articles and journals. **Journals** are publications typically focused on a particular topic or professional activity. They are published on an ongoing basis at regular intervals and contain the following elements:

- **Article:** a single paper focused on one topic, most often the results of a single research project.
- **Issue:** a set of articles published together on a weekly, monthly, or quarterly basis.
- **Volume:** a collection of all the issues published in a single year.

Figure 1.1 Images of journal article, issue, and volume

The parts of a journal are easier to remember if you compare them to parts of a television show. An article in a journal focuses on a topic in the same way that a scene in a television show focuses on a plot element. A collection of articles forms an issue similar to the way scenes come together to complete an episode. Not all journal articles within the same issue will be on the exact same topic. They may just be loosely related within the same discipline. Think of a show with multiple plot lines or separate segments (e.g., *Saturday Night Live* sketches). A year's worth of issues adds up to a volume in the same way episodes comprise a season. These volumes are part of a journal, like seasons are part of a series. Some have completed their run, and some are ongoing. Journals and the articles they contain are made available through indexes in a similar way to how series and episodes are made available by networks or distributors (e.g. CBS, Netflix, ESPN). You'll learn more about indexes in Chapter 2.

Check your understanding

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1.5 PRIMARY AND SECONDARY SOURCES

A factor you may not have considered when starting your research is time. It's important to know when something happened because that can help you determine both how much and what type of information might exist on your topic. The closer you are to the actual date something happened, the less information there is likely to be on that topic. By the same token, the further away you are from the event in time, the more likely it is that more information and publications may be available. This concept is called the flow of information.

In general, you can expect to find information on the internet, television, and newspapers in the first few days after a newsworthy event. As weeks go by, other information sources begin to emerge, adding new perspectives and information on the topic. Articles in magazines such as *Newsweek* or *People* appear next. Over time, other publications that take longer to produce may emerge like scholarly research articles and books.

Understanding when an event happened will help you figure out how much and what kinds of information are available on a given topic. It can also give you insight into whether primary or secondary sources are available on the topic. Depending on your research needs, using one or the other may strengthen your project. If you're researching a current event, you will likely rely heavily on primary sources such as newspapers. If your teacher requires you to use only peer-reviewed journal articles, you'll need to choose a topic that is not as recent so that there has been time for articles to undergo peer review and be published on your topic.

Primary sources

The first information available about a particular event usually attempts to describe or report it on the same day or very soon after it happens. These types of sources are often called primary sources because they are the first accounts and often provide eye-witness perspectives. Common types of primary sources include web and newspaper articles from the time of the event, diaries, news transcripts, photographs, and videos. These resources

are particularly useful when your research could benefit from the perspectives of a given time period, not influenced by shifts in public thought over time.

Primary sources can also refer to publications describing scientific exploration when they are written by the people who did the research. In the sciences, "the purpose of reading the primary source is to get the original data, not someone else's interpretation of the data (a secondary source)."[1]

Secondary sources

Secondary sources analyze an event or previous research after the fact, often putting an event into historical context or comparing it with other resources, issues, trends, or movements. Secondary sources analyze the original event in more depth and context. Common types of secondary sources include books, research articles, and encyclopedia articles. Some disciplines may define secondary sources mostly as books and encyclopedia articles.

Projects you work on may need to tap into many of these types of sources, and some sources may fall into more than one category. For example, a scholarly journal article may fall into the category of either a primary or secondary source, but a book with background information is likely to be a secondary source. Although each of these might be useful for your research, the sources you choose will have to conform to your instructor's expectations and the requirements for your project.

Now that you have a grasp on the different types and formats of materials you might want to use in your research and why, let's delve into how you can develop and refine your research topic.

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1. Mount Allison University. (n.d.). *Chemistry and Biochemistry subject guide: Articles.* Retrieved June 2, 2021 from https://libraryguides.mta.ca/chem/articles

Check your understanding

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https://iastate.pressbooks.pub/lib160/?p=231#h5p-21

1.6 DEVELOPING A RESEARCH QUESTION

Sometimes your instructor may give you a very specific topic or research question to answer for your project. Other times, you may be allowed to decide what topic you're researching. Whether you have been assigned a topic or not, developing a simple concept into a well-defined research question is an essential part of the research process. Your research question should inform the structure and contents of your project and everything you cite should be related to your research question in some way. Eventually, your research question will develop into your **thesis**, which is the central idea on which your project is based.

Turning your topic into a research question

There is no single approach to developing a research question that will work for every person and topic. You may start with a topic you're somewhat familiar with and investigate a specific aspect of that topic that interests you. Or you may start by doing background research on a topic that's new to you and then exploring the questions that arise as you learn more. A good research question cannot be answered with a yes or no. Creating a research question is not as simple as taking a topic you are interested in and making it into a question. Your research question should be clear, focused, manageable, and defensible (i.e. able to be supported by evidence). Let's examine an example of this in more depth.

You are assigned to write a paper about the United States during the prohibition era. As you do some background research into the time period, you find that the illegal consumption of alcohol was prominent, especially among those with money. You come up with the following topic for your research: "illegal activity during prohibition in the United States." How can we translate this into a clear, focused, manageable, and defensible research question?

Is it clear?

A research question should be stated clearly. Knowing what you want to research will help

keep you from getting distracted by ideas that may be interesting, but are only loosely related to your topic. "Illegal activity during prohibition" could refer to a lot of things. Are you interested in mob activity, the prevalence of speakeasies, or another illegal activity at that time? Let's say you're specifically interested in the purchase and sale of alcohol. Your research question would be better phrased as: "How did the illegal use of alcohol persist when prohibition was in place?"

Is it focused?

Your new research question is fairly clear, but broad. There are a lot of resources about this topic and you may be overwhelmed with what you find. To make it more focused, you could refine your question by limiting it to a specific place (the American South) or timeframe (from 1920 to 1925). Revising your question for focus, it could read as: "How did the illegal use of alcohol persist in the American South when prohibition was in place?"

Is it manageable?

Perhaps even after narrowing your research topic you still find an overwhelming amount of resources. Or maybe you narrowed your topic too much, and you aren't able to find enough information for your project. Based on what you learn along the way while searching, you may need to modify your research question or search strategy. You have to find balance between asking a really good, innovative research question and not overwhelming yourself by making it too big to conquer within the guidelines of your assignment, or too simple where it can be answered with a quick Google search. Looking at the research question posed above, "How did the illegal use of alcohol persist in the American South when prohibition was in place?" you wouldn't need to make any revisions because this example is broad enough that you could find information about it easily, but it's unlikely that you could find everything about your topic in a single search.

Is it defensible?

Whenever you do research, you bring your own biases and perspectives into your work, and these can influence the entire structure of your project. Avoid questions that have a moral stance "___ is not okay," or an absolute stance "___ always results in ___." Open-

ended questions such as ones starting with "how," "why," or "what" make a great foundation for a research question. Be willing to change your research question if you can't find resources that address your topic in a useful way. It could be that your topic is too new to have anything published about it, or it may be a topic that has been disproven by research over time. As you develop a research question, you should always think about whether your question can be supported by evidence. Our example, "How did the illegal use of alcohol persist in the American South when prohibition was in place?" is a good example of a defensible research question. You can find plenty of sources with relevant, reputable evidence about the economics, politics, and legal aspects of the illegal use of alcohol in this time and region to support your argument.

The next step is to begin searching for sources to support your research question. To find sources appropriate for your class projects, you'll often need to search in specialized databases such as Academic Search in EBSCO or Compendex to find information. To efficiently search within these tools, you need to think carefully about the terms you'll be using.

1.7 TRANSLATING YOUR TOPIC INTO SEARCHABLE KEYWORDS

It is important to think about your search terms more carefully so you get better and more relevant results for your research. Take the time to think about the essential concepts that make up your research question. These concepts can become keywords, concise terms that you can use to make your search more efficient and relevant. Here are some examples of how you might go about generating keywords to improve your search. For these examples we'll assume you have a class project on the topic "home design that is safe and comfortable for the elderly."

Go to Google

One way of generating keywords would be to go to Google and search for that exact phrase. Using this approach, you'll find lots of results, but only some of them will be helpful and relevant. As you examine your results, you might find synonyms or alternate vocabulary that could be useful, including: "home safety," "universal design," "accessible housing," "older adults," and so on. These can become helpful keywords for you to use when building a new search.

Find the essential concepts

Another way to find keywords is to break your topic into its essential concepts. Our example could be split up like this:

- Concept 1: home design
- Concept 2: safe and comfortable
- Concept 3: elderly

Once you have these concepts, you can search for them in a thesaurus, a tool that suggests synonyms based on the term you use. Be aware that some terms in the thesaurus may match your intended meaning better than others, for example, the word "benefit" could have several different meanings. Below, we've listed some potential

keywords from both our Google search and the thesaurus, alongside the original concepts they relate to:

- **home design**: universal design, design for aging, elder-friendly design, housing design, architecture, architectural design, design features, supportive design, design
- **safe and comfortable**: home safety, accessibility, barrier-free
- **elderly**: senior citizens, seniors, old, older adults, older people, aging, aged, elderly people, elder

Use your keywords effectively

Now that we've identified keywords for our concepts, we can bring them together to build a search, such as:

- home design and safety and elderly
- universal design and safety and older people
- housing design and accessibility and senior citizens

In your search, you want to include keywords for each of the concepts. This will reduce the number of extra results that are partly off-topic. In our example, a search for the two concepts "safety and home design" could also find articles on making homes safe for babies and children instead of for senior citizens. Mix and match the keywords and try out different combinations to see which strategies produce the most relevant results. Are some terms or strategies more successful? Save useful searches and try them out in other search tools as well.

Need some more practice? Try this How to Generate Keywords tutorial, from the University of Texas at Austin. It will take you through the steps of brainstorming synonyms for the topic of your choice. You can experiment with searching for these terms using the ISU Library website.

Sometimes the topic you're researching is so new to you that you don't know whether you're using the right keywords. When that's the case, finding background information can help. Background information can lead you to new concepts and keywords related to your topic. Believe it or not, Wikipedia can be a good source for this type of information.

1.8 FINDING BACKGROUND INFORMATION IN WIKIPEDIA

You probably use Wikipedia often. It is a top result in many Google searches, and you may have learned a lot using Wikipedia, despite being told not to use it for research. It can actually serve as a helpful source of background information on a variety of topics. Here are a few ways you can use Wikipedia to help your research.

As a starting point

Wikipedia itself suggests it be used as a starting point and not an end. You can use it to learn vocabulary or technical terms for an unfamiliar topic. Wikipedia is handy for finding dates and timelines for historical events, or for outlining aspects of a topic you had not yet considered.

For related information

Wikipedia can also help you understand how your research question fits into a broader topic. One of Wikipedia's strengths is that articles include links to other, related articles. These can help you explore the context of your topic. You may come across disambiguation pages as well, which can help you find different entries for a term that has multiple meanings (e.g. Hologram). These practices can be particularly useful when developing your research question.

To find more sources

Finally, Wikipedia can be useful for finding references to reliable sources such as scholarly books and articles. Most articles have a list of linked references and notes that you can use to verify Wikipedia's content. Once you've found adequate background information on your topic from Wikipedia, you can explore other scholarly and direct sources to get a more complete picture of your topic.

Don't stop at Wikipedia

Although Wikipedia can be a great resource for background information, not all topics

have the same amount of depth or coverage. Entries on popular topics, such as social networking, TV shows, and extreme sports, tend to have more detail. In addition, Wikipedia contains entries on various academic topics, with generally the same level of detail as traditional encyclopedias. These academic entries tend to be summaries and broad overviews because original research is deliberately not included in Wikipedia. When you need more detailed subject knowledge, such as new theories, analyses, and interpretations to back up your projects, you would be better served by investigating scholarly materials such as journal articles and books rather than an encyclopedia.

Wikipedia is a crowdsourced encyclopedia, which means anyone can create and edit content. This is both a strength and a weakness. One of the most fundamental ways the scholarly community determines the reliability and authority of information is by knowing the scholarly or professional credentials of authors. Wikipedia articles are usually signed only with a username or pseudonym. You can't tell who the authors or editors are or what qualifies them to write on the topic, if they are qualified at all. A survey of Wikipedia contributors found that for 45% of them, the highest degree earned was high school or less.[1]

It's also important to know who is contributing to Wikipedia because that informs what content is available. This is true of all research, but particularly for a community-managed resource like Wikipedia. A large majority of Wikipedia contributors have self-identified as male on their profiles and in several studies.[2],[3] How might this affect the articles available and the biases found within? What voices are contributing or being excluded, particularly as they relate to race, sex, gender, and other social issues? Keep this in mind as you're browsing Wikipedia. Just because there is no article about a specific topic yet, that doesn't mean it isn't important or deserving of focus.

Both its strengths and weaknesses are linked to the fact that Wikipedia is open to anyone,

1. Glott, R., Schmidt, P., & Ghosh, R. (2010). *Wikipedia survey: Overview of results*. Retrieved from https://web.archive.org/web/20110728182835/http://www.wikipediastudy.org/docs/Wikipedia_Overview_15March2010-FINAL.pdf
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has a large contributor base, and contains articles written by consensus. This allows authors more freedom over the sharing of information, but also provides a platform for those with negative or exclusionary views, or even false information that may not be vetted by the scholarly community. Unless you yourself are already an expert on the topic you're reading about, there's no way to quickly verify the accuracy of a Wikipedia article without consulting other sources on the subject.

1.9 KEEPING TRACK OF YOUR SOURCES

As you progress in your research you will find a lot of information from a variety of sources. It is important to keep track of these so you can credit the different ideas and facts you use. Keeping your sources organized also helps strengthen your argument by helping you quickly add more information from a specific source, find the original context of a quote you've pulled out, or point directly to what you used to answer your research question. Having your sources organized can also make your writing process more efficient because you have a better idea of where everything came from.

Your instructors will expect you to cite your sources so, at a bare minimum, be sure to track your citation information. You also may want to track other information as you go along. Here are some useful details to track:

- **Citation information**: title, author, year of publication, publisher or journal, page numbers, etc.
- **Quotes**: quotable or noteworthy passages, ideas you want to include in your project
- **Context**: reasons for citing it, ways it is relevant to your research question, and how it relates to other sources

You can keep organized in a variety of ways. There are citation managers like Zotero and EndNote which can help generate citations and attach notes directly to the citation information and sources. You can also use notecards, spreadsheets, and outlines. It doesn't matter how you stay organized, just that you find a way that works well for you.

Getting used to college-level work

Time management is frequently a problem for students and faculty alike, making it hard to meet deadlines. Being overwhelmed with college life, illness, and having family or personal problems are also common factors that may lead students to make bad academic choices, such as cheating or missing deadlines. Here are a few ways you can get help with time management:

- Develop a plan for your project by working backward and estimating how much time each step will take. One tool that can help you do this is the online Assignment Calculator from the University of Minnesota. It helps you put your assignments and research projects into a timeline.
- The Academic Success Center recommends developing a weekly, monthly, and/or semester-long study schedule that accounts for everything you need to get done.
- Find ways to reduce distractions. Some things that can help include muting phone notifications, using time management apps, and finding quiet places to study.

If you feel overwhelmed, you should talk with your professor, your adviser, or Dean of Students office staff. You can also contact the ISU Student Counseling Services for help. They can help with issues as varied as depression, loneliness, eating disorders, substance abuse problems, and so on. They can help you get counseling for family or personal problems, and also help with career planning. Learn more about how to manage the various demands of student life, and to take care of yourself, as this can help you prepare for life after college.

CHAPTER 2: LOCATING INFORMATION

Learning Objectives

After completing this chapter, you should be able to…

- connect your information needs and search strategies to appropriate search tools,
- differentiate between open and paywalled materials,
- analyze your search results to identify relevant materials,
- use call numbers and related information to locate items within the library, and
- locate online materials effectively using Google Scholar, Quick Search, and article indexes.

2.1 THREE CATEGORIES OF FINDING TOOLS

Now that you have some ideas about the extent and kinds of sources you need, it's time to think about which search tools will find them. It might be tempting to do all of this information-gathering with a single internet search. However, you may need to use many types of sources, not all of which will be covered by your basic search engine, like Google. Keep in mind that research takes time, thought, and energy, and there will often be more than one place to search or tool to use.

Finding tools provide structure for information searches. They include information about a resource's content (like what topics are discussed) and how it is packaged (like the format). In this chapter the three main categories of finding tools that we'll discuss are web search engines, library discovery tools, and article indexes. You're probably already familiar with at least one of these finding tools. While all of these tools are typically accessed via the internet, they function in different ways and search different things. Some finding tools overlap in coverage (e.g., all article indexes can find journal articles, but web search engines can also find some articles), but each has its own unique features that can help you find particular types of resources. The finding tools complement each other and each is a vital piece in the information-seeking puzzle. Below is a breakdown of the different finding tools we'll discuss in this class.

Web search engines

Web search engines are tools that search the internet using the keywords you provide. Some popular search engines are Google, Bing, DuckDuckGo, and Yahoo.

Search engines are best for finding:

- websites,
- news sources,
- images,
- statistical information from government sources and some other organizations, and
- most of the information on the open web.

Library discovery tools

Library discovery tools combine the traditional library catalog (showing you what a library owns) with a collection of links to many journal articles and other online resources the library subscribes to. ISU Library's Quick Search is an example of a library discovery tool.

Library discovery tools are best for finding:

- books, e-books, and encyclopedias,
- scholarly journals and journal articles, and
- other materials that a specific library owns or provides access to.

Article indexes and databases

Article indexes and databases help you find scholarly materials such as journal articles, book chapters, and more. These tools use the keywords you provide to search through details about scholarly sources (such as topics, authors, and titles), allowing you to find targeted results. ISU Library's list of article indexes and databases provides examples you have access to as an ISU student.

Article indexes and databases are best for finding:

- scholarly journal articles and summaries of articles you can request through Interlibrary Loan,
- newspaper articles, including many historical newspapers, and/or
- highly specialized types of documents used in certain subject areas.

Table 2.1 Finding tool features

	Web search engines	Library discovery tools	Article indexes
Simple Interface	Yes	Yes	Yes
Various advance search options	No	Yes	Yes, often designed for the subject area
Multiple filters for narrowing your search	No	Yes	Yes
Coverage is focused on a particular subject area	No	No	Yes, in many cases

Now that you know what kinds of resources you can find using these tools, we need to address some restrictions to how you can access those resources.

Library Guides are another way to find resources or databases by subject. A librarian has compiled information in a given discipline, and some are even made for a specific course. When deciding which guide to use, you're not limited to just the ones listed for your major! You should select the guide that best fits the topic of your project or class.

2.2 PAYWALLS AND ACCESS

The open web

The **open web** is composed of everything you can access online without logging in or paying fees. Tim Berners-Lee invented the World Wide Web as a means for researchers to easily share information. He wanted the internet to be available to everyone and not controlled by governments or corporations, which is one reason why there is such a wide variety of content online today.

The open web includes content that ranges across a spectrum of quality and topic areas. You can find high-quality and reliable research material, but you can also find someone's personal website dedicated to their cat. The internet is full of sources that may or may not be reputable, so you need to critically evaluate all the sources you find. The key factor is that all of the open web is free to access.

Behind paywalls

In contrast to the open web, resources behind a paywall are only available to paying subscribers. A **paywall** is a system that limits access to content so that users must:

- pay a fee,
- log in (so they can collect data about you), or
- be members of a community (like ISU) that has paid subscription fees for them.

For example, Netflix is a subscription service that keeps its content (streaming movies and television shows) behind a paywall.

Did you know?

When you create a free account with a site to get more access, you're providing information about yourself and your online activity. So, while access to a resource may be free, you are still trading something in exchange for this access. Companies collect information about you so they can target ads to your interests based on your activities or sell your information.

The majority of scholarly resources are also locked behind paywalls. This means that people across the world are shut out from accessing many scholarly materials.
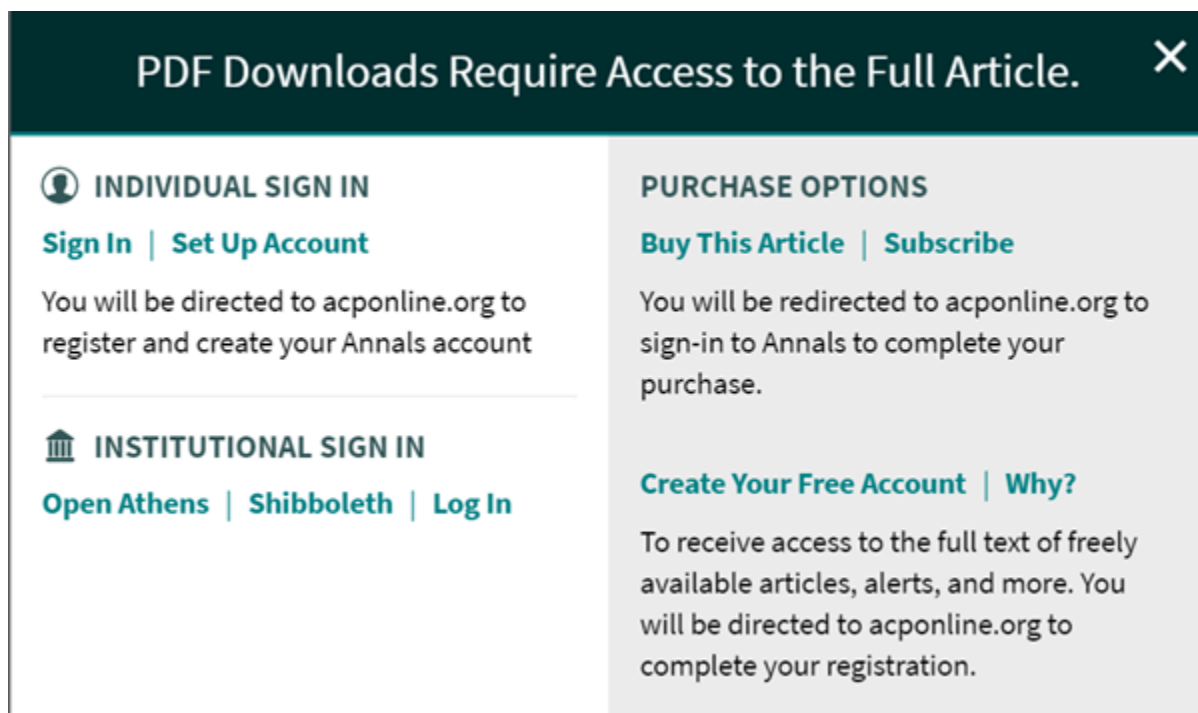

Figure 2.1 An example of what you might encounter on a site with a paywall

Librarians and scholars are working to develop more scholarly journals that are high-quality yet low-cost or totally free to access, allowing people to use them regardless of their ability to pay. **Open access** materials don't require a subscription or login to use. Open access materials can be books, articles, theses, and even datasets. Sometimes, an author

can share an earlier version of their paywalled content. Before giving up on finding a paper, check if the author made an open access version available with a tool like the Unpaywall application.

2.3 WEB SEARCH ENGINES

Many of you use Google every day. You may trust that it will quickly and easily find exactly what you want. While Google is certainly the largest and most heavily used search engine, there are plenty of others available. Examples of other search engines include Bing, DuckDuckGo, and Yahoo. Each search engine uses different ranking systems, which affect the number and order of your search results. This discrepancy can make it difficult to replicate search results or to share a search with a friend. Even if you use the same search engine and keywords, the search history on the computer you use also affects the list of results you retrieve. Try experimenting with different search engines to find the one you prefer. We're going to focus on Google as an example of how most search engines work.

How Google works

Google uses proprietary algorithms and a unique ranking system to determine where a website will be placed in your search results. Google's algorithm tries to interpret your search terms based on several predetermined criteria and returns results that it decides are relevant. For everyday, quick searches, this can be helpful. However, the top results may not be the best sites for your intended purpose. Google does not always correctly interpret your search terms or intent, and excludes materials not available on the open web.

Sponsored links

Sponsored links are advertisements that often appear at the top of your search results. This means that someone has paid to have their website appear at the top of a specific web search. Depending on the search engine you're using, it may not always be easy to identify these ads from your real search results. Some are clearly labeled, others are not. Be sure you know the difference between these paid advertisements and more authoritative content. Advertisements are a chief source of revenue for Google and other web search engines, and they are placed prominently in your search results to generate income from advertisers.

Every search has a different context. Sometimes you just need basic facts and news and, in that case, Google would be a good option. However, if you need scholarly information, Google is probably not your best choice. Because much scholarly work lives behind paywalls requiring payment or a login for access, you won't easily find full access to these articles using Google.

Why can't you just use Google?

Figure 2.2 A Tweet from the Jane Goodall Institute about the relationship between humanity and nature.

If you rely on typical web search engines for all your information needs, you probably will miss most of the scholarly information on your topic because a lot of it is behind a paywall. Let's say you need to write a paper about Jane Goodall, a world-renowned researcher and activist who has studied chimpanzees and animal behavior since the 1950s. She holds a PhD in ethology (animal behavior) from Cambridge University and has received numerous awards for her ground-breaking research in primatology and related conservation, environmental, and humanitarian work. She has also been named a United Nations Messenger of Peace.

Dr. Goodall has published at least 15 books on chimpanzees, animal behavior, and humanitarian/environmental topics. She has authored more than 100 scholarly articles about her research, publishing in some of the most renowned science journals. These works have been written primarily for an audience of fellow researchers.

Figure 2.3 Jane Goodall studying chimpanzees and her research papers

Where do you start when you need to find information for your paper on Jane Goodall's work? When you Google Jane Goodall, you'll find websites related to her organizations, a Wikipedia entry, her social media profiles, photos and videos, links to buy her books, news articles, and so on. All of this may be good information, but most of it is not peer-reviewed scholarly material. If your professor requires you to use only peer-reviewed sources in your work, it will be necessary to go beyond Google to find what you need.

Strengths and weaknesses of web search engines

Strengths

- Simple to search and mobile-friendly
- Available to anyone with Internet access, regardless of university affiliation
- Media content, such as videos and images, is much easier to find than with other finding tools

Weaknesses

- Difficult to focus or refine your search and the number of results may be overwhelming
- Has more difficulty finding scholarly materials, such as journal articles
- Search engine algorithms may interpret your meaning incorrectly, based on past searches

2.4 GOOGLE SCHOLAR

Google Scholar is similar to Google except that it typically excludes non-scholarly web content because its primary purpose is to find scholarly materials. These include journal articles, books, patents, legal documents, reports, and more. However, there's no easy way to separate journal articles from other resources covered by Google Scholar, including some digitized books and scholarly websites. You may also find things you wouldn't expect like course syllabi and PowerPoint slides.

One of the most important things to understand about Google Scholar is where its content comes from because that determines if and how you can access it. Much of the material you find there comes directly from the open web. For example, it's common to see pdf files from researchers' websites, open access articles, and similar links in your Google Scholar search results. These types of materials are available to anyone, anywhere. You shouldn't have to log in to any website or database to access these materials.

Mixed in with these open web materials, you'll also find paywalled materials, including subscription journal articles and e-books. In most cases you can still access these, though it may take a few steps. Google Scholar has a feature that provides members of the ISU community with links for materials covered by ISU subscriptions. To set this up, follow the steps on the Google Scholar Library Guide. Below are some strengths and weaknesses to consider when using Google Scholar.

Strengths and weaknesses of Google Scholar

Strengths

- Simple to search and mobile-friendly
- A good choice if you have a partial citation, missing some information on a specific item
- Can find free versions of articles, although most items will not be free to access by default

- Can be linked to the ISU Library for greater access to subscription-only content

Weaknesses

- Difficult to focus or refine your search
- Finds things that are not journal articles, even when you limit your search to articles only
- Lists older articles before newer ones that haven't been referenced as frequently yet

2.5 LIBRARY DISCOVERY TOOLS

The ISU Library subscribes to thousands of electronic journals, scholarly indexes, e-books, and many other types of online resources. Traditionally, libraries depended on a finding tool called the library catalog, which told you what materials the library owned and where those materials were located in the library building. Much the same way that our library has a larger collection compared to other libraries you may have used in the past, library discovery tools help researchers find a wider range of resources beyond the items a library owns. Our library discovery tool is called **Quick Search**.

Quick Search basics

Quick Search is a powerful search tool that has two interfaces you'll encounter. The first and most prominent interface is a simple search box which is accessed through the library's homepage. Quick Search's simple search is commonly used in the beginning of your research. There is also an advanced search interface, which gives you more control over your search from the start by introducing filters you can apply. We'll discuss advanced search more in chapter 3.

Quick Search is particularly useful when you're starting your search from a general topic or don't have a specific source in mind. Try typing a few keywords or an author's name into the simple search box and exploring what you find.
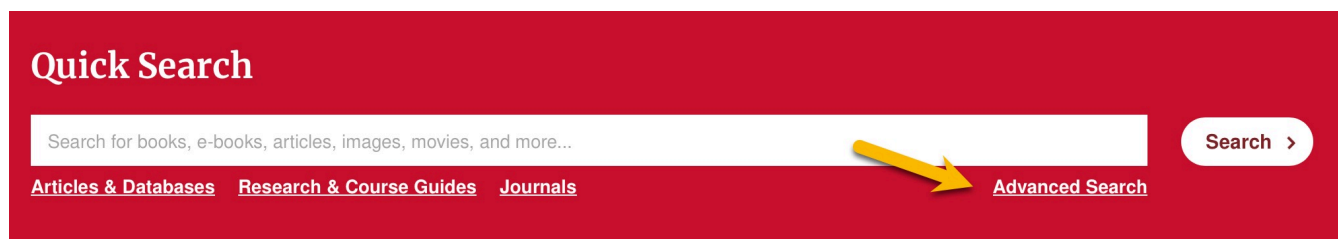

Figure 2.4 You can access Advanced Search from the Quick Search box

Quick Search not only incorporates the traditional functions of a library catalog by helping you find what we own, but also searches:

- Articles from some of the library's online indexes and databases,
- E-books and book chapters,
- Digital films, art, and music,
- Digital content from the Special Collections and University Archives,
- Online course and research guides,
- Open access web resources such as books from Project Gutenberg or the Directory of Open Access Books,
- Other items that the library doesn't have direct access to, but which you can request through Interlibrary Loan, and more.

Because Quick Search searches both the library's physical collections and some indexes and databases, it can be a straightforward starting place for finding both books and articles. This is particularly true for interdisciplinary topics. Be aware that Quick Search does not find every article the ISU Library provides access to, just ones from indexes that are compatible with it.

Quick Search features

Quick Search has a lot of flexible and useful features. For example, Quick Search uses labels in your results list so you can instantly tell which items are books, which are DVDs or CDs, and so on. Another helpful feature generates citations for sources you've found. You can also email item descriptions from your search results to yourself or someone else. Additionally, you can log in with your NetID to access more features.
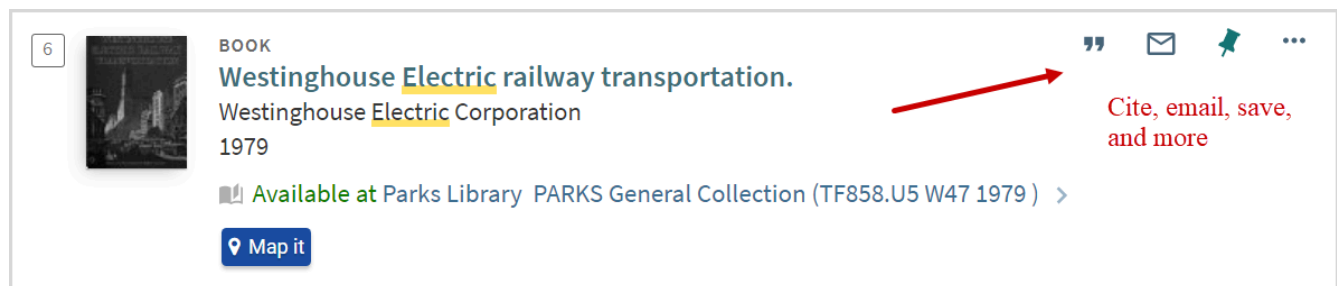

Figure 2.5 Example of Quick Search features, such as cite, email, and save

Strengths and weaknesses of Quick Search

Strengths

- It covers a wide range of topics and materials.
- It has an easy-to-use simple search interface.
- It can find books and other materials the library provides access to in addition to articles.

Weaknesses

- Because it covers a wide range of subjects and material types, you may get an unreasonable number of results.
- It has less extensive subject coverage when compared to subject-specific indexes.
- Unlike subject-specific indexes, it lacks highly specialized search tools for every subject area (e.g. searching by chemical formula, study methodology).

2.6 EXPLORING YOUR QUICK SEARCH RESULTS

Quick Search's results page contains elements that tell you more about the items you found. Here are some particularly useful ones to make note of:

Material type

Each item on your list has information to tell you what format your item is in, for example whether it is a book, journal article, or video. This is helpful when you are seeking a specific format (e.g. when your instructor requires a specific number of source formats, like one book and four journal articles). It also signals whether you can expect the resource to be long or short, or whether it is text-based or audio-visual.
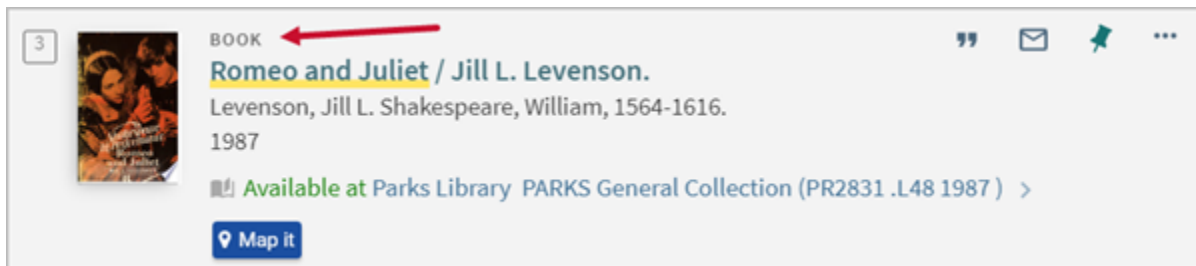
Figure 2.6 Material type information on the search results list

Multiple versions exist

This indicates your search has found something with more than one edition or format. You can click either the title or the **see all versions** link to find the list of versions. This might be helpful when you want a specific edition of a book or a specific recording of a musical piece. Think of Shakespeare's *Romeo and Juliet*. In this case, "multiple versions" includes several different film versions, music recordings, different editions of books, physical books and e-books, and more.
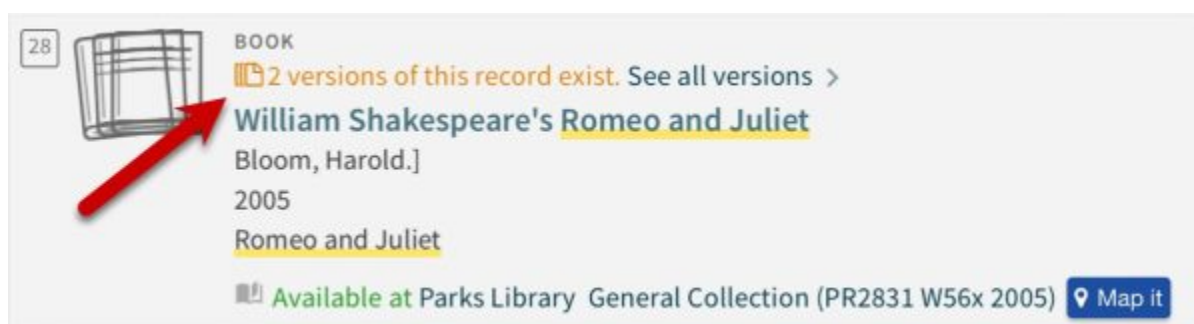
Figure 2.7 Information about number of versions available

Available or Not Available

This shows whether an item is available for you to use, or if it is not available to you because it is checked out.

Figure 2.8 Information about item's availability

Figure 2.9 Information about item's availability

Full text available

This means the whole item, not just a snippet or excerpt, is available in a digital format. Clicking on **online access** or **full text available** takes you either directly to your item, or to the digital collection that includes your item. If there is more than one digital collection

listed, check which years are displayed for each and select one that includes the year you need (when your resource was published).

Figure 2.10 Note the years listed for each collection. Figure out what year your article was published and then pick which collection, if any, it is in. If there is a resource that says "Available from" without an ending date, that means it includes the most recent issues

Learn more about your results

Sometimes the brief description of an item on the Quick Search results page doesn't tell you enough to know if the item is a good fit for your topic. To find out more, click the item title in bold to view the full display page which contains further details.

Tweak my results

On the right side of your search result page you'll find a number of filters that will help you focus your results. We'll talk about them in more detail later; however, it is worth noting that they can be helpful at any stage of the search process. Some filters you might start using right away are availability (whether something is available online or in the library), format type, creation date, and topic.

Using Quick Search to locate library materials

Quick Search helps you find both electronic and physical items within the library. Electronic items usually have one or more links which allow access to the item. To locate a physical item, you need these three things: collection, location (Map it), and call number.
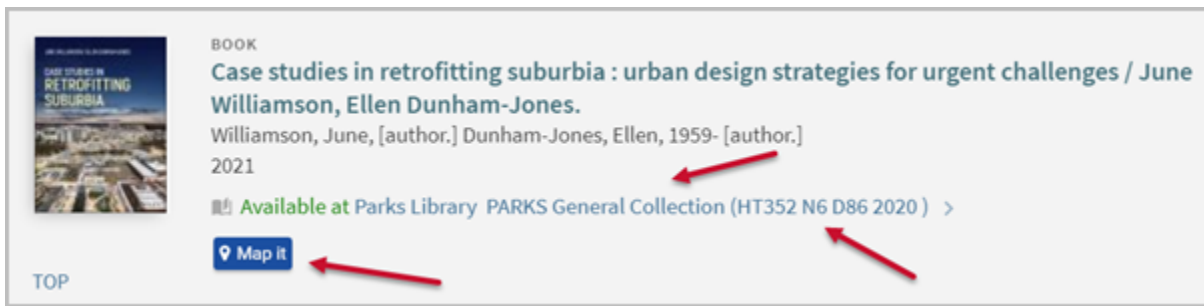
Figure 2.11 Three things you need to know to locate items

Collection

To find a physical item in the library, first check which collection your item is in. Collections you might encounter include:

- General Collection: Most library materials fall within this collection. These can be located on the Lower Level, Floors 2 and 3, and Tiers 1 through 7 of the library. You can find maps of the floors and tiers on the library website.
- Reference Collection: This includes handbooks, encyclopedias, style manuals, and other books used to quickly look up information. These materials can only be checked out for one week (or less in some cases); they are located on Tier 2.
- Media Center: Located on the Lower Level, this collection includes DVDs, CDs, and other multimedia items.
- Special Collections: This department is home to rare and unique research materials that support major research areas of Iowa State University. Because these materials are rare and tend to be fragile, access is more restricted and hours are limited. Special Collections is located on Floor 4.
- Other locations, such as Design, Veterinary Medical Library, or the Storage Building may also be listed with the call number.

Location (Map it)

Some collections are spread across multiple floors, so Quick Search's **Map it** can help. This feature indicates where your item is located in Parks Library. Map it lists the floor or tier

your item should be on, and provides a graphic indicating the approximate location. If you need help locating your items you can always ask for assistance at the Main Desk.

Figure 2.12 Map of floor 2, tiers 4 and 5 and graphic indication of approximate location of your item

Call numbers

Each item in the library has a unique call number. Like most academic research libraries in the United States, the ISU Library uses the Library of Congress Classification System to organize its books and journals. The first thing you need to know about this system is that it is alphanumeric, meaning its call numbers are composed of both letters and numbers. Call numbers are made up of at least two sections that encode a book's subject and other attributes. Because of this, books on the same shelf will be about similar topics.

In library catalogs and library discovery tools like Quick Search, call numbers typically appear in one long string with spaces in between each section of the call number. When call numbers are printed on the spine of a book, the sections will often be stacked in several short rows. Here's an example of the same call number in these two different formats:

In Quick Search:

ML419 K495 S313 2006

On a book spine:

ML419
K495
S313
2006

In both formats, each section of the call number signifies a different part of the book's code. It's not necessary to know what these mean; the important thing is to understand how they are read and arranged.

2.8 ARTICLE INDEXES AND DATABASES

Quick Search is the best place to start your research if books or book chapters are what you need. Quick Search can help find some articles; however, if you find you need more results or highly specialized articles, the library has other tools that may be more effective.

When you need to find a comprehensive set of articles on your topic, the most efficient finding tool to use is an article index. In the context of scholarly research, an index is an article finding tool, rather than a list of topics and page numbers in the back of a book. **Article indexes** (sometimes referred to as **databases**) help you identify and find articles on your topic. An article index allows you to search for your topic in hundreds of journals at once, so using an index is a huge time saver when you don't have one specific journal in mind. Some indexes also cover magazines, newspapers, book chapters, conference presentations, dissertations, or other materials.

Which index should you choose?

The ISU Library subscribes to hundreds of article indexes providing access to articles. Each index is different in terms of:

- subject(s) covered
- types of materials included
- whether materials are peer-reviewed
- whether abstracts (brief summaries of content) or full-text materials are provided
- dates included
- languages included
- overall design and search options

Features of article indexes

Indexes provide a variety of robust advanced search features to help researchers focus their searches. You can typically select, sort, and download articles or article abstracts. For scholarly research, indexes tend to be either general purpose or subject-focused.

Strengths and weaknesses of indexes

Strengths

- The best finding tool for locating scholarly articles
- Provide many robust search features that give you control over your searches
- Provide a list of what subjects and dates are covered
- Provide a list of which journals and conference publications may be found within
- Connect directly to full-text articles
- Subject-specific indexes cover an extensive set of journal articles and other materials focused on a subject area

Weaknesses

- Often too specific for finding general or background information
- Interfaces may be clunky or not compatible with mobile devices
- May not include the full text of articles

2.9 FINDING INDEXES

The library provides a list of Articles & Databases that you have access to as an ISU student. You can access these from the library homepage.
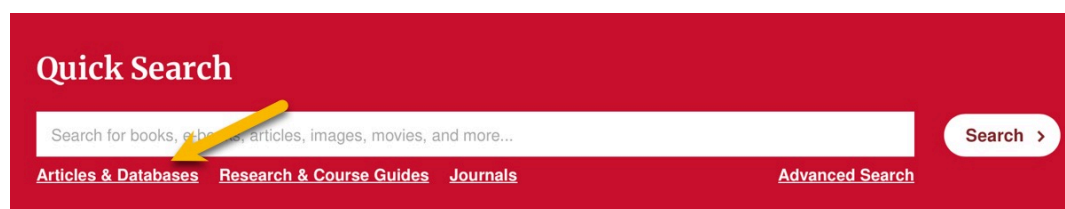

Figure 2.16 Link to the Articles and Databases page

You can browse the indexes by subject using the **All Subjects** drop-down menu. Once you choose your subject you'll get a list of indexes and databases that cover that area, with **Best Bets** featured at the top.

Figure 2.17 Articles and Databases page, by Subject drop-down menu, Best bets and other databases in chemistry

The **Subjects dropdown** on the Articles & Databases page brings you to a list of article indexes hand-picked by the librarian for that subject. If you need help with your research, that librarian's contact information is listed there so you can contact them with questions.

If you know the name of the article index you want, you can find it by using the default A-Z list or by using the search box. Then click on the name of the index you want to use. Note: this search box does not find articles within the index, but instead it searches names and descriptions of indexes or databases. When using the search box, it is best to use very general terms, such as "chemistry" or "design." If you're not sure which index to use, you can also use a general article database like Academic Search Ultimate.

General purpose indexes

General purpose article indexes cover many different subject areas and often include articles from magazines and newspapers as well as from scholarly journals. One good example of a general-purpose index is Academic Search Ultimate. Because it covers many different subject areas, a general-purpose index like this can be a good place to start.

In Academic Search Ultimate, options for filtering your search results are located on the left side of your screen in the **Refine Results** section. You can use these to focus your search results in various ways.
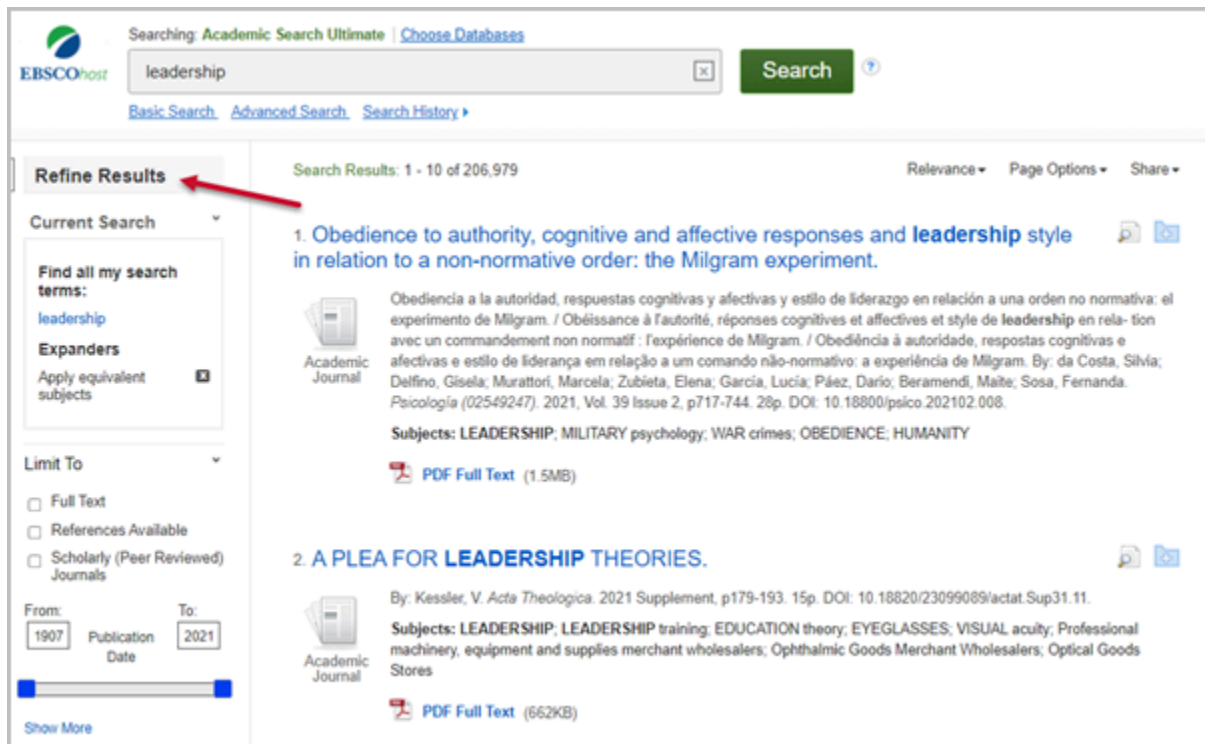
Figure 2.18 Academic Search Ultimate, Refine Results feature

Academic Search Ultimate has some interesting and unique features, including text to

speech technology that can read articles to you. Other features include saving your search results, filtering articles to peer-reviewed journals only, and generating citations for your bibliography.

Indexes like Academic Search Ultimate are great for finding information when you're not sure which subject area your topic falls under. However, if you want to find in-depth research articles in a specific subject area, subject-focused indexes are a better choice.

2.10 SUBJECT-FOCUSED INDEXES

When you are doing in-depth research and need to find a comprehensive set of scholarly articles in a particular subject area, the best finding tool will almost always be an index focused on that subject. Here are a few examples of subject-focused indexes to give you a better idea of what they can cover:

- CAB Abstracts is one of the largest agricultural databases covering international research and development literature in the fields of agronomy, animal health, forestry, human health, nutrition, and management & conservation of natural resources.
- Design & Applied Arts Index (DAAI) is an international index that provides resources on topics related to design and applied arts such as advertising, product design, and architecture. It contains citations and abstracts of articles, news items, and reviews created from 1973 to the present.
- Compendex – Engineering Village is a highly comprehensive engineering database with over 14 million records from journals, conference proceedings and technical papers in all engineering disciplines. Coverage dates from 1884 to the present.
- Food Science and Technology Abstracts is produced by the International Food Information Service (IFIS), and is the world's leading database of information on food science, food technology and nutrition.
- Sociological Abstracts provides full-text access to resources on topics related to sociology such as family and marriage, social change, and culture. This index covers thousands of journals dating back to 1952 and includes articles, book chapters, and conference papers.
- ABI/INFORM Global searches worldwide business periodicals for in-depth coverage of business and economic conditions, management techniques, theory, and practice of business, advertising, marketing, economics, human resources, finance, taxation, computers, and more.
- ERIC (Education Resource Information Center, EBSCOhost Access) is a comprehensive index of education literature and curriculum materials, containing more than 1.3 million records and links to more than 323,000 full-text documents

dating back to 1966.

- Communication & Mass Media Complete is a robust communication studies database. It provides full-text, indexing and abstracts for many top communication journals covering all related disciplines, including media studies, linguistics, rhetoric and discourse.

Subject-focused indexes like these offer discipline-specific tools to help you search, sort, and focus your results. For example, history databases let you search by the date an event occurred, whereas chemistry databases let you search by chemical compound. You will want to familiarize yourself with the indexes that relate to your classes so you can efficiently find the best sources for your projects.

Interdisciplinary topics

Depending on your topic, you may need to use more than one subject-focused index. Let's say you want to learn more about marketing new products to college students and influencing their buying behavior. In this example, you'd probably want to search a business-focused index (such as ABI/INFORM) and maybe also an index focused on sociology or psychology (such as Sociological Abstracts or PsycInfo). Each index will retrieve articles with different viewpoints, keywords, or subject emphases. Talk with your course instructor or a subject librarian if you need help identifying the right indexes for your topic.

Conclusion

To find out which tools are the best for your needs, you will probably need to explore a few of them and compare your search results in each. In scholarly research, one-stop-shopping doesn't happen very often. Instead, you need to use the right tools for the right job and be willing to experiment. In the next chapter, we will discuss how to use these finding tools effectively by implementing effective search strategies.

CHAPTER 3: SEARCH TECHNIQUES

Learning Objectives

After completing this chapter, you should be able to…

- identify basic and more complex search strategies and when to use them,
- apply common features of finding tools in order to improve your search results,
- recognize that item records have a specific structure, and that you can use key fields within that structure to strengthen your searching capabilities,
- interpret citations to find the items they describe, and
- use library tools and services to get access to materials not available in local collections.

3.1 BASIC SEARCH TECHNIQUES

Earlier, we discussed developing a topic into searchable keywords, and introduced key finding tools for library research. This chapter combines those topics to explore how you can use specific techniques to build an effective search strategy for your projects. Keep in mind that no single strategy, set of keywords, or finding tool will work perfectly every time. You'll need to use different strategies for different situations.

Simple searching techniques

Starting simple is often a useful strategy, especially when you have a broad topic or don't have a specific source in mind. The easiest way to get started in most finding tools is to type a few keywords into the search box. In the following examples we will use Quick Search, but these strategies will work in almost any finding tool.

Let's say you are doing a project about solar energy and power storage. Just putting these words in the simple search box uses the default settings without restricting the results that come up. Sometimes that's what you want, like when you're doing an initial exploration of what's available. However, doing this may retrieve far too many results. If that's the case, you may have to try different search terms or strategies to narrow your results down to the most relevant sources.
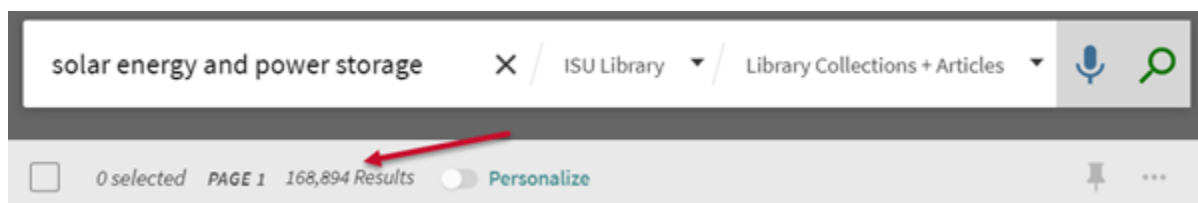

Figure 3.1 Number of items retrieved in a simple search

Here are some simple ways you can narrow your search results:

Phrase searching is when you take a specific phrase and enter it into the search box using quotations around it. It's helpful when you want to find a specific term or phrase, for example "solar energy." By putting quotations around the phrase, that ensures the

database will search for those words together, in the order you specify, rather than sprinkled anywhere in the resource.

Truncation is when you use a special symbol, often an asterisk (*), to search for multiple endings for a word's base, or "trunk." Using a truncation symbol tells the search tool to find any word that starts with the letters leading up to that symbol, regardless of what letters come after that point. This is a simplified way to search for different forms of the same word with a single search. For example, by searching for electric* you can find results containing all or any of these terms: electric, electrical, and electricity.

You can determine where to truncate by spelling out variations of your keyword and highlighting the last place where the letters overlap. This is likely to be the most useful place to truncate. See the example below.
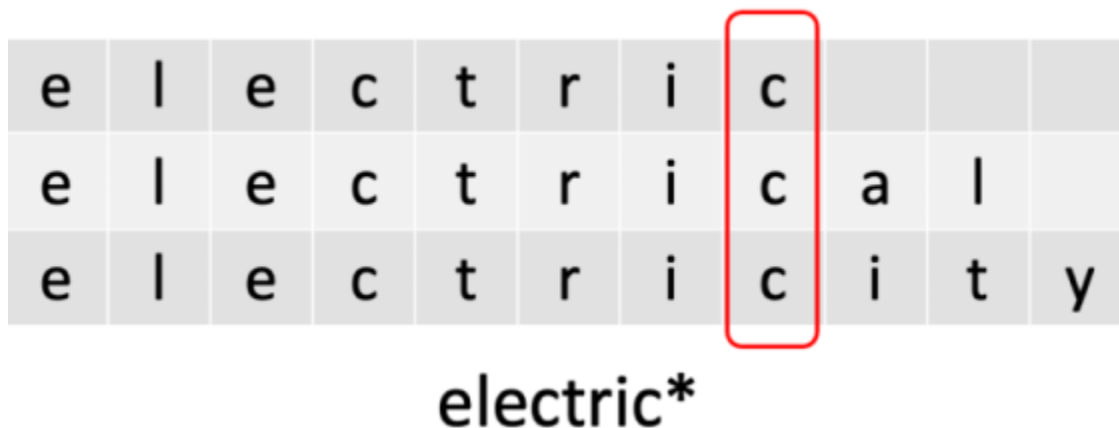
Figure 3.2 Use truncation to search for multiple words that share a base.

Watch out!

- Truncating too **early** makes it more likely that you'll retrieve irrelevant results. For example, by truncating electric as elect*, you would also get elections, elected, and electoral.
- Truncating too **late** reduces the number of variations you will find, missing many results that could be useful. For example, electricit* will retrieve electricity but not electrical.
- Truncation is not a useful strategy for all keywords. In some cases, a keyword may

share a base with words that are not closely related to it. For example, protest* will find the related terms protests, protesters, and protesting, but also matches the unrelated word Protestant.

Check your understanding

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://iastate.pressbooks.pub/lib160/?p=168#h5p-4

Filtering your results

Filtering is the process of narrowing your results by applying modifiers to your existing search. Think of it like online shopping: after you search for something you want, you can limit your results to only items within your price range, or those with free shipping. Filtering your search results when doing research is a similar process. Finding tools like Quick Search include various filters that let you do things like restrict your results to a specific date range (e.g. published in the past 5 years) or format (e.g. books instead of articles).

Where the filters are located will depend on which tool you're using. In Quick Search, they are located in a column on the right side of the page, but many databases and indexes place them on the left. Once you have selected one or more filters and applied them to your search, they will typically appear in a list near the top of your search results page. One thing to be aware of is how your search tool handles filters when you change your search or start a new one. Filters from your previous searches may still be active, or not. If a filter was removed, you might want to add it back in; alternatively, if the filters are still active, you may want to remove one or more of them to broaden your results.

When you're considering your search terms, take a few moments to reflect on whether modifying the phrases and keywords you've used will be useful for your search. Phrase

searching, truncation, and filtering are not the only techniques you should know, but they are useful to know. In the next section, we'll explore a technique that gives you more control over your results from the beginning.

3.2 BOOLEAN OPERATORS

Boolean operators (AND, OR, and NOT) help you broaden or narrow your search, depending on which operator you use. Each operator works according to its own set of rules to affect how your keywords are searched. Boolean operators act on the keywords around them in a way similar to how math operators act on numbers. Note that in many finding tools, you must capitalize Booleans for them to be recognized.

AND

AND specifies that all the keywords you connect with AND must be present in your search results. The more search terms you add with AND, the more you will restrict your results, and the fewer results you will get. AND is most useful when you have two or more keywords and want to make sure all are included in each of your search results.

Let's say you're doing research on the evolution of dogs. Here is an example of a Boolean search you might try:
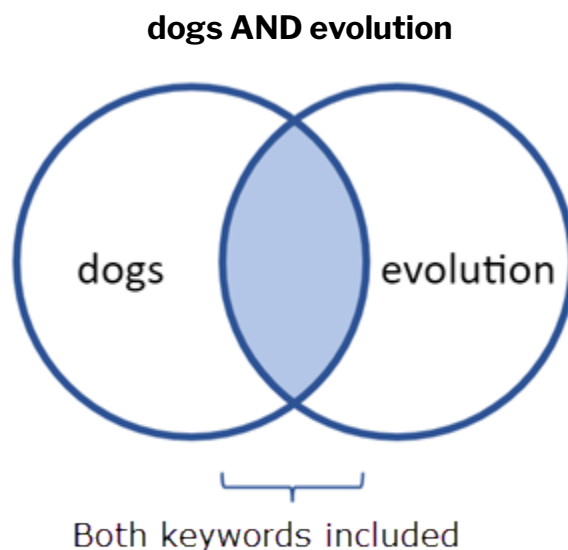
dogs AND evolution

Figure 3.3 Shaded area represents dogs AND evolution

By constructing your search with AND between each term, your results would each need

to contain both dogs and evolution. Any item with only one of those terms but not the other would be excluded from your results. This is useful because the majority of sources about dogs do not talk about evolution, and the majority of sources about evolution do not talk about dogs specifically.

You can use more than two keywords with AND, but be careful not to go too far. Adding too many terms may overly restrict your results. If you get zero results in a search, that doesn't necessarily mean that there isn't any information on your topic. You may just need to change the ways you combine your search terms (or which terms you use) and try again.

OR

When using **OR** as a connector, it specifies that at least one of the keywords you searched must be present in your search results. Unlike AND, using OR will only guarantee that one of your terms is present in the results, not necessarily all of them. When you combine keywords with OR, you'll retrieve more results than if you searched just one of those terms. This is useful when you want to search synonyms or closely related concepts for your topic simultaneously.
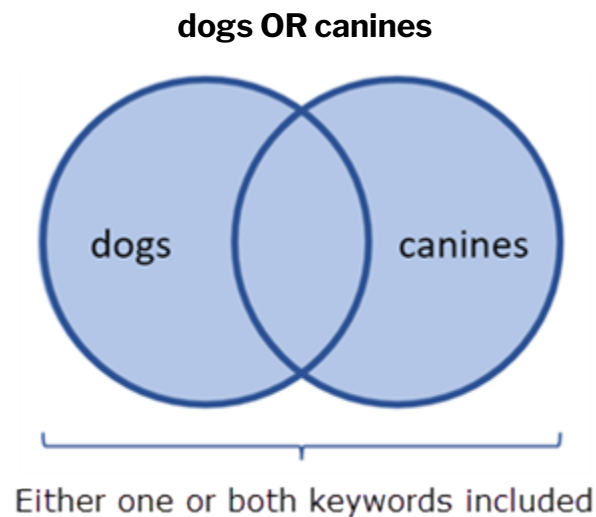
Figure 3.4 Shaded area represents dogs OR canines

Returning to our example, if you want to find more sources about dogs and evolution, using

OR allows you to add related terms like "canine" to your search. Here is an example of a Boolean search you can try:

(dogs OR canines) AND evolution
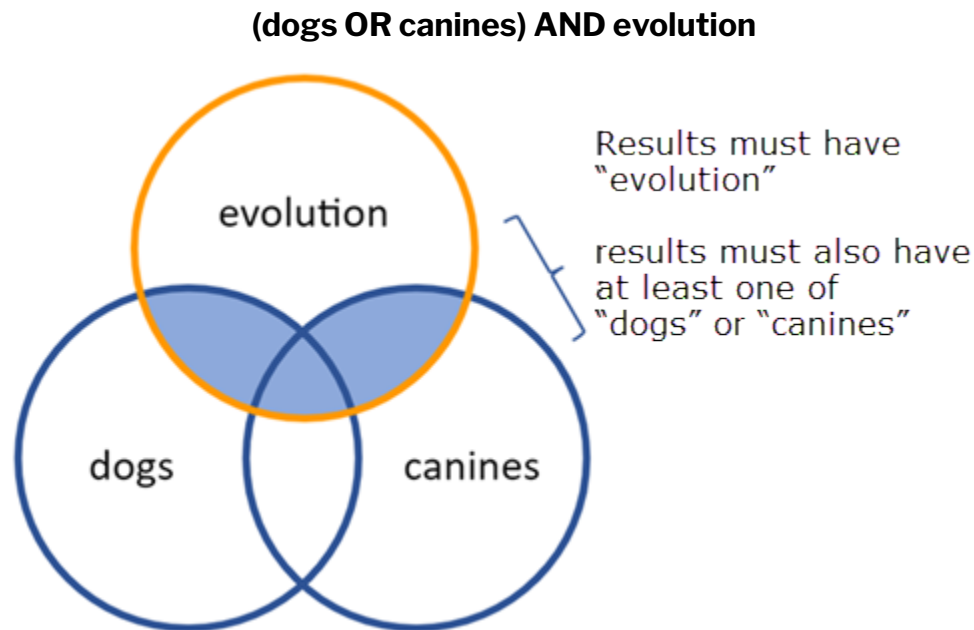
Figure 3.5 Shaded area represents (dogs OR canines) AND evolution

Note that adding in some terms with OR may expand your results too much. Never use "OR research," "OR methods," "OR data," or other very broad terms. This will find an overwhelming amount of irrelevant research, because every study on every possible subject contains those terms. "Dogs OR research" will find a lot of results, but the results about dogs will be buried within results covering thousands of other topics. Exercise care when choosing terms to add to your search with OR, and remember you can always change your search terms and try again.

NOT

NOT will restrict your search by omitting any keyword(s) that come after NOT. This is a useful way to prevent items containing irrelevant or unwanted keywords from appearing in your search results.

canines NOT teeth

One keyword included but not the other

Figure 3.6 Shaded area represents canines NOT teeth

Returning to our canine evolution example, if you keep finding results about the "canine teeth" of other animals rather than results about dogs, using NOT allows you to exclude the term "teeth" from your search results. Here is an example of how that Boolean search could be constructed:

(dogs OR canines) AND evolution NOT teeth

Results must have "evolution"

results must also have at least one of "dogs" or "canines"

results cannot have "teeth"

Figure 3.7 Shaded area represents (dogs OR canines) AND evolution NOT teeth

This search will find items containing the terms "dogs" or "canines," as long as those records do not also include the word "teeth." Be careful, though! Using NOT might

eliminate useful results that happen to contain the term you want to exclude. In the above example, you would eliminate any records about using teeth to date canine fossils, even though those items might be exactly what you want.

Did you know?

Some interfaces use Booleans differently:

- Google places an invisible AND between each of your search terms and will attempt to find results with all of your terms before anything else.
- Google uses a minus symbol (–) in place of NOT for Boolean searches.
- Some indexes will suggest a string of synonyms connected with OR after you type a keyword or phrase.
- Some indexes will treat everything in the search box as one phrase that has to occur in that order unless you use Booleans between keywords.

While using Booleans can be incredibly useful in many finding tools, they won't work the same way in every tool you use. Experimenting with the terms you use and how you use them is key.

3.3 NESTING

Nesting lets you combine multiple searches into a single search. It allows you to group similar concepts or keywords together within parentheses so you don't have to perform multiple searches. Combined with Boolean operators like AND and OR, nesting is an efficient and effective way to improve your keyword search results.

Boolean order of operations

Before we jump into how nesting works, you need to know how Boolean operators function without parentheses to group them in nests. Boolean operators follow an order of operations that determines how a finding tool will interpret your search. In a Boolean search NOT takes priority, followed by AND, and then OR. To use a combination of Booleans most effectively, you'll want to use parentheses to make the order clear. It can be helpful to think of this like order of operations in math, where using parentheses impacts the order in which an operation is performed. By using parentheses, you control which action the finding tool you are using applies first. Here are some examples:

heavy AND metal

With this search, you may be interested in learning about heavy metals as a material, perhaps for industry production, chemistry, or the health aspects of exposure to heavy metals. However, if you just search "heavy metal," your search will retrieve a mix of information, including resources talking about the heavy metal music genre.

heavy AND metal NOT music

By adding NOT, the index will follow the Boolean order of operations by first removing any results that contain the word "music." This should help eliminate any references to bands or songs in the heavy metal genre. Finally, the database will search for records containing all of the remaining search terms connected by AND. But what if you have a longer list of keywords to search for?

Using nests

Let's say you want to search for information about the causes of anxiety. After brainstorming synonyms for your keyword "causes," you come up with "reasons" and "factors." Databases may use different terminology to talk about the same subject. Instead of performing three separate searches for anxiety with each term, you can instead use the Boolean OR to search them all at once. Without parentheses, the search "anxiety AND reasons OR causes OR factors" would find sources containing "anxiety AND reasons," or sources containing "causes" or "factors" without necessarily containing anything about anxiety. This will bring you way too many results, many of which will be irrelevant. To fix this search to find what you actually want, use nesting.

anxiety AND (reasons OR causes OR factors)

By combining the keywords "reasons," "causes," and "factors," with OR inside the parentheses, the finding tool will first search for results containing any or all of those terms. By leaving "anxiety AND" outside of the parentheses, we are telling the finding tool that, no matter which of the three other terms it finds, "anxiety" must also be present in all of our results.

Figure 3.6 Illustration of a nested search

Using nested keywords lets us be more efficient by searching for all of these at the same time, rather than having to perform each search separately:

anxiety AND reasons
anxiety AND causes
anxiety AND factors

Using multiple nests

In this final example, you want to find resources discussing *criticism of French cinema*. Similar to the example above, using nested terms with OR lets you group related concepts to control the order in which they are searched. Because there are many ways to talk about cinema, you can connect synonyms within parentheses with OR. Similarly, you know authors may use either "French" or "France" when talking about this topic, so you create another nest with these terms.

(cinema OR movies OR film) AND (french OR france) AND criticism

The reason you don't want to put all of the terms together with Boolean ORs in the same set of parentheses is because they are not interchangeable topics — both "France" and "cinema" are integral to our search. For this reason, we have included AND between the sets of parentheses. Boolean operators and nesting let you make your keyword search as simple or as complex as you wish. Most finding tools have features built into their advanced search to help you integrate Booleans, nesting, and more into your search process.

3.4 USING ADVANCED SEARCH

Unlike a basic search, advanced search gives you more control over how you structure your search and what that search finds. This can be particularly helpful when doing in-depth research. In most finding tools, you can find a link to advanced search near the default search box.
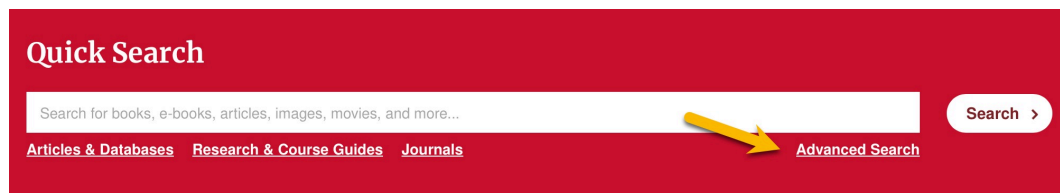

Figure 3.7 You can access Advanced Search from the Quick Search box

Advanced search may seem more complicated with more than one search box and various drop-down menus or check boxes, but these can better help you craft a more specific search to help you find relevant resources.

Advanced search features

Most finding tools allow you to do a simple search or use more advanced features. In subject-focused indexes, these features can be highly specialized. Search features you are likely to find in an article index include:

- limiting to only peer-reviewed articles
- full-text or abstract only
- specifying a date range to search within
- restricting to languages you understand
- document type (book chapter, article, etc.)

You can also do more complex searching in advanced search with booleans, field searching, and subject searching.

Booleans in advanced search

Advanced search can help you structure complex Boolean searches more easily. Typically,

the advanced search interface starts by displaying two rows of search boxes, but you can add more rows as well. Each row acts to group terms together, with an implied set of parentheses around your search terms. Between the rows, you can select AND, OR, or NOT to choose which Boolean operator is applied between the groups. You can place Booleans alongside your keywords within these search boxes, as well as using the Booleans outside of the search boxes. This can be particularly useful if you are new to using Booleans, as advanced search helps you group your keywords on different rows. You can think of this as showing your work while doing math problems until you're familiar enough with the processes to be able to perform mental math. This is demonstrated in the figure below.

Figure 3.8 Using nested search in Quick Search

The example above shows you how to perform a search for (*cinema OR movies OR film*) AND (*french OR france*) AND *criticism* using advanced search in an article index. We have grouped the related terms together on their own rows using OR. We also connected the three rows with the Boolean operator AND. Even though there are no parentheses displayed around the search boxes, the terms are nested because they are grouped in different rows.

Did you know?

Some finding tools' advanced search interface lets you choose how your words are processed. Here are some options you might encounter for that.

- The default option in most finding tools, **contains/anywhere**, finds items that contain your keywords in any order anywhere in the item's information (not necessarily together in the order you wrote them). Use the default option if you don't remember the exact title or wording of the item you want to find.
- Use **phrase** or **contains exact phrase** only when you're certain you remember the exact wording of a title, author, or other elements of the item you're trying to find. This lets you do phrase searching without using quotation marks.
- Use **starts with** if you know how a title or phrase begins but you aren't sure what the full title of the book is. You'll mostly find this in Quick Search.

These options may appear and function differently depending on which finding tool you use. They may present as drop-down menus, radio buttons, checkboxes, or more.

3.5 ITEM RECORDS

Once you've done a search, the finding tool will generate a list of brief item records. Item records are descriptions of individual books, journal articles, and other materials. Important parts of an item record include things like article title, author, and the source name (e.g. journal title). Each of these parts is a field. Some article indexes label each field; others don't, assuming that you can infer what each part represents.

Typically, subject focused indexes display short versions of item records in search results lists, as in the example below. Important parts of the item description are included, but most fields are not labeled in this short version.
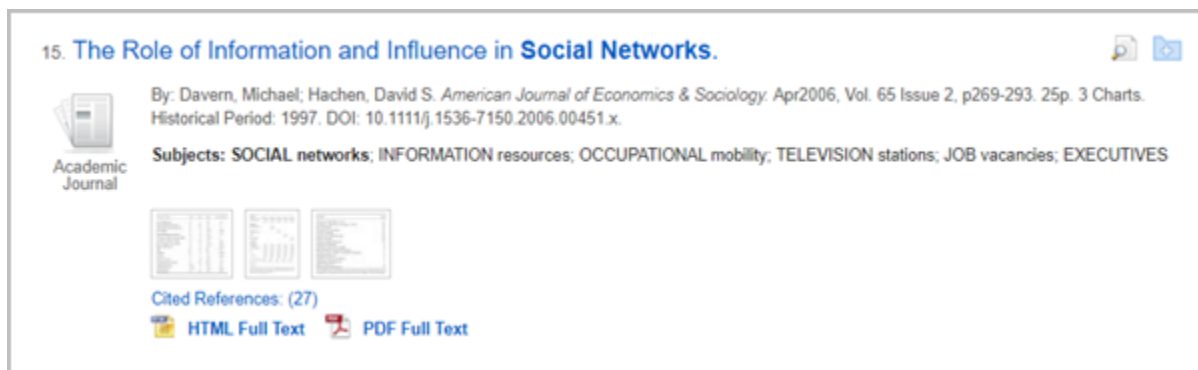

Figure 3.9 Short item record showing a few fields, but not the full item description

Clicking on the title generally brings up a detailed version of the record with a lot more information, including additional fields, labels for most of the fields, and often an abstract or link to the full text.

Detailed Record

HTML Full Text

PDF Full Text

Cited References (27)

Find Similar Results
using SmartText Searching.

◄ Result List   Refine Search   ◄ 15 of 3,626 ►

The Role of Information and Influence in Social Networks.

Authors:	Davern, Michael[1] (AUTHOR) Hachen, David S.[2] (AUTHOR)
Source:	American Journal of Economics & Sociology. Apr2006, Vol. 65 Issue 2, p269-293. 25p. 3 Charts.
Historical Period:	1997
Document Type:	Article
Subject Terms:	SOCIAL networks INFORMATION resources OCCUPATIONAL mobility TELEVISION stations JOB vacancies EXECUTIVES

Images

Abstract: Examines two mechanisms through which **social networks** are related to job mobility: access to diverse sources of information about job openings and nonredundant sources of influence. Using data from 1997 on job changing and **social networks** among television station managers, the authors assess the extent to which job information and influence variables mediate the relationship between **social network** structure and getting a better job. Results indicate that there is an association between job mobility and having nonredundant contacts, but the measures of the information and influence mechanisms are not significant mediators. The authors also reexamine the **network**-resource model that forms the basis for much of the research on the relationship between **social networks** and job mobility. [ABSTRACT FROM AUTHOR]

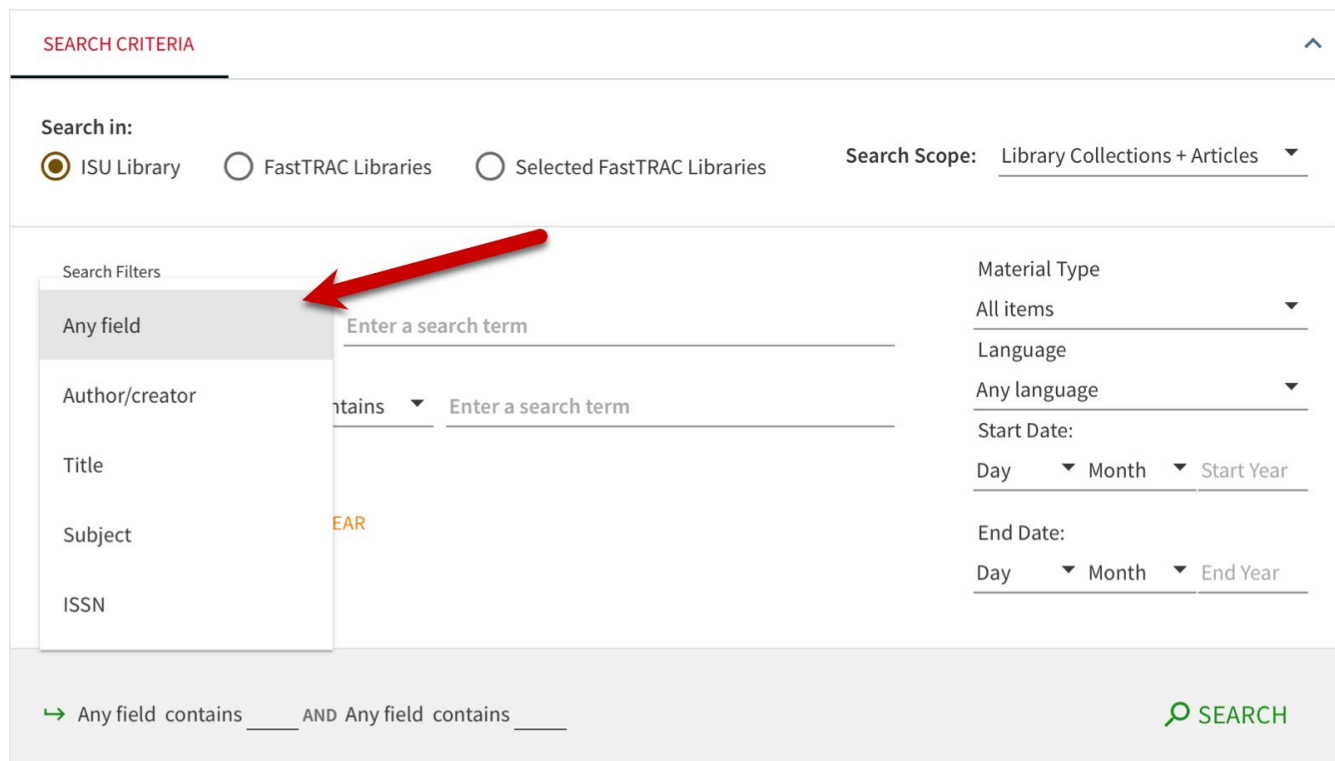|	
Author Affiliations:	[1]University of Minnesota, School of Public Health [2]University of Notre Dame, Department of Sociology

Figure 3.10 Item record with more information about the article

3.6 FIELD SEARCHING

Field searching is a technique that lets you search for information that you know will be in a specific field of an item record, such as the title or author. This focuses your search in advance, making your results more relevant from the start.

Quick search and many other finding tools will let you do field searching in advanced search by selecting a field from a drop down menu next to the search box. When you specify a field this way, the finding tool will search for the terms you entered only within that field.

Figure 3.11 Field searching drop-down menu in Quick Search

Field search options generally aren't labeled. Instead you'll just find a choice like "any field," "anywhere," or "select a field" displayed. "Any field" or "anywhere" is a good place to start when you don't have a specific resource in mind. This will yield a wide range of possible results, as your terms may appear in the title, author, subject, or any other field in the

item record and still be considered a match for your search. The default "any field" is also useful when your search terms fall into different fields, such as title and author/creator (e.g., Brothers Karamazov and Dostoevsky).

Exploring the field search options lets you search within a specific field like title or author. For example, if you search for Stephen King under "any field," you will find books about Stephen King as well as books by him. If you want to narrow your results to books by Stephen King, you can select the author/creator field.

Searchable fields and why to use them

- **Author**: Use this field when you know the author, editor, or creator's name. For example, if you wanted to find things Jim Henson wrote or produced, searching by author would be your best choice.
- **Subject**: The subject field contains terms that describe what items are about. Use this with caution because subject terms are taken from preset lists, and don't necessarily cover all the ways their topic can be described (e.g. synonyms). More on this in the next section.
- **Title**: Use this field when you know all or some of the words in an item's title. This can help dramatically reduce the number of results you get, but there may still be multiple items with the same words in their titles.
- **Format or material type**: This field allows you to limit your results to specific item types, such as only searching for books, articles, journals, audio (e.g. music CDs, audiobooks) videos (e.g. streaming video, DVDs), or images. Some tools will have a separate option to limit to peer-reviewed articles. These are often sources your instructors prefer, so it's a handy shortcut to be aware of.
- **Publication date**: This allows you to find resources published within a specific year or date range. This is particularly useful when your assignment requires you to find items published in the last five years.
- **Language**: This field lets you search for items in a specific language. Typically the finding tool will provide a list of languages to select from. This is helpful for limiting to items in languages you understand.

Depending on which tool you use, the field labels may vary, and the limiters you add may

stick around from search to search. It's a good idea to pay attention to what's happening in your searches so you know what's affecting your results.

Corporate authors

Authors can include anyone or any group who is responsible for creating a work, such as writers, music composers, companies or organizations, performers, and so on. You can find materials written or produced by NASA, the United States Department of Agriculture, scholarly organizations, and many others by using the author field.

3.7 THE SUBJECT FIELD

As we covered in Chapter 1, when beginning your research, you need to think about your research question and pull out the most important keywords to use in your search. These may be technical terms from a certain field of study or they may be general words that describe a topic or concept. Combining these terms to create a custom search is how most of us start our research.

Here are some examples:

- Forever 21 clothing sweatshops scandal
- 20th century art from the United States
- future of electric cars
- job interview etiquette

These sorts of searches work well in a variety of tools (Google, indexes, Quick Search). However, when you need to find a comprehensive set of resources that are all about the same topic, you should make the most of features built into your finding tool, like subject searching.

Subject searching is a type of field search that works a little differently because **subject fields** work a little differently. Subject fields contain words that describe topics, but these terms are not randomly selected. They come from a preset list put in place to be used with the finding tool. The terms from these lists are called **controlled vocabulary**. Using standard terms for subjects lets researchers more easily find resources *about* their desired topic, even though authors of different resources may use different terms for a topic.

Many indexes call their subject headings by different names such as subjects, categories, subject terms or descriptors. Here are some examples of subject headings you might encounter in scholarly indexes, similar to those described above in the keyword searches:

- Clothing trade–corrupt practices

- Art, modern–20th century–United States–Exhibitions
- Hybrid electric cars
- Employment interviewing

When subject searching, you may encounter terms that seem outdated or even offensive. For instance, categorizations related to identities in the LGBTQIA+ community, racial and ethnic groups, and educational ability have historically been problematic. This is one of the negative consequences of having a standardized system for categorizing topics, as it's often hard to change the labels once they've been established. People are working towards change to address these problems, but these older terms may still remain in your search results. This doesn't mean that the finding tool or library that uses these terms isn't trying to change them.

Subject searching

As discussed earlier in this chapter, advanced search features typically allow you to search for your keywords in specific areas of the item record (e.g., author, date, type, format). Searching for a specific subject heading is not the best way of using controlled vocabulary, though. After all, most of the time, you won't know what words a specific finding tool uses for its subjects. Below are two effective ways of finding subject headings for your search: starting from a keyword search or using a thesaurus.

You could begin with a simple keyword search, or try combining search strategies like the ones we've described so far. Once you've done your search, examine your results list. When you find an item that seems relevant to your topic, open the item record and skim through the abstract to make sure it is actually a good fit for your research. The item that best fits your needs might not be the first item on your list, or even on the first page of results.

Details

Title	Hunting Dogs
Author/Creator	Ridgway, Marcella >
Subjects	Bird dogs >
	Gun dogs >
	Scent hounds >
	Sport dogs >
	Sporting breeds >
	Upland game >
	Zoonoses >
Is Part Of	The Veterinary clinics of North America. Small animal practice, 2021-07, Vol.51 (4), p.877-890
Description	Herding and hunting dogs are intense, high-drive dogs that work, and often live, outdoors and in constant or repeated close contact with domestic and wild animals. These dogs are at increased risk for injury and exposure to infectious diseases, toxic substances, and environmental threats. The common practice of feeding or allowing access to raw meat from farm or game animals enhances disease transmission risk. These dogs can be affected by infectious diseases and injurious agents that are rarely encountered in other groups of dogs. In addition, their extreme work ethic may lead to delays in diagnosis.
Publisher	Elsevier Inc
Language	English
Identifier	ISSN: 0195-5616
	EISSN: 1878-1306
	DOI: 10.1016/j.cvsm.2021.04.006
Source	ScienceDirect Journals (5 years ago - present)

Figure 3.12 Subjects field shows other subject terms associated with this item

Once you're sure that you've found a useful subject heading, evaluate the subject terms listed and how they relate to your topic. You can use subject terms in two different ways:

- Click on a subject term directly from the item record. Doing this will generate a new Advanced Search and retrieve everything in the index on that topic.
- Modify your original search to incorporate the subject terms you found. To do this, add a new line in Advanced Search, type out one of the subject terms you have found, and select the subject field for that line.

Remember, you can always go back and add more keywords, phrases, and subjects to build upon your initial search and explore items that you might not have otherwise found. Experiment with different search techniques and explore how your results change.

Keep in mind that different databases use different subject headings to refer to similar

topics. For example, in a psychology index, there may be more psychology-specific subject headings than there would be in an engineering index. For this reason, when you get started with a new finding tool, you'll probably need to do some initial exploration to discover the subjects that best match your topic.

Using a thesaurus

Another way to find subject headings is by using a thesaurus. In indexes and databases, a **thesaurus** is a tool that identifies the subject terms a specific database uses. Some databases may use different names for this tool, such as "Subject Terms" or "Subjects." This tool can be useful when you want to simultaneously explore a variety of subject terms related to your topic. Note: not all databases have a thesaurus tool.

In some databases, the thesaurus button may appear in different places, such as on the advanced search page or on the homepage. For example, in Academic Search Ultimate, the thesaurus is called Subject Terms and is found in the top menu.
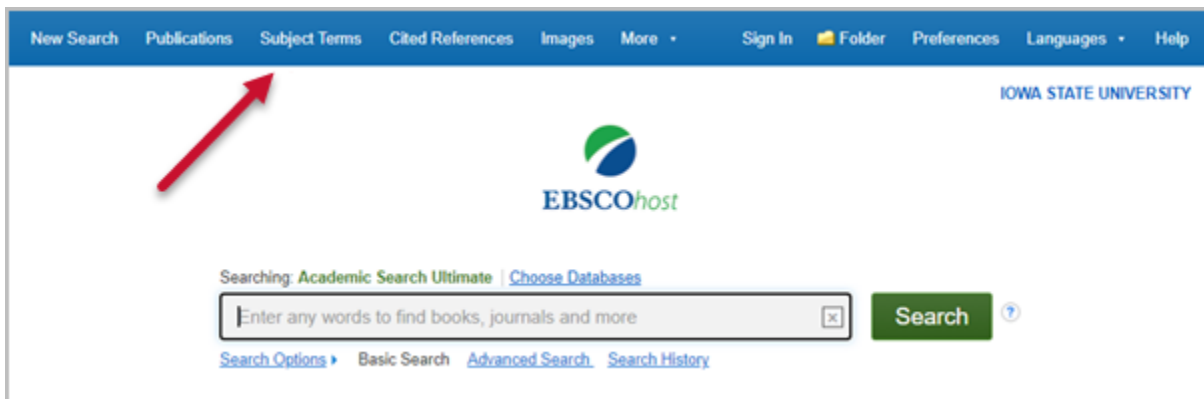
Figure 3.13 In Academic Search Ultimate, use Subject Terms for the thesaurus feature

After opening this menu, start by searching for a broad term. Let's say you are interested in finding articles about drug addiction. A search in the thesaurus for "addiction" will lead you to various options such as "drug addiction," "social media addiction," and "nicotine addiction." From this list, you can select the subjects that are the most relevant to your research topic and directly add them to your search.

Figure 3.14 Finding subject terms in Academic Search Ultimate

If there is one subject heading that seems particularly useful, you can click on it to explore broader or narrower subject terms that are related. Keep track of these subject terms until you are done with your project or paper, in case you need to find more resources later.

There are many ways you can use field searching to improve your research. While this section has focused primarily on subject searching, it is often a better choice to use other fields from the start, particularly when you want to find a resource by a specific author or published in a specific date range. Explore the advanced search options that different indexes and databases provide to figure out what works best for your research.

3.8 USING CITATIONS TO FIND AN ITEM

A **citation** contains elements (e.g. author, date, title) that uniquely identify a resource. You will primarily find citations in the works cited or reference section of a paper or book. They may also appear on websites, your course syllabus, or other materials provided by your instructor. Your instructors expect you to include citations in your papers to tell them where your ideas came from. Scholars out in the wider world include citations in their work for the same purpose. You can use their citations to trace back where their ideas originated, the same way your instructors check your work.

We've talked about using field searching when you are starting your research without a specific item in mind. You can also leverage field searching to find an item you already know key information about! For example, you may have a full or partial citation for an item that seems like it could be useful, or you may be interested in finding a research article that is mentioned in the news. The pieces of this citation correspond with specific fields in an item record. Note that different citation styles (MLA, APA, Chicago, etc.) will have different rules or ways of representing common elements of citations, such as author name, title of article or book, and so on. What's important for this chapter is to focus on recognizing these citation elements rather than the specific rules for a given style. Below are some examples of citations and how you can find the resources they describe.

Book

Here is a citation for a book in Chicago style:

Frank, Frederick S. *The First Gothics: A Critical Guide to the English Gothic Novel*. Garland Publishing, 1987.

The best way to read this book quickly (and for free) is to check whether the library has it. To find this out, search for the book's title in Quick Search. You can also use the **Title** field in Advanced Search. In this example, the book's title is italicized.

Author name   Book title

Frank, Frederick S. *The First Gothics: A Critical Guide to the English Gothic Novel.*
Garland Publishing, 1987.
Publisher   Publication year

Check your understanding

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://iastate.pressbooks.pub/lib160/?p=180#h5p-24

If the book you're searching for has a simple title, like *World History,* you will want to add the author's name to your search. To do this in Advanced Search, add another line to your search and select the **Author/creator** option. This will help filter out books with the same title by other authors. In most citation styles, the author's name is the very first piece of a book citation.

Figure 3.15 Searching by citation elements in Quick Search

Once you've searched for the book title and author's name together, your search should find the book, as long as it is available in the ISU Library. Quick Search may also display reviews for the book in your results. If you want to filter these out, you can limit your format type to **Books**.

Book chapter

Here is a citation for a book chapter in MLA style:

Neves, Marcos Fava, and Luciano Thomé e Castro, "Inserting small holders into sustainable value chains." In *Handbook of Business Practices and Growth in Emerging Markets*, ed. Satyendra Singh. (Singapore: World Scientific, 2010), 235-253.

A book chapter citation contains all the elements of a book citation, plus some extra pieces that indicate the citation is for part of a book, rather than the whole book. These commonly include an editor's name, the chapter title in addition to the book title, and page numbers for the chapter. Generally, a book chapter citation includes two sets of names. The first is

the author(s) of the book chapter being cited. The second set represents the editor(s) for the entire book.

Check your understanding

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://iastate.pressbooks.pub/lib160/?p=180#h5p-23

You cannot reliably find a book chapter by searching for the chapter author's name or the chapter title. To find a book chapter from its citation, you'll first need to find the book that contains that chapter. In this example, the book's title is *Handbook of Business Practices and Growth in Emerging Markets*. To search for the book in Quick Search, enter the **book's title** (not the chapter title) and the **editor's last name** (not the chapter authors' names) in the search box. You can also do this in Advanced Search with field searching.

Figure 3.16 Searching by citation elements in Quick Search

Note: The item records in Quick Search do not list chapter titles and chapter authors for every book, which means you cannot search for chapters directly. Because of this, a more successful approach is to search for the book the chapter is in.

Journal article

Example citation in APA style:

Upadhyay, R. & Rao, J.M. (2012). Microwave-assisted extraction of chlorogenic acids from green coffee beans. *Food Chemistry, 130*(1), 184-188. doi: 10.1016/j.foodchem.2011.06.057

Typical article citation elements include author and title of the article, journal name, journal volume and issue numbers. There are several ways to find a journal article from a citation. You can search for the article by its title or by the journal it's found within.

Check your understanding

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://iastate.pressbooks.pub/lib160/?p=180#h5p-22

Finding a journal article by its title

Many, but not all, articles can be found by using Quick Search. First, identify which part of the citation is the article title, and then search for that title in Quick Search. If the article title is particularly simple or generic, it may be helpful to add the author's surname to your search. Doing this will filter your results to find articles containing both the author's name and the article title, making it easier to identify the correct article among your results.

Figure 3.17 Searching for journal article in Quick Search by citation elements

You can also search for an article by its title in Google Scholar. Just be sure that you have chosen **Iowa State University** as your institution in your Google Scholar Settings so you can get access to the article through Iowa State. You can use our Google Scholar Library Guide to learn how to do this.

Searching by the article title works well most of the time, but if it doesn't, you still have hope! Try one of the following:

- Check for typos in your search terms. Even if you copy/paste, sometimes the original citation contains errors.
- It may be tempting to put the title in quotation marks, but it's usually not necessary. The wording in the citation may be incorrect, or the item record may spell the title slightly differently from the citation you're working from.
- Make sure you're searching for just the author's surname. Sometimes, using an author's initials or full name can throw off your search.

Finding an article by its journal

Example citation in APA style:

Byrd, A. P., Saucier, P. R., & Anderson, R. G. (2019). Laboratory management needs of Iowa school-based agricultural mechanics teachers. *Career & Technical Education Research*, 44(3), 37–51. https://doi.org/10.5328/cter44.3.37

This article's citation follows the same standards as our previous example:

Another approach for finding an article is to identify the title of the journal in which the article was published, then search for the journal title in Quick Search. To do this, choose **Journal** from the **Material Type** drop-down menu and enter the journal title in the Advanced Search interface.

Figure 3.18 Searching for journal in Quick Search

Once you find the journal, you may find an **Online access** link in your search results list under the journal title. This link always points to the first access option available, which may not include the year your article was published. Instead of potentially wasting time in a database that does not have access to your article, click through to the item record to explore all your access options, which years are available, and in what formats. Some journals might have multiple options for getting access, such as different years from the same journal being covered by different indexes and databases. In this example, you can access the journal through either **Digital Library and Archives Electronic Journals** or **EBCOhost Education Full Text**, as displayed in the image below.

Figure 3.19 Options to access the item

Comparing the article's publication date to the ranges of years listed in the item record helps you know if you can access the article and if so, where. "Available from 2005 until 2009" means only articles published between 2005 and 2009 are included, whereas "Available from 04/01/2005" means that articles published from April 2005 until the present are available.

When searching for an article by its journal, here are some possible situations you might encounter:

- If there are multiple links that include your article's publication date, you can click on whichever one you want.
- If there is only one access link that includes your article's publication date, click through to it.
- If the journal is available only in print, there will not be an online access link. Instead the record will list the available volumes and provide a call number. Check if the list includes the volume from your citation. If so, use the call number and location to find the physical item in the library. You can scan and email the article, or (possibly) check out the entire volume.
- If the article's publication date falls outside of the available ranges, there may be no immediate access available.

For articles with online access, once you click through to the journal you will still need to locate your article. You can usually search for the article by its title in a search box, or you

can navigate within the journal to your article's publication year, volume, and issue to find the article you need.
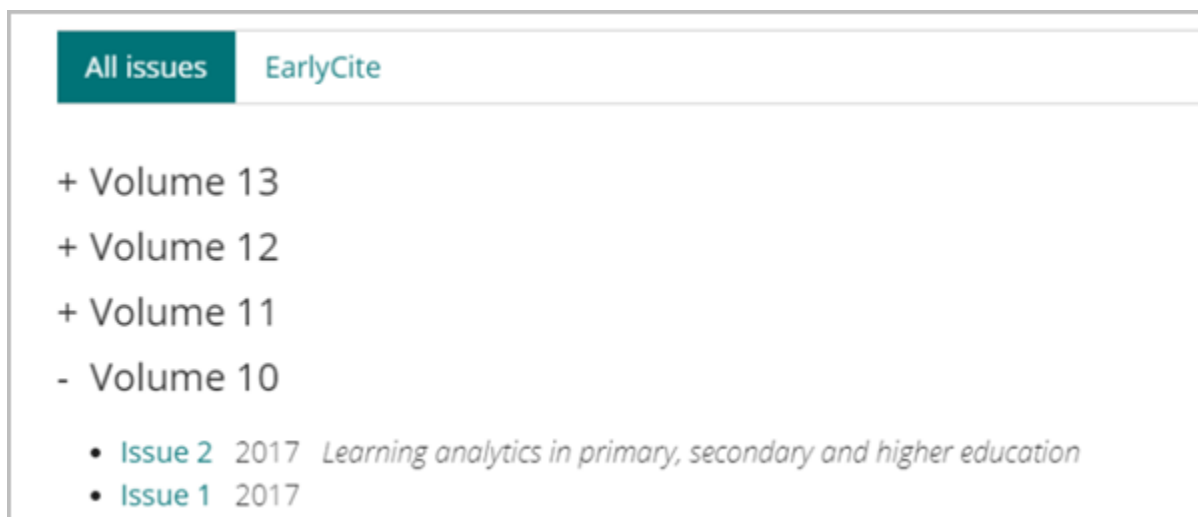
Figure 3.20 Volumes available for this item

Note: Some citations may include abbreviations for journal titles rather than providing the full title. For example, *Advanced Functional Materials* is often cited as *Adv. Funct. Mater.* This can make searching for journals difficult, but there are ways to work around them. You can find the full versions of abbreviated journal names by using library guides like this Berkeley guide to Bioscience journal abbreviations.

Some citations include a web address at the end. This may be a URL or it may be a DOI (Digital Object Identifier), a persistent, unique identifier for an item, such as a journal article or book chapter. This link will take you to the publisher's page for your article, but you may not be allowed to read it there. Sometimes, a url will bring you to a journal's homepage and ask you to pay for an article, even when the library can provide it for you.

Finally, if you don't find direct access to your article, don't give up! In those cases, you can use Interlibrary Loan to get most articles for free, which we will cover in more detail in the next section.

Conference proceedings

If you're searching for an article from a citation and are having trouble finding anything using the strategies described above, you may actually be working from a citation for

conference proceedings. **Conference proceedings** are materials presented at professional conferences for a discipline or society. Note that there are more variations in the structure and presentation of conference proceedings citations, so they may not be as easy to pick out at a first glance. You can often distinguish these citations from journal article citations when the phrase "paper presented at" is included, or when "conference," "annual meeting," or "transactions of" is included in the conference's name.

Example citation (APA):

Shesh, A. (2019). Allowing and fully supporting multiple programming languages in a computer graphics course: An experience. *Proceedings of the 50th ACM Technical Symposium on Computer Science Education*, 235-253. https://doi.org/10.1145/3287324.3287464

Citations for conference materials are structured similarly to journal article citations, and can be found using similar search strategies. You may be able to find the paper from your citation by searching Quick Search or Google Scholar—try both the paper title and the conference name. The one difference would be that instead of selecting Journal as your Material Type in Advanced Search, you leave the Material Type set to **All items** and do a more general search. If you need help, ask a librarian.

Newspaper articles

As primary sources, newspaper articles can provide firsthand accounts and perspectives on current or noteworthy events. You may encounter citations for newspaper articles in your research. Tracking them down will help you both read the article yourself and check for any updates or related news stories.

The citation elements for a newspaper article typically include an exact date (with month,

date, and year listed). If the article appeared in print, it will also contain specific pages or columns ("col2" means column 2). Even if you don't recognize the name of the newspaper being cited, these elements can help you recognize that it's a newspaper article citation.

Example citation (APA):

Reynolds, G. (2019, May 1). How exercise affects our memory. *The New York Times*. Retrieved from https://www.nytimes.com/2019/05/01/well/move/how-exercise-affects-our-memory.html

To find a newspaper article, visit the Newspapers Library Guide, which will show which newspapers are available in which indexes and databases. From there, you can navigate to the best database or other finding tool for your article. Once you're in the right place, you can search for the title of the newspaper article, or search for the newspaper title and then browse by date. If you are using Quick Search to find the newspaper, just like for journal articles, you will need to open the record to find out which dates are covered and in which format(s). If the newspaper is not available online, ask a librarian for help.

Course Reserves

Sometimes, you may be told to read a book or article for your class, without your instructor giving you a copy. If your instructor says the item is on reserve, you might not have to search for it!

You can access Course Reserves directly in Canvas by clicking the Course Reserves link in the left menu. If this link is not available, ask your instructor where you can access your materials before delving into the library to search on your own.

Citation chaining

Citation chaining is the process of tracking down items connected to a single paper by using citations to follow a line of research backward or forward in time.

Citation chaining backward
Sources that are cited within your original source

← One of the papers cited in your original source. Using the citation helps you track back the idea to where it first came from.

← Another paper cited in your original resource.

← A third paper cited in your original resource.

Your original source

Citation chaining forward
Newer sources that cite your original resource

The ideas from your original source are cited in a new article →

The ideas from your original source are cited in a second new article →

The ideas from your original source are cited in a third new article →

Figure 3.21 Illustration of backward and forward citation chaining

How do you do citation chaining? Start with an article that you know is useful for your research and highly relevant to your topic. From there, you can use:

1. **Citation chaining backward in time:** Examine the references list at the end of your starting article. These are resources that the author used to build their argument, and they may contain information that you can use to help you build your argument, as well. Now that you have learned how to find a source from its citation, you can use these references like a map to find additional relevant articles.

2. **Citation chaining forward in time:** This can help you quickly locate newer articles on your topic that could be relevant to your research. Some finding tools, like Google Scholar and Scopus, are designed with this feature. Begin with a search for the article you want to start from. If the search tool knows about newer articles that cite that one, there will be a **Cited by** link or similar button near the article's description. This will link to a list of more recent resources that cited your starting article, which are likely to also discuss your topic.

Figure 3.22 Illustration of an article record with "cited by" information

If your starting article is fairly new, it may not be cited by anyone yet. In those cases, you may only be able to locate articles by citation chaining backward.

3.9 GETTING ACCESS TO MATERIALS

Once you've found a good source for your research, you may be provided with a few options for getting access to it. From the item's record, you can decide to skim the article's abstract, read it right away, or save it to read later. For example, in the business database ABI/INFORM, buttons provided in the top right corner show your access options: download pdf, cite, email, print, and more.

Figure 3.23 ABI/INFORM page with access option buttons in the top right corner

If you are trying to find a specific item from a citation and the full text is not immediately available, the library provides other options for getting access.

Logging in

Make sure you log in so you can access materials online! Begin on the library website and click the Library Account link.
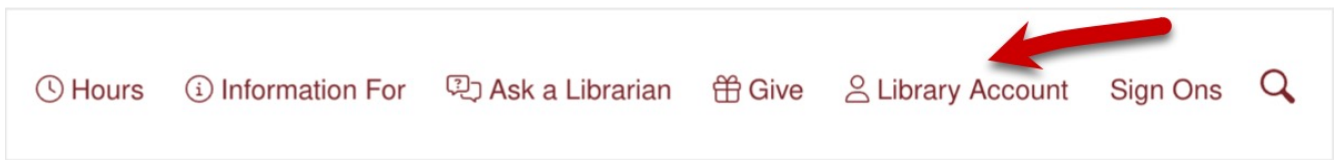
Figure 3.24 Link to log in to your library account

The current login screen for library resources shows options for Okta and OpenAthens.
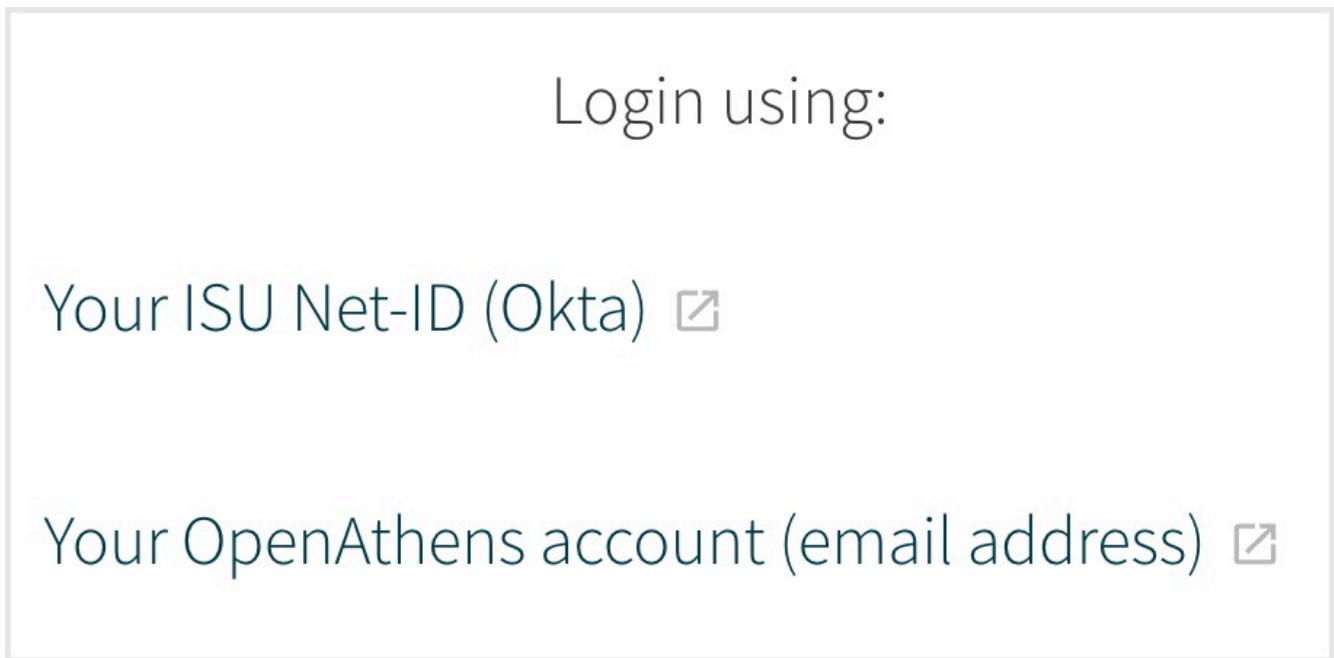
Figure 3.25 Options to log in to your Library account

Pick the Okta option and use your Net-ID to sign into the library system. Your Net-ID is the portion of your ISU email address that appears before the @ symbol. For example, is Cy's ema address is ccyclone@iastate.edu, his Net-ID is **ccyclone**. Your password will be the same one you use for all campus logins.

Once you have already signed into Okta during your browser session, you may not need to log in again.

Don't forget to log off if you're using one of the university's shared, public computers. If you do forget, anyone passing by has access to your email, printing allowance, and any social media you logged into. If you find someone else's private information running or stored

on a shared computer, the ethical thing to do is to sign out of their account before you proceed.

Get it@ISU

Many indexes and databases include the full text of articles, but some subject-focused indexes do not. In these cases, there will typically be a **Get it@ISU** button nearby. Click on the button and the library's system will check our subscriptions to access the full text of your article.
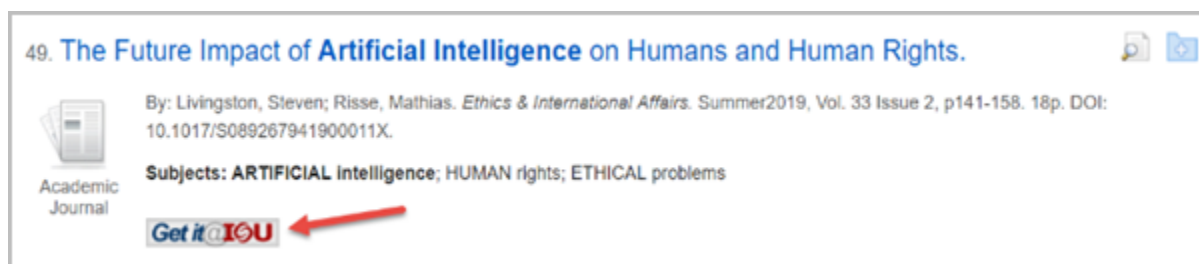
Figure 3.26 Use the Get it at ISU button to request an item

If the library has online access to the full text of your article, Get it@ISU will give you one or more links to it, similar to the online access options in the item record. Clicking any of them should bring you to your article. If a link you try is broken, use one of the other links available (if possible) and report the broken link.

In some indexes, this button might look different. Here are two examples:

Document title	Authors	Year	Source
☐ 1 The Impact of Artificial Intelligence on the Accounting Industry	Shi, Y.	2020	Advances in Intelligent Systems and Computing 928, pp. 971-978
View abstract ⌄ Get it@ISU View at Publisher Related documents			

Figure 3.27 Illustration of a Get it at ISU button

1. ☐ **Research and implementation of financial decision model based on artificial intelligence**
Zhao, Desheng (Langfang Ploytechnic Institute, Hebei Langfang, China); Liu, Xiaoyu Source: *Agro Food Industry Hi-Tech*, v 28, n 3, p 2576-2579, May-June 2017
Database: Compendex
Document type: Journal article (JA)
Detailed Show preview ⌄ **Iowa State University Library** ↗

Figure 3.28 Illustration of a Get it at ISU button

If Get it@ISU does not find a link to your article, the library may still own a print version. The item record in Quick Search will help you verify which years/volumes are available and will provide a call number for the journal's location in the library. To find the journal on the shelf, follow the steps for locating an item by call number as given in Chapter 2.

If you would rather not flip through an entire journal volume to find the one article you want, you can use Document Delivery to request a scanned copy of the article instead.

Document Delivery is a free service for getting electronic access to articles and book chapters the library already owns in print (not full-length books). This process can take up to 48 hours (longer over a weekend), so if you need an item right away or need an entire book, coming to the library in person is your best bet.

If the library doesn't have what you need, then it's time to request the full text through Interlibrary Loan.

Interlibrary Loan (ILL)

Interlibrary Loan (ILL) functions the same as Document Delivery (and even uses the same form) but can help you get access to items that the ISU Library does not own. This service lets the ISU library borrow materials from other libraries for free. Below are three simple ways to use Iowa State University's ILL service:

Common ILL requests

If you aren't sure how to get started with ILL, the simplest way might be to use the Get it@ISU tool. If there are no links available for online access, the Get it@ISU button will generate a "Request access through interlibrary loan" link. Using this link should auto-fill the ILL request form with details about your item, such as the title, journal, volume and issue number, and pages.

You can also submit an ILL request directly by filling out a request form on the ILL webpage. Just log in with your NetID and fill out the form with the citation information you have for the item you want. In most cases, you'll get books within 5-7 days and articles within 1-3 days. Because this process takes time, be sure to plan ahead and start searching for sources at least a week before your paper's deadline, just in case you might need to request something through ILL.

FastTRAC libraries

Another easy way to get books from other libraries is to check FastTRAC through Quick Search. Near the top of the Advanced Search screen, three buttons give you a choice between ISU Library, FastTRAC, and Selected Partner Libraries.

Figure 3.29 Searching in a Selected Partner Library in Quick Search

The FastTRAC option finds items from all of the partner libraries in a single search, while Selected Partner Libraries brings up a **Search Scope** dropdown for choosing one library at a time from this group. When you find a book you need, click **Check for available services** to determine if the item is available to check out. If it is, just follow the steps online to borrow the book. Once you've submitted your request, you should get an email within 2-3 business days that the book is ready for you to pick up at the Parks Library Main desk. Another perk of FastTRAC is that you can visit the partner libraries to borrow items in person if you happen to be nearby.

WorldCat

Another way to locate books and library materials anywhere is to use WorldCat, a database that searches the catalogs of thousands of libraries across the world, including the ISU Library and Ames Public Library. When you find a book you'd like in your search results, click on the title to open its full item record. To check if ISU owns a copy of the book, use the View access options section. If the ISU Library owns the book, you will see a button that says "Borrow from your library"
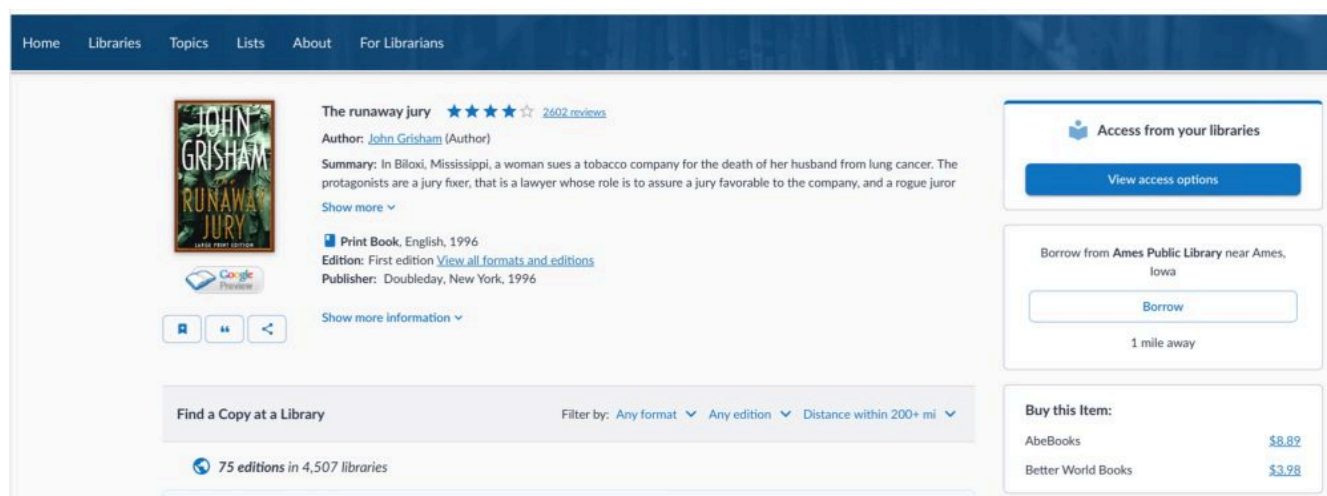
Figure 3.30 Item record page in WorldCat

If not, you have the option to request that the item be sent to you through Interlibrary Loan. First, click on "Get It @ ISU", then click on "Request book from Interlibrary Loan"
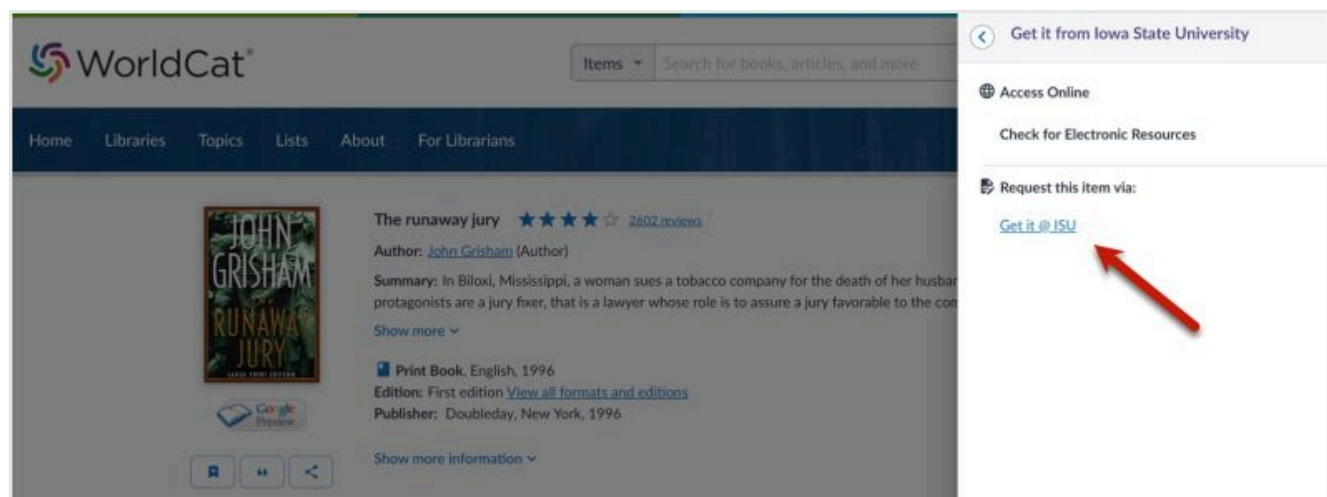
Figure 3.31 Item request in WorldCat

Conclusion

We've covered a lot of ground in this chapter. There are quite a few tools and techniques that come into play when doing research. Try experimenting with search terms to determine what works best in the tools you're using. This may lead you to new resources within the library you didn't find with your original search. You may even find information

about resources that we don't have! In those cases, use ILL to get access as you navigate your research.

CHAPTER 4: EVALUATING INFORMATION

Learning Objectives

After completing this chapter, you should be able to...

- identify key reasons for evaluating information sources,
- apply the four moves of SIFT to evaluate sources, both in academic and personal contexts,
- implement steps to investigate the background, reputation, and biases of a source,
- recognize when and how to learn more about a topic, author, or event by searching for additional sources, and
- use the structure of a scholarly article to inform your evaluation process.

4.1 WHY EVALUATE INFORMATION?

Vast amounts of new information are being created every minute and it can be overwhelming to make sense of it all. How do you know you've found the best information for your needs? You evaluate it! In this chapter, we'll discuss how you can more effectively evaluate and fact-check all kinds of information, from news stories to academic articles.

Evaluating information is something you do every day, whether you know it or not. You evaluate information when you determine what to write down in your notes, debate issues with friends, and use reviews to decide which book to read — all this before you even start gathering information for a research project. Below are some reasons why you should make thoughtful evaluation a part of your research process.

Sniff out bullshit

One reason to evaluate information is to sniff out bullshit. As Bergstrom & West (2017) state,

> "Bullshit involves language, statistical figures, data graphics, and other forms of presentation intended to persuade by impressing and overwhelming a reader or listener, with a blatant disregard for truth and logical coherence." [1]

There are many reasons why a piece of information might be inaccurate. Any time information is shared, there is a possibility for it to be misunderstood or misinterpreted. This is not always done to mislead. Sometimes, we just get things wrong the first time around.

It could be that our understanding of an issue has changed over time, so the sources we use need to reflect that. For example, the way we categorize planets has changed, so we now classify Pluto as a dwarf planet. In other cases, information is no longer accurate because advances in research and technology have changed what is possible. For example,

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1. Bergstrom, C. & West, J. (2017). *Calling bullshit*. Retrieved from https://www.callingbullshit.org/

as technology for batteries has improved, the production of electric cars has increased beyond what was even possible thirty years ago.

Information may also be inaccurate because of how it is presented, like when someone tries to represent every side of an issue equally, but ends up lending undue importance to a perspective that is not well-supported by research. For example, a journalist may write a story about the positive environmental impact of using native plants in home landscaping projects, and cite various studies to back up that claim. However, if the author dedicates equal space in the article to commentary from people who prefer the appearance of grass lawns, this could give the impression that both views hold equal weight, despite one of the views not being supported by research.

Another way information may be more easily misinterpreted is if its importance has been overstated. Sometimes academic authors exaggerate the importance of an experiment by misrepresenting the results to get their work published and recognized widely. In other cases, media outlets might oversimplify a paper's results. This is not always malicious or deliberate. It could be an attempt to draw more clicks with an exciting or dramatic headline, or it could just be a reporter who is not an expert on that topic misunderstanding the research. Because news articles tend to be shorter and written for a general audience, their summaries of research studies will always be simplified. So if you want to use information from a summary like this in a college project, you should track down the original source to get the level of detail and context you need.

This Twitter account highlights articles with deceptive titles. It tweets out examples of headlines where research done on mice is being misrepresented as directly applicable to humans:[2]

https://twitter.com/justsaysinmice/status/1266376602583134215

Avoiding misinformation is a good reason for evaluating your sources, but it isn't the only one. You'll also want to avoid sharing that misinformation, particularly when it comes to your college projects.

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2. justsaysinmice. (2020, May 29). IN MICE. Tweet. Retrieved from https://twitter.com/justsaysinmice/status/1266376602583134215

Save time

Your time is valuable, so make sure you're spending that time on sources you will actually be able to use. After all, even the best, most truthful, information won't be useful if it's not relevant for your research project.

Below are questions to consider when evaluating whether a source is relevant:

- Does it meet the requirements for your assignment?
- Does it address your research question directly?
- Does it add something new to your project beyond what your other sources already state?

Class requirements

Often, your professor will provide specific requirements for your project. For example, you may need to use a total of five sources from peer-reviewed journals published in the last ten years, or you may be told to only use a specific database. These requirements may differ depending on your major and/or the course you're taking, so don't assume that the requirements for a paper or project in one class will be the same in another. Knowing these requirements can help you plan your research and avoid wasting time reviewing something that you wouldn't be able to use anyway because it doesn't match your instructor's guidelines.

Research questions

As we discussed in Chapter 1, your research question should be clear, focused, manageable, and defensible. Similarly, your sources should focus on and support your research question. It's not enough just to find several peer-reviewed articles and use them in your paper. They should also be closely related to your topic. Let's say you're writing a paper about "winter sports participation among athletes in the Southern hemisphere" and you find an article titled "The History of Snowboarding." Just because related words appear *somewhere* in the text or title of this article doesn't mean that it supports your

research question. You will need to evaluate the article to make sure it addresses your specific research question before assuming that it will meet your needs.

Digging deep enough

The sources you use should add something new to your project. Having a variety of sources and authors helps support your argument. By evaluating your sources as you gather them, you can save time and avoid having to redo your search. It can be frustrating when you need to start over in the middle of a project because your sources don't back up your argument with enough depth.

These approaches also apply to evaluating the information you use in your everyday life. In the next section, we'll dig deeper into some steps to help you evaluate all kinds of information, from research articles to social media posts.

4.2 EVALUATING WITH SIFT

SIFT is an acronym developed by Mike Caulfield (2019) that describes four steps you can use to evaluate sources. The four steps included in SIFT are:

- S: Stop
- I: Investigate the source
- F: Find better coverage
- T: Trace information back to the source

Throughout the next few pages, we'll be exploring each of these steps and how you can integrate them into your everyday habits for evaluating content.

Why SIFT?

You might have been previously introduced to CRAAP, a checklist created in the 2000s for evaluating sources. CRAAP tells you to analyze a webpage by taking what it contains and how it is presented at face value and in isolation. Because there is now an overwhelming volume of information and misinformation available online, to really evaluate the trustworthiness of a source, you need to learn more about where the content within a source comes from so you can make a more informed decision about its value. SIFT helps you do that by walking you through practices you can use to get a broader view of a source and fully evaluate its content.

In contrast to other evaluation methods, SIFT presents evaluation as a set of steps you can use and modify, rather than treating the evaluation process as a checklist of attributes that are universally good or bad. After all, you will want to evaluate the information in a newspaper article differently from the research you find in a peer-reviewed journal article. Sometimes you will need to navigate through all four of the steps in SIFT to determine a source's usefulness and reliability, while other times you will only need one or two. What makes SIFT powerful is that it helps you engage with evaluation as an ongoing process. As the creator of SIFT explains, these steps don't necessarily need to follow the same order

every time. Although **Stop** will always come first, the other three steps can be executed in any order that makes sense for your situation![1]

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1. Caulfield, M. (2020, January 1). *The S in SIFT (1): Introduction and the S in SIFT*. YouTube. https://www.youtube.com/watch?v=3VEPbuicH1A

4.3 STOP

The first step in SIFT is also the most simple: stop reading and consider why you're engaging with this source instead of another. What drew you to this source, and how is it applicable for your needs? Specifically, you'll want to stop and check these two things:

Check yourself

Everyone brings their own expectations to their research. These expectations can affect every step of your research process, from the search terms you use to the sources you choose to cite. For example, you may have a preconceived notion of what you think the research should show, but this may not be what the research actually shows.

If a source confirms or denies what you believe to be true, you may have an emotional reaction (e.g. anger, sadness, vindication, excitement). Use your reaction as a reminder to **check yourself** and make sure your emotions are not affecting the sources you use and how you use them.

Make it a habit to check your emotions and ensure that they aren't affecting the choices you make in your research or life. After you check yourself, you can move on to evaluate your source using the other steps in SIFT. Verifying the truth of a source you agree with or finding additional sources that present a different perspective (even if it may upset you or contradict your beliefs) can strengthen your case.[1]

Checking yourself in everyday life

Checking yourself is particularly important in your everyday life as well. You've likely had friends or family share an article on social media and had the comments explode. How many of the commenters do you think actually read the article? It's possible that even

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1. Building A Fact-Checking Habit By Checking Your Emotions: https://webliteracy.pressbooks.com/chapter/building-a-habit-by-checking-your-emotions/

the person who shared it didn't read the whole article before reacting to the headline. When you know the person sharing something, it is natural to rely on their judgment. This can lead to embarrassment if you share or react to something that isn't saying what you thought it was.
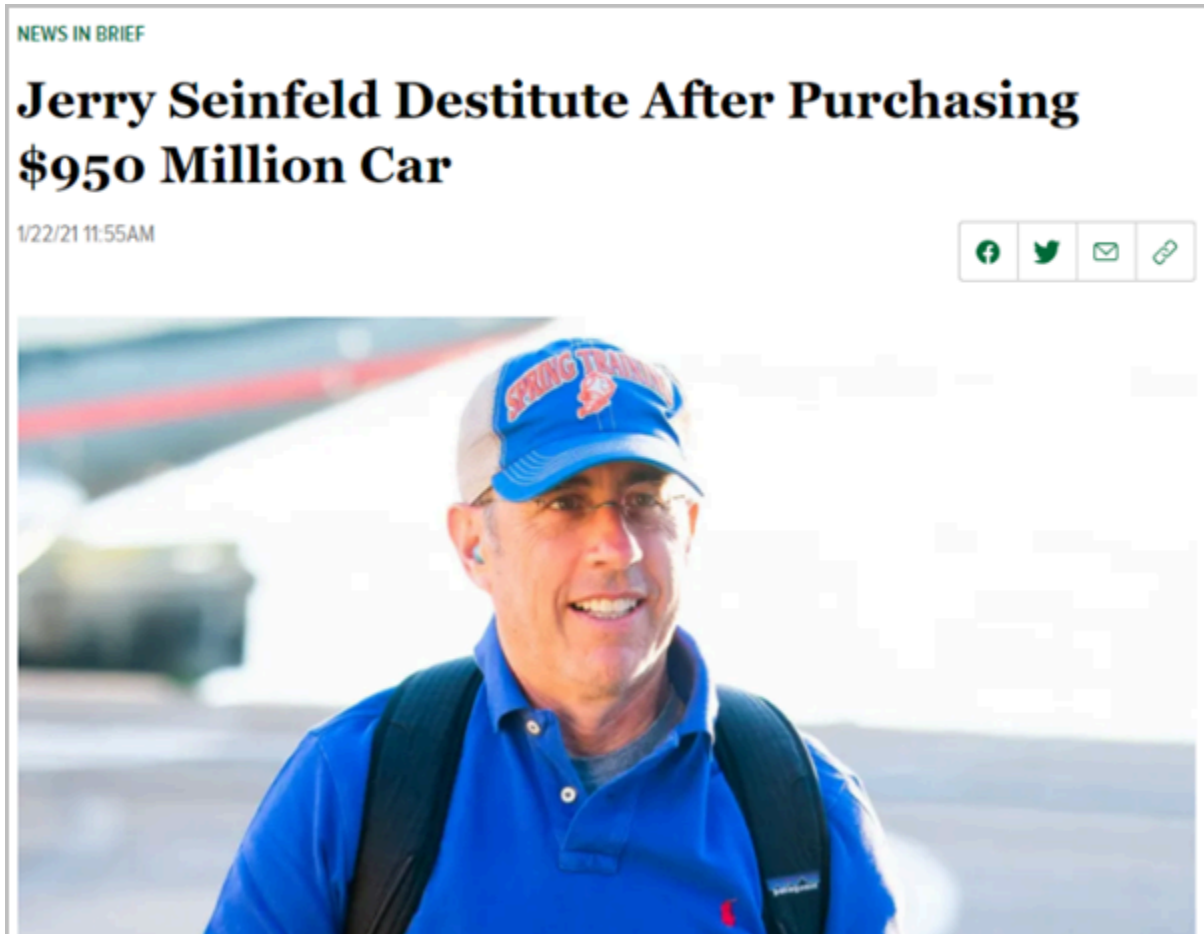
Figure 4.1 Jerry Seinfeld is known as a car collector, but can you trust this headline?

Checking your emotions and reading beyond the headlines and summary information for an article can help you avoid sharing false or inaccurate information, whether it's for a class project or in conversations with friends on social media.

Check that you're on task

Stop is also a reminder to **stay on task**. It is easy to get lost exploring interesting tangents while researching. As soon as you find yourself getting distracted, stop and remember your original goal. For a paper or project, this means focusing on your research question and sources that are directly related to it.

Let's say you want to find examples of accessible interior design for a class project. As you're searching, you stumble upon this article: "10 Incredible Dog Houses for Your Best Friend." From here, you might decide to start exploring more examples of dog house design, or you can stop and ask whether this article is really adding anything to your project. Yes, it's a fun distraction, but you still need to finish your research. By cultivating a habit of checking yourself regularly, you can avoid situations where a fun distraction becomes a lost afternoon.

In addition to checking that you're on task through what you read, you can also check that you're on task by using the right search terms. Think about the purpose of your research and whether the keywords you are using closely align with your research question. You can use the tips you learned in Chapter 1 to make sure you're using the best keywords for your research question.

You'll also want to determine whether the search tool you are using can help you find the right kind of sources for your research. Do you need in-depth research articles, information on current events, or other types of sources? You may find a lot of interesting sources in a newspaper index, but if you need to use peer-reviewed journal articles for your project, you should use the article indexes and databases rather than spending a lot of time on sources you won't be able to use, no matter how interesting they seem. You can refer back to Chapter 2 for help navigating that process.

4.4 INVESTIGATE THE SOURCE

Once you are sure that you are on task with your research, you can move on to critically evaluate your sources. Even if the sources you've found seem to fit your project's topic well, you will still need to evaluate their quality and context in other ways. Here are some points to consider:

- Reputation/Authority
- Purpose
- Conflicts of Interest
- Bias

You'll need to understand your sources and decide whether each is worth using. If a source you encounter is low quality or if you can't verify that it's reliable, your best strategy is to not use it and move on to other sources.

Don't rely on first impressions to tell you whether a source is good. There are many great academic websites that appear outdated or poorly designed because the creators' expertise lies in content rather than web design. You might have noticed that not all of your professors are great at using Canvas, for example. Your course pages may not be the most attractive, but because your professors are experts in their course topics, you can feel confident in using their content. In contrast, some intentionally misleading websites appear sleek and well-supported because their creators have heavily invested in making their work look "reputable." Rather than evaluating a website based solely on the way it presents itself, follow these steps:

Explore the reputation of the author

Investigate how other sources talk about the author or publication (newspaper, journal, etc.) to learn more about your source's reputation and authority. **Authority** is another way of saying "expertise" or "qualifications." Understanding an author's background can help

you decide whether to trust what they have produced. An author has developed authority in a subject when they have extensively studied or worked in that area.

To check if an author is an authority on their topic, search for them on Google or Wikipedia to determine whether they have a degree or job related to the topic they are writing about. For journalists, check whether the author usually writes about research or if they work primarily on editorial and opinion pieces. Background checks like this may also yield information about an author's reputation in the academic or professional community. If an author lacks experience in your research topic or has a bad reputation, find a different source.

Investigate the reputation of the publication

In addition, you can assess your source's authority by investigating the reputation of the publication that produced it. For an article, you can check how the journal, newspaper, or magazine is described and perceived by experts in its field. For books and book chapters, you can check the reputation of the publishing company. You can use Wikipedia and Google to find out more about publications or publishers, just like you can with authors. For example, if the Wikipedia entry for a journal describes it as "infamously racist," you might want to find sources for your paper elsewhere. Here's a tip: when using Google to search for this kind of information, include "reputation" as a keyword to find how the publication is perceived, and not just links to its website.

This video from Mike Caulfield walks you through the process of searching for a publication's information online:

> *One or more interactive elements has been excluded from this version of the text. You can view them online here: https://iastate.pressbooks.pub/lib160/?p=91#oembed-1*

You may have noticed by now that we've mentioned Wikipedia a few times. Yes! Just like we said in Chapter 1, Wikipedia can be incredibly useful for finding background information about an author or publication. Keep in mind that Wikipedia does not cover all topics with the same level of detail. An author can still be an expert in their field even if there is no Wikipedia entry for them.

Examine your source's purpose

A publication's purpose might be to inform, convince, entertain, sell products, or promote a particular viewpoint. As you investigate your source, you may come across this information through purpose statements. A company or organization's purpose statement does not necessarily represent its true agenda, but it can give you a good idea of how they want to be perceived. A few examples of purpose statements are provided below:

- **TikTok**: "TikTok is the leading destination for short-form mobile video. Our mission is to inspire creativity and bring joy."[1]
- **Goop**: "We operate from a place of curiosity and nonjudgment [sic], and we start hard conversations, crack open taboos, and look for connection and resonance everywhere we can find it."[2]
- **JSTOR**: "We help you explore a wide range of scholarly content through a powerful research and teaching platform."[3]

Just as you should search for context outside a source to learn about its reputation, don't stay within the website you're exploring when you're trying to figure out its purpose. Find out what other sources say about the company or publication's purpose as well. For example, checking Wikipedia about Goop finds this: "Goop has faced criticism for marketing products and treatments that are based on pseudoscience, lack efficacy, and are recognized by the medical establishment as harmful or misleading."[4]

Don't make assumptions based on the domain

Domains like .edu, .com, and .org can offer hints for where a website's information came from, but the domain by itself does not give any assurance that its content is accurate, up-to-date, thorough, or unbiased.

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1. TikTok. (n.d.). *Our mission*. https://www.tiktok.com/about
2. Goop. (n.d.) *What's Goop?* https://goop.com/whats-goop/
3. JSTOR. (n.d.). *About JSTOR*. https://about.jstor.org/
4. Wikimedia contributors. (n.d.). *Goop (company)*. Retrieved August 12, 2021 from https://en.wikipedia.org/wiki/Goop_(company)

- .edu websites are hosted by colleges and other educational institutions, but that doesn't automatically make their information scholarly. For example, personal home pages for students and staff may have a .edu domain if they're hosted by the university.

- .com is often associated with businesses and personal websites, but it is also the domain used by many scholarly publishing companies. Journals hosted on .com websites aren't necessarily any better or worse than journals hosted on .edu or .org websites.

- .org websites are often assumed to represent non-profit organizations, but any group or individual can purchase a .org domain. Even if a .org website is for a non-profit organization, it can still be biased. Non-profit organizations are not necessarily objective and neutral, and their biases may be reflected in how they present their interests and related research. Examples of this include the ways some political organizations, animal rights activist groups, or other organizations use marketing tactics to influence the way you feel about their issues, as opposed to using objective research.

Watch out for potential conflicts of interest

Conflicts of interest are "when an entity or individual becomes unreliable because of a clash between personal (or self-serving) interests and professional duties or responsibilities."[5] Sometimes an author or publisher's personal, political, or business relationships may affect the objectivity of their work. Check if any funding information or corporate ties to the project are listed, and consider whether those ties are likely to impact how the research is presented. You can typically find this information by reading the "sponsors" or "special thanks" section at the end of an article or elsewhere on their website. In some cases, you may find a section explicitly titled "potential conflicts of interest." In other cases, this information may not be clearly listed and you will have to search for it elsewhere online.

5. Segal, T. (2020, December 1). Conflict of interest. *Investopedia*. Retrieved from https://www.investopedia.com/terms/c/conflict-of-interest.asp

For example, the article "Impact of cocoa flavanol intake on age-dependent vascular stiffness in healthy men," is funded in part by "an unrestricted grant from Mars, Inc." (the makers of M&M's and other candy). It asserts that flavanols found in cocoa may help lower blood pressure; however, because of the article's association with Mars, its results should be carefully compared with other sources. The article doesn't assert that simply eating chocolate impacts blood pressure, but the cocoa flavanols that are the focus of the study are a component of cocoa-based nutritional supplements sold by Mars, Inc. Therefore, the researchers have a clear conflict of interest because their research is sponsored by Mars.

Industry support is a common source of research funding in many fields, which may be a conflict of interest for researchers. This doesn't necessarily invalidate an author's work, but you will need to determine whether those conflicts affected how their research was carried out and reported.

4.5 INVESTIGATE THE SOURCE: BIAS

Recognize types of bias

Conflicts of interest are a type of bias, but they aren't the only type of bias you should watch out for when investigating sources. Biases can be driven by commercial interests, the influence of a publisher or publication's audience, or personal beliefs, such as the political or religious beliefs of an author. Below we have listed five common types of bias:

Article selection

All publications choose which articles to publish and how much to emphasize them. However, when the article selection process distorts what the audience perceives as important or true, this becomes a form of bias. For example, editors may place new articles with still-developing stories more prominently than they do follow-up articles that complete the picture.[1] Similarly, scholarly articles that try to reproduce the results of prior research have a harder time getting published than articles with new research questions.

Framing

Even if an article's claims are technically true, the way that they are presented may be misleading.[2] This is called **framing**: the way an author manipulates the context around an argument to promote their own interpretation. Biased framing often occurs in articles about controversial issues, but it can happen in various contexts. For example, framing can take the form of clickbait, when a publication makes an article seem more interesting by using a sensational headline to attract readers.

Framing can also occur *within* an article, such as when an author provides a conclusion that

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1. Hartford Union High School. (n.d.). *Media bias uncovered: Overview*. Retrieved from https://libguides.huhs.org/mediabias
2. Caulfield, M. (2019, October 3). It's not the claim, it's the frame. *Hapgood blog*. Retrieved from https://hapgood.us/2019/10/03/its-not-the-claim-its-the-frame/

is not actually supported by their evidence. Authors may intentionally frame their story to favor their position, but occasionally misleading framing is caused by poor reasoning or ignorance on the part of the author. You find this a lot in news media, but framing bias can also appear in scholarly contexts.

Absence of balance

When an article presents only one side of a story, event, or issue without considering other relevant viewpoints, this can lead to an absence of balance. Examples of an absence of balance include telling only a portion of a story or not reporting the full context to avoid information that conflicts with the author's point of view. Aside from excluding information, balance can also be skewed through the use of emotionally loaded language that clearly favors or disparages one position.

Sometimes authors can fall into a **false balance**. This happens when authors give equal coverage to perspectives that are not equally supported by facts, in an effort to appear balanced.[3] However, this gives the false impression that both perspectives are equally important and valid.

Flawed sourcing

Flawed sourcing is when an article reports information without supporting it with context and references. This type of bias typically occurs due to a lack of good research practice. For example, the author may not have searched for sources extensively enough, missing key information about their topic. Alternatively, an author may not indicate where the information in their story came from, even when they have consulted sources they should reference. Finally, even when references are provided, an author may be using unreliable sources.

Note: sometimes a journalist or researcher will reference an anonymous source—a person known to the author but not identified to the public to protect the source's privacy. If an

3. Aliprandini, M., and Flynn, S.I. (2016). *Media Bias: An Overview*. Salem Press Encyclopedia.

author clearly states they have used an anonymous source, this is not a sign of flawed sourcing.

Tone

Tone can be biased in the way the author uses words and phrases to influence a reader's perceptions of and reactions toward a topic. Tone can be manipulated in many ways, such as:

- **Word choice**: when the author's choice of words gives a topic a positive or negative connotation. Compare positive words such as youthful, smile, proud with negative words such as childish, smirk, gloating.
- **Sensationalism**: twisting the context of a story to maximize the emotional impact for readers, or to overemphasize the importance of a situation or topic.
- **Mudslinging**: the use of misleading or insulting statements to harm or discredit an individual or group's reputation.
- **Opinions presented as facts**: presenting unverified information as fact without making clear that the information is subjective, unconfirmed, or only an opinion.
- **Facts presented as opinions**: when the author ignores the available evidence for facts that contradict their position.

Everything that is touched by humans has some form of bias. This isn't necessarily a problem, but being aware of bias is essential. Bias becomes a problem when it gets in the way of accurately reporting on an issue, topic, or event. Unless you are researching public perception, you should seek out sources that discuss your topic as objectively as possible.

4.6 FIND BETTER COVERAGE

Most of the time, you won't be able to determine the reliability of a claim or statement based on how it is covered in a single source. To get a better understanding of your topic and ensure that the information you're using is reliable, try to find better coverage. This can take many forms: you might find better coverage through sources that are more detailed, varied, authoritative, or recent. Even if you think your original source is good, verifying what you've found with additional sources will strengthen your research.

Lateral reading

Rather than assuming the information presented within a single article provides a full picture of your topic, read multiple sources and examine how they support or contradict your original source. This is called **lateral reading**, going beyond your original source to explore how the same topic is discussed by others.[1] The primary purpose of reading laterally is to quickly determine whether the original information you found is true. It's more than just fact-checking, though; this process can also uncover better information if the source you started with is not as reliable as you had hoped.

Here is an example of reading laterally in action. You may find a news article that asserts "coffee reduces your risk of getting cancer." Seek out additional sources to determine whether there is any research that backs up that claim. Open up a new browser window and search for the phrase "coffee and cancer risk." This may reveal if other news sites are reporting the same information, and how they have interpreted the results. Sometimes, multiple news sources will post or broadcast the same story word-for-word. Just because a story is shared widely doesn't mean that it is accurate, and it doesn't tell you where the data came from. Keep searching to find a better source. "After verifying, refuting, or otherwise contextualizing the data in question, you'd return to the original text and

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1. News Literacy Project. (n.d.). *Expand your view with lateral reading*. Retrieved August 16, 2021 from https://newslit.org/tips-tools/expand-your-view-with-lateral-reading/

continue reading."[2] If you find that the information is being misrepresented or if you cannot find anything to back up the claim, don't use your original source. Instead, seek out new sources on your topic that do a better job of supporting their claims.

Navigating around paywalls

In the past, we encouraged using Wikipedia or Google for quick fact-checking and investigation. However, lateral reading may require more extensive searching because many reliable sources can only be accessed through subscriptions. As an ISU student, you can use the library's article indexes and databases to access many of these subscription-based materials for free.

Let's say you want to verify a news story; you find another article on the topic but the newspaper's website won't let you read the entire article without subscribing. In cases like this, check if the ISU Library subscribes to that newspaper through a database like Access World News, or if there is access directly, as for the *New York Times*. The best way to find this information for many local and major newspapers is to check the Newspapers Library Guide.

Alternatively, your professor may provide a link to an article that you need to read, but that leads to a paywall. You can use the search techniques for tracking back a citation from Chapter 3 to find the article you need, or use a tool like LibKey Nomad. LibKey Nomad is a browser extension that enables one-click access to the full text of articles from publishers, Google, Wikipedia, and more, without needing to start at the library website. Visit the LibKey Nomad Library Guide to learn more about this tool.

This process works for any source you want to learn more about. Another benefit of reading laterally is that you may encounter additional sources that will better inform your project and support your argument.

Interference from algorithms and generative Artificial Intelligence

2. Heick, T. (n.d.). What's the difference between lateral reading and vertical reading? *TeachThought*. Retrieved from https://www.teachthought.com/literacy/how-res-ding-different-future-literacy/

(AI)

Another reason library search tools may be useful for finding better coverage is to avoid the heavy bias built into the search algorithms used by Google and other web search engines. These tools change your search results based on your personal search history, online activity, and location and are affected by algorithmic bias. Unlike the other types of bias we mentioned in the last section, **algorithmic bias** can be difficult to detect: algorithms may appear to be objective because they are based on data, but the ways that data is gathered, used, or manipulated often reflects the biases of the algorithm's creators and users. "In search engines, for example, algorithmic bias can create search results that reflect racist, sexist, or other social biases, despite the presumed neutrality of the data."[3]

Your results are skewed by what Google thinks you want, based on what it "knows" about you. This may change what results are displayed but, more importantly, it determines the order they're listed in. If you and another person search for the same thing, what is displayed first for each of you may be different. Don't let Google decide for you what is and isn't relevant for your needs. Use a tool that is less likely to use your browsing history to inform what it retrieves for you, such as DuckDuckGo. Everyday tips like clearing your search history and cookies can also lessen these algorithms' effect on your search results.

You know now that interference from algorithmic bias and the artificial intelligence (AI) behind these search engine algorithms affects your research in unseen ways. With recent advancements in **generative AI** such as ChatGPT, Bard, and Dall-E, we are beginning to notice these technologies impacting research at all levels. In addition to being affected by algorithmic bias, generative AI has the ability to create convincing yet false statements. As the use of generative AI becomes more widespread, it is getting harder to find and distinguish between reliable sources with accurate information and AI-generated content full of misinformation.

For example, when Google first released their generative AI, Bard, it claimed that the James Webb Space Telescope (JWST) took the first pictures of an exoplanet. This was quickly

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3. Butler, W.D., Sargent, A., and Smith, K. (2020). Algorithmic bias. In Introduction to College Research. Retrieved from https://introtocollegeresearch.pressbooks.com/chapter/algorithmic-bias/

proved false by space enthusiasts who pointed out the first picture of an exoplanet was actually taken in 2004—years before the JWST was launched. This is one of the reasons why you absolutely have to evaluate your resources critically before you decide to use them in your research.)
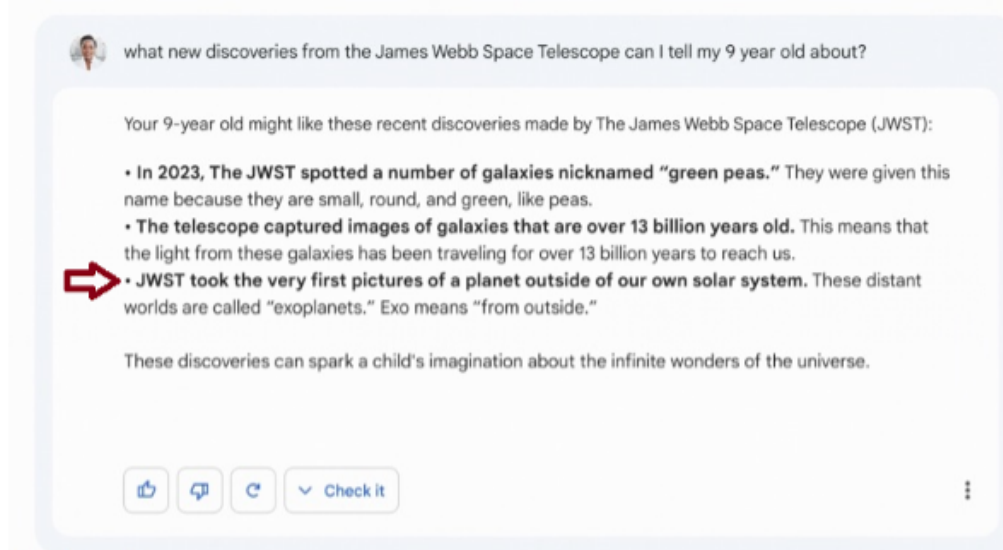
Figure 4.2 Content generated by AI

Whether you are searching for sources on Google or using AI just to help you generate ideas, you still need to check for inaccurate information and be cautious of algorithmic bias.

4.7 TRACE IT BACK

Before trusting or reusing information you've found, make sure you understand its original context by tracing the claims, quotes, and media back to their sources. This is useful whether you're exploring a news source, article, or social media post. In this section, we'll use a few examples to explore how to trace information back.

Trace back from a news source

Often, popular news stories will embed links throughout their story to generate interest in other stories from their sites. For example, an article from Bustle reviews "8 ways caffeine can change your brain."[1] While some of the article's many embedded links lead to scientific studies, others lead to non-scientific, barely-related Bustle articles. If you were trying to track down where the actual science came from, you might get lost in a sea of clicks.

Read carefully, noting any clues that can help you find the original source for a claim. For example, in the Bustle article the phrase "studies have shown" precedes a link to a press release about a new scientific article. From that press release, you can identify the actual study the Bustle article was referring to.

Don't assume that all links within an article lead to a scholarly source. Often, random phrases will contain links that lead to popular lifestyle and entertainment articles, or even advertisements. In our Bustle example, the phrase "various forms of coffee" hints at an article about types of coffee and their caffeine content, but instead leads to a recipe for a fun coffee-based beverage.

Tracing back information to its sources gives you the opportunity to investigate the original research and whether it is being represented accurately. For example, the Bustle article claims a study shows that caffeine "affects your serotonin." However, if you read the study they're citing, you'll find that the research actually suggests that coffee may affect

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1. Thorpe, J.R. & DeBianchi, A. (2021, March 1). Here's what happens in your brain when you drink caffeine. *Bustle*. Retrieved from https://www.bustle.com/wellness/ways-caffeine-can-change-your-brain-according-to-science

serotonin production in rats.[2] This could be due to caffeine or from some other compound found in coffee, and may not even occur in humans.

When you have a partial citation

News articles often don't include direct links to their sources. They may only mention the name of a researcher or institution and not provide a full citation or link.

In the article, "Dinosaur-killing asteroid strike gave rise to Amazon rainforest," the authors note that their information came from "Mónica Carvalho, from the Smithsonian Tropical Research Institution."[3] How do you get from this information to the actual research article?

In a best case scenario, there will be a direct quote from the study in the news article. You can then copy that phrase into a web search engine to try to find the original study, or at least a news story that actually links to the study. Be aware, though, sometimes quotes in an article come from interviews with the researchers, not from the published study. In these cases, searching for a quoted phrase will not lead to the original article. Instead, the search only finds news stories that include that specific quote.

If there is no quote available, take note of other information related to the research article, such as the researcher's or organization's name, article title, or the name of the journal where it was published. In this example, you have both a researcher's name, "Mónica Carvalho," and her organization, "the Smithsonian Tropical Research Institution." Since you're wanting to find something scholarly, you will want to search in a more specific tool, such as Google Scholar or a general purpose article index. Searching for the author's name in Google Scholar brings up over 25 articles she has written. To help narrow it down, add the Smithsonian Tropical Research Institution to your search. If this doesn't bring up the article, you can add keywords about the topic to get more specific results. In this case, you can use the keyword "rainforest." Once you've done that, there it is at the top of

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2. Yamato, T., Yamasaki, S., Misumi, Y., Kino, M., Obata, T., & Aomine, M. (2002). Modulation of the stress response by coffee: An in vivo microdialysis study of hippocampal serotonin and dopamine levels in rat. *Neuroscience Letters 332*(2): 87-90. DOI: 10.1016/s0304-3940(02)00828-5

3. BBC News. (April 2, 2021). *Dinosaur-killing asteroid strike gave rise to Amazon rainforest*. Retrieved from https://www.bbc.com/news/science-environment-56617409

your results! The article is "Extinction at the end-Cretaceous and the origin of modern Neotropical rainforests," published in *Science*.

Trace back from social media

On social media, people frequently share quotes and images taken out of context. You've probably encountered a strange photograph with no identifying information or a screenshot that only shows part of an article. When these posts are shared without looking further into their backgrounds, this can spread false or misleading information. When you come across something like this, you can break the cycle—and feel more confident in what you choose to share—by tracing it back to find the real story behind the post.

When an image has some description

When you come across an image, there are a few ways you can trace it back. If you're lucky, the image is posted with both a caption and a link to a related news article. Rather than trusting the description provided on social media, go to that article and read it. This should give you the information you need to better understand the post you found. If you aren't sure whether you can trust the linked article, you may need to use the other SIFT moves to investigate the source and find better coverage.

You won't always have this much detail to work with. Sometimes, a social media post will include an image and description, but no link, like in the image below.

Purussaurus, probably the biggest crocodile ever

Figure 4.3 You can tell almost immediately that there's something incredible about this image. The question is: is it real?

For instances like this, start by searching for the text provided within the image. This will bring results from websites such as Reddit, 9gag, and Pinterest, which is not a good sign for the reliability of the post. To determine if this is a known hoax, add the word "Snopes" to your search and see if the popular fact-checking site has discussed this example already. Searching for "Purussaurus, probably the biggest crocodile ever Snopes" brings up a page on the Snopes website with the following information: "Purussaurus was a giant species of caiman that went extinct millions of years ago, but this photograph does not show a genuine fossil. This is a replica model of a skull belonging to a different extinct crocodile species: Deinosuchus."[4]

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4. Evon, D. (2021, April 20). *Is this the largest crocodile skull ever found?* Retrieved from https://www.snopes.com/fact-check/largest-crocodile-skull/

Use fact-checking sites

Reputable fact-checking sites are good resources for verifying or refuting viral stories, urban legends, or news you suspect may be fake or extremely biased.

Here are a few examples:

- Snopes.com: Since 1994, this site has been fact-checking news, political claims, hoaxes, urban legends, and other stories shared online.
- Media Bias/Fact Check: This site examines bias in newspapers and news organizations by identifying sources that are questionable, conspiracy-pseudoscience, and satirical.
- Politifact: This site uses a "Truth-o-meter" to grade U.S. politicians' public statements on a scale from true to false, labeling the most egregious lies with "pants on fire."

When an image has no description

Images are often posted on social media without any context at all. In these cases, your best bet is to use Google Image Search to try and find the first time an image was used on the internet. Keep in mind that this is a trial and error process and you may not find exactly what you're looking for. The image you are working with may have been edited in a way that makes it impossible to track down the original version. If you're not sure about whether searching for this image is worth your time, remember **Stop**: make sure you are on task. If you are certain that this image is worth exploring, Google Image Search is worth a try! Even if you don't find the original source for the image, your search may still provide clues indicating whether the image is false or misleading.

Figure 4.4 An image of a cute, white, baby bat.

Let's say you've found this image of a cute, white, baby bat:

To trace it back, try using **Google Image Search**. Clicking the camera button in the search box will let you **Search by image**. From there, you can upload a copy of the image or paste the image's url into the search box. Alternatively, you can click and drag the image into Google Image Search directly.

Google Image Search finds similar-looking images or ones with similar descriptions. For this example, Google will find the same image posted on many websites, but you cannot necessarily tell where the image was first used.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://iastate.pressbooks.pub/lib160/?p=98#oembed-1

One way to try to find the original picture is to narrow your results down to a specific date range. Look at the dates on the images in your first round of results to get an idea of how far back you need to limit your search. Are there any versions of the image from the 2010s? How about the 2000s? In this example, start by limiting the date range to 2000-2010. Go to the **Tools** option and click on **Time** to set a date range.[5] If you still get too many results (or none), try changing the dates in your search.

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5. Caulfield, M. (2017). Filtering by time and place to find the original. In *Web Literacy for Student Fact-Checkers*. Retrieved from https://webliteracy.pressbooks.com/chapter/filtering-by-time-and-place-to-find-the-original/

Figure 4.5 Your search results can give you a hint into what this image might actually represent.

Now you have fewer results to sort through, making your job a lot easier. Reviewing your results, there appears to be a post mentioning that the bat is a stuffed animal. Now you can alter your search to include the term "stuffed." This brings up multiple fact-checking sites and news stories, explaining the context that this picture is of a stuffed toy sold on an Etsy store specializing in realistic felt animals.

In this example, you have found the original source for the image. However, this is not always possible. Remember we have shared other tips for tracing back a source that can be used to supplement Google Image Search. If one approach doesn't work, try something else.

Did you know?

In some cases, like with deepfakes, photos and even videos can be manufactured to mislead. A deepfake is "an image or recording that has been convincingly altered and manipulated to misrepresent someone as doing or saying something that was not actually done or said."[6] The Which face is real? website provides examples of just how convincing deepfaked images can be.

6. Merriam-Webster Dictionary. "Deepfake." Retrieved from https://www.merriam-webster.com/dictionary/deepfake

Wrapping up SIFT

T may be the "last" move in SIFT, but it isn't the last thing you need to do. Once you find the original source for a piece of information, you may need to circle back to steps I and F to evaluate any new information you've found.

4.8 MORE MOVES FOR EVALUATING SCHOLARLY SOURCES

Evaluating scholarly information takes more than just verifying that it has been peer-reviewed. You also need to determine if your source is accurate, reliable, and relevant. In addition to using SIFT, there are some other strategies and considerations that can be useful for quickly assessing a scholarly source.

In this section, we're going to focus on articles. However, you can also use these strategies when evaluating other types of scholarly sources, such as books. Although the sections of books and articles are labeled differently, they generally serve the same purpose. These sections can provide information and structure to help you quickly evaluate the source. For example, the summary section at the beginning of an article or book chapter is called the **abstract**, but in a book, this is called the **introduction**. However they're labeled, you can use the information found within them to evaluate the source.

Read the abstract and conclusion

If an article has an abstract, read that first. This summary gives you a general idea of what the authors were trying to accomplish, as well as a brief description of their experiment, observations, or analysis. If the abstract is too complex or technical, that is an indication for what the rest of the article will be like. If you can understand most of the language used in the abstract, highlight terms that you don't recognize to look up later. This can be a useful learning experience. However, if you can't understand the article at all, then it may not be the right resource for you, even if it's written by the foremost expert in the field.

Once you've read the abstract, you can skip down to the conclusion. With scholarly articles, you don't always have to read straight through from start to finish. Strategically skipping around and skimming specific sections can help you understand the big takeaways from the research. The **conclusion** usually includes information about major findings and why the author thinks they're important. By reading the conclusion, you can verify that the impression you got from the abstract is correct and check that the article is actually

relevant for your research question. This can also inform how you read and interpret the rest of the article.

Explore the rest of the article

If you found the abstract and conclusion relevant for your research topic, read the rest of the article. This will give you the details you will want to use and cite in your project.

Dig into the **methods** section to understand how the author(s) conducted their research, including how they gathered their data (e.g. surveys, interviews, experiments, or observations) and why they chose that method. Be on alert for approaches that are too general or don't give any detail, such as only stating "We ran a qualitative analysis." If you don't understand a term or phrase, take note of it to look it up later. Reviewing a paper's methods can give you a deeper understanding of how the authors got their results and will put their findings into a better context.

The **results** section (sometimes called discussion) provides more specific details about what the authors found. This includes descriptions of overall results and their corresponding data. Important or notable findings may be pulled out in tables, figures, and graphics, to help you understand the data more quickly or completely. Reading the results section will give you the full breadth of the research findings, not just the highlights you saw in the conclusion.

Did you know?

Correlation does not equal causation! Claims presented in a paper can be misleading even when they appear convincing. Trends in data can seem to form patterns or overlap (correlation) without actually being related in any way. Good research investigates whether there is truly a connection where one change causes another (causation).
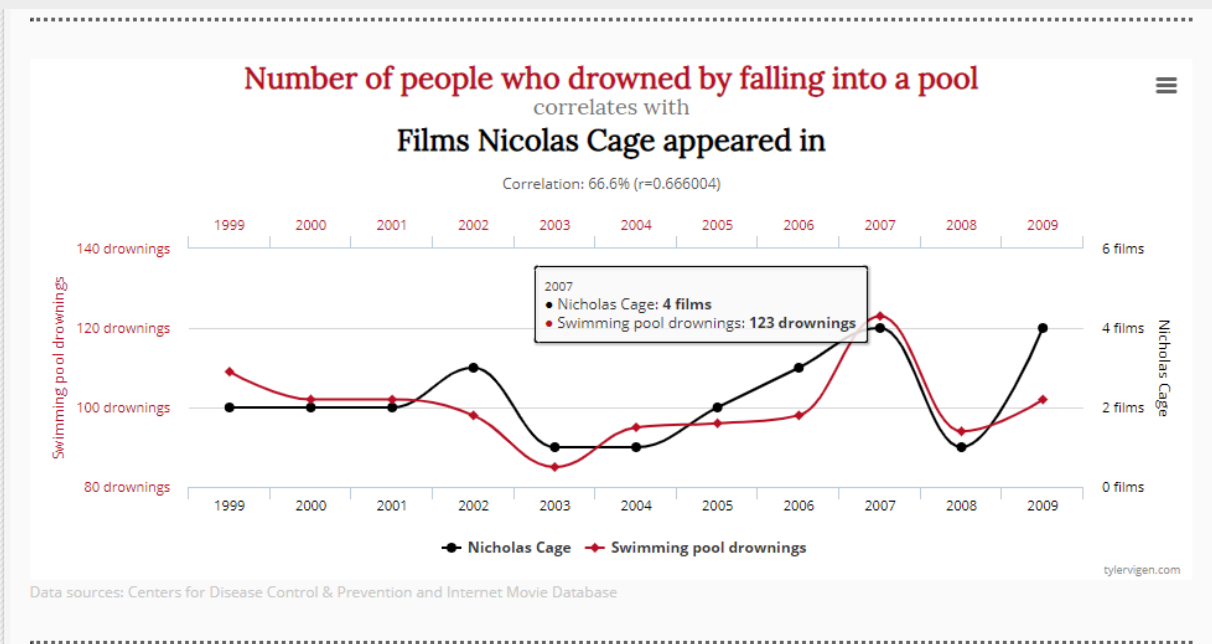
Fig 4.5 Drownings correlate to Nicholas Cage Films. Source: Spurious correlations: http://www.tylervigen.com/spurious-correlations

Is Nicolas Cage's presence in movies really impacting the number of swimming pool drownings? Is the number of pool drownings impacting the number of Nicolas Cage movies made per year? No! These two variables were chosen because they line up, not because there is actually any connection between them. You may notice this problem more often in news media, which is why it's important to go back to the article (i.e., Trace it back) to find what the research actually says. Remember this when you're looking at scholarly graphics, as well, though they may not be nearly as entertaining.

Other things to consider

As you review the paper, notice whether and how the author uses citations. Is the author supporting their research with citations to other papers? If the article you are reading makes broad statements like "studies find that students love LIB 160," make sure there is at least one study cited at the end of that sentence. If there are citations, make sure they are not leading to only the author's own papers. This is an example of self-citations and may be a sign that the author is only focusing on their own findings, and disregarding the work of other researchers.

Finally, consider when your source was published. This date can affect how useful (or not) that source will be for you now. Depending on your topic or assignment, you may need something published within the last five or ten years. This can be the case when researching recent events or technological innovations. For other topics, it may be necessary to consult an older source, such as for research on a historical event or a longstanding theory in your discipline. Keep in mind, if a theory has been around for a long time, it has had more opportunity to be criticized, overturned, built upon, or reinforced. You may need to seek out newer sources about the same topic to figure out whether the information in your original source is outdated today. If you're not sure whether a source's publication date matters for your project, ask your instructor.

Peer-reviewed papers aren't immune to misinformation or mistakes. A retraction is when a journal removes a paper that has already been published but was later determined to be inaccurate (or even intentionally false, though this is rare). This is bigger than just differences in opinion about the topic; it is about faulty research or results. When this happens, the publisher either flags the article with a notice about the reason for its retraction, requires the author to correct the article and adds an explanation about the original inaccuracies, or removes the article from the journal completely. In most circumstances, you should not use retracted articles.

4.9 PUTTING SIFT INTO PRACTICE

This section walks you through the process of evaluating a source online.

In 2019, the status of koala extinction was discussed on social media following a spread of wildfires in Australia, with hundreds of individuals tweeting about this topic.

Figure 4.6 Beard's original Koala tweet

After seeing others share that the koala's situation is dire, David Beard tweeted out an article that asserts that koalas are not functionally extinct. Kathy Gill responded on Twitter with another article about the same topic, asserting that koalas are becoming functionally extinct. So, who should we believe?

First of all, we should start by checking our emotions. Why is this contentious? Because koalas are cute and they may be functionally extinct and that's sad. It might feel like David is claiming we shouldn't care about koalas. After all, he is asserting that we shouldn't "buy into the hype." Is this the case, though? There is a lot here that we should stop and think about before jumping to conclusions.

Next, let's investigate who shared this information. Who is David Beard? David Beard's bio on Twitter tells us that he used to work for the Washington Post and the Associated Press.

After consulting the Washington Post's website, we can see that this is true. So David works with news organizations, but he may or may not be a koala expert. Kathy is also not a koala expert, and instead she is a journalist and professor focusing on user experience. From their backgrounds, it seems that the individuals here are both fairly credible sources, but they aren't the authors of these articles, just the people who shared them.

Why are koalas suffering so much in this fire season?

When it comes to fire, everything seems to be stacked against koalas. Their only real defense is climbing higher into the eucalyptus trees where they make their homes—little defense at all in a raging forest fire.

Left: Volunteers from the Port Macquarie Koala Hospital search for injured koalas after a brushfire ripped through prime breeding grounds.
Right: Koala Hospital staff tend to the injuries of Peter, a male koala found severely... Read More

PHOTOGRAPH BY NATHAN EDWARDS (LEFT) AND PHOTOGRAP BY NATHAN EDWARDS (RIGHT)

Animal campaigners say that koala numbers have fallen so low that the animal is "functionally extinct".

The Australian Koala Foundation says there are fewer than 80,000 koalas left in the wild.

Although 80,000 sounds like a lot, the foundation says these koalas are unlikely to produce a new generation.

'Functionally extinct' describes an animal population which has so few pairs that they are unlikely to produce a new generation.

It can also describe an animal which is breeding in such few numbers that they are more likely to become ill from disease.

Figure 4.7 Screenshots of the two articles these journalists shared online are highlighted above

What about their sources? David shared a link to a *National Geographic* article. According to Wikipedia, *National Geographic* is a magazine that shares "articles about science, geography, history, and world culture." The article titled "No, Koalas are Not Functionally Extinct – Yet" cites scholars in wildlife conservation and environmental change biology at the University of Queensland Australia (Christine Adams-Hosking) and the University of Tasmania (Chris Johnson), experts who are likely closely examining this issue as it evolves. It also cites studies about the koala population from 2012 and 2016.[1]

To argue that koalas are becoming functionally extinct, Kathy shared a link to an article from *Newsround*. According to Wikipedia, *Newsround* is "one of the world's first television news magazines aimed specifically at children." This does not mean that *Newsround* is a low-quality resource, only that it might be simplifying the news to better explain it to

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1. Daly, N. (November 25, 2019). No, koalas are not functionally extinct - yet. *National Geographic*.
https://www.nationalgeographic.com/animals/article/koalas-near-extinction-myth-australia-fires

children. We can see this within the article proper. The article states that koala numbers are in decline and may be headed toward functional extinction. In fact, despite the way Kathy presented the article in her tweet, her article appears to actually support David's point.

Evaluation breakdown

Here is a breakdown of what we've found:

- Both David and Kathy have some credibility and experience with journalism.
- The sources that the two shared are both credible but not equally authoritative.
- The *National Geographic* article has a greater breadth of information about koalas than *Newsround*.
- *National Geographic* also provides a good base of scholarship to support its claims.
- *Newsround*'s article, on the other hand, includes no citations to back up its claims.
- Therefore, the *National Geographic* article is a better source of information about this topic.

Note: Even though the title of the *National Geographic* article seems to imply koalas are in less danger, the article's content does not actually assert that koalas are perfectly safe. It concludes with: "If we want koalas, we've got to look after them. We need to step up."[2]

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2. ibid.

CHAPTER 5: USING INFORMATION ETHICALLY

Learning Objectives

After completing this chapter, you should be able to...

- describe why citing sources is an important part of the research process,
- recognize when you should cite a claim and how to paraphrase effectively,
- identify what constitutes plagiarism and how to avoid it,
- explain what copyright is and how public domain and fair use relate to it, and
- distinguish between copyright infringement and plagiarism.

5.1 CITING YOUR SOURCES

Now that you've learned effective strategies for searching for, accessing, and evaluating sources, let's review the final stage of the research process: using those sources in your project. In this chapter you will learn the basics about citations, using sources ethically, and copyright.

Why cite sources?

In Chapter 3, we examined how you can use citations to find specific items. As a writer, there are also reasons to cite your sources:

- to meet the requirements for your assignment,
- to give the original creators credit for their ideas,
- to help your readers find and learn from the sources you used, and
- to lend credibility to your argument.

You are likely familiar with the first three reasons already, so let's examine the last one in more detail. How does citing sources lend credibility to your argument? Research projects involve reading, analyzing, and synthesizing information from multiple sources and using their ideas to inform your work. There is a common misconception that academic research consists of one person making amazing breakthroughs all alone in their lab or office, but that's not what actually happens in most cases. Instead, research is a process where scholars build on older work while sharing their new ideas. When you cite others' research, you're doing the same thing. By citing a scholar that has done research on your topic area, you are using their authority and experience to support your claims, and adding your own insights.

When to cite

Whenever you use someone else's ideas, you need to cite them. This is true for any source where there is interpretation involved (opinions, research findings, recent discoveries,

statistics, etc). In the examples below, we've bolded words that indicate you probably need to cite a source:

- **Some** biographers of Abraham Lincoln say he suffered from clinical depression. (Which biographers?)
- The quart measurement **might** have originated in medieval England as a measurement for beer. (Says who?)
- **60%** of art majors believe that Pablo Picasso's paintings are more interesting than his sculptures. (Where did this percentage come from?)
- In recent studies of Y-chromosomes, geneticists have found that Genghis Khan has **approximately 16 million** descendants living today. (Where did they get that number?)

No matter where ideas come from you still need to cite them, whether they're from images, tables, charts, statistics, websites, podcasts, interviews, emails, speeches, songs, movies, or any other source.

5.2 HOW TO CITE

Once you have done your research and found sources, the next step is writing your paper. As you write, you'll need to communicate your ideas to your audience. You'll also need to demonstrate that you know how to integrate others' ideas in your writing in an ethical, clear, and consistent way. This means incorporating citations when paraphrasing or using direct quotes.

Cite purposefully

Citations aren't just there to fill up space. Each citation you include in your paper should be relevant and serve a purpose. Maybe you agree with the author and wish to further explore their main points. Or perhaps you disagree with their conclusions and wish to explain your own perspectives. In either case, the ideas you are citing must somehow add to your argument. Keep in mind that no single article or book will be exactly what you need. To strengthen your argument, you need to examine the work of multiple authors.

When to use direct quotes

Sometimes an author presents an idea in a way that you cannot rephrase without losing something important from the original quote. In these cases, you can use a direct quote by copying the text and putting it into your paper with quotation marks around the phrase –and citing, of course!

When you do this, keep the quote as short as you can and still make your point. Be careful not to rely too heavily on quoted material. Remember, the purpose of research is to make an original argument, and not to just pull together big blocks of quotes.

You may have been told at some point that you don't need to use quotation marks unless you copy some specific number of words in a row from an author's work. There's more to it than that. If the author has used words or phrases in a distinctive way, make sure that you use quotation marks if you use the same words in your paper. For example, a source might define a new process or system that must be cited, such as "action painting," a term which combines common words in a new way, and was coined by a specific art critic.

Paraphrasing

There are times when an exact quote is the best option for your paper, but most of the time, you'll be paraphrasing the sources you cite. **Paraphrasing** refers to incorporating someone else's ideas into your work and restating them in your own words. This means more than simply swapping out a few words for synonyms. When you paraphrase, you analyze the ideas presented, synthesize that information, and summarize it while citing the original source. By paraphrasing well, you demonstrate that you have understood an author's ideas, and that you can restate them without altering the author's meaning.

Tips for paraphrasing

- **Understand your source**: when you understand someone else's perspective and how it fits into your argument, only then can you put those ideas in your own words. Most writing guides will recommend that you read and reflect on the main points that may be relevant to your project.
- **Be true to the source**: you must accurately represent the message of the original author in your paraphrasing. This doesn't mean you have to agree with the ideas, just that you explain them accurately.
- **Acknowledge the source**: you must always cite the source whenever you paraphrase. Citing acknowledges that you are using someone else's ideas whether or not you are using the exact words of the original author. Not citing paraphrased material is plagiarism. Your work is strengthened when you show that you have done your research; citing other writers' works is your evidence!

It is okay if you don't feel confident paraphrasing yet. This skill can be challenging and takes practice.

You can get help learning about paraphrasing, citing sources, and structuring your bibliography at the Writing and Communication Consultations.

Common knowledge

Common knowledge is factual information that can *easily be verified in multiple*

authoritative sources (e.g., encyclopedias, dictionaries, reputable websites, and books). You always need to cite things like opinions, ideas, or new research findings, but well-established facts don't need citations. Even if it's something new to you, if it's a long-held fact, it is considered common knowledge and doesn't need to be cited.

Here are some types of common knowledge, with examples of each:

- Widely-known facts: that water boils at 100° Celsius.
- Uncontested historical dates: 1776 was the year the Declaration of Independence was signed in the United States of America.
- Well-known cultural references, such as important facts, people, or historical events within that culture: Suleiman the Magnificent was the longest ruling sultan of the Ottoman Empire.

These examples were adapted from MIT's Academic Integrity Handbook for Students.[1]

Be aware that some common knowledge may also be contextual. For example, what is common knowledge among microbiologists may not be common knowledge among lawyers, and vice versa. But if you have any doubt whether something is or isn't common knowledge, the best practice is to cite.

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1. Massachusetts Institute of Technology. (n.d.). What is common knowledge? *Academic integrity at MIT: A handbook for students.* https://integrity.mit.edu/handbook/citing-your-sources/what-common-knowledge

5.3 STYLE MANUALS

Style manuals are guides that help you write particular types of papers (research reports, technical reports, and theses). They also have rules for how to cite sources properly and consistently. Your professor will usually tell you which style manual you should follow for your papers in their class. If not, you should ask. If no specific style is preferred, the most important thing for you to remember is to choose one style, and follow its rules consistently.

In addition to helping you configure citations, style manuals also help you structure your writing in a way that is understood by an audience of subject experts. For example, chemists might use ACS, the American Chemical Society Style Guide; sociologists typically use ASA, the Style Guide from the American Sociological Association; those in psychology and related fields might use APA, the Publication Manual of the American Psychological Association, and so on. There are also publication styles that are not associated with a specific subject area, such as the Chicago Manual of Style, Turabian, Harvard Style, Elements of Indigenous Style, and others. Take the time to get to know the standards for communicating in your major.

The exact form of citations will vary depending on the style guide used but they all provide most of the same information. As we discussed in Chapter 3, understanding what each part of a citation represents will help you find the cited source, no matter which style is used.

Some styles have quick guides available online. The library also has copies of many different style manuals. To find style manuals in your area of study, talk with your professors or a subject specialist librarian. You can also consult the library's Citation Style Guide, which covers APA, MLA, Chicago, Harvard, and others.

Bibliographies

At the end of your project, you'll need to compile the sources you used into a bibliography. A **bibliography**, sometimes called "references" or "works cited," is a comprehensive list

of citations at the end of a project. The rules for organizing and formatting a bibliography differ depending on which style you're using, but the style manual should provide guidance for how to do this consistently. This is another thing the Writing and Communication Consultations can help you with.

Citation management tools

Bibliographic or citation management tools can make it easier to organize and use sources. These tools help you collect, organize, and store citations and documents as you find them online. They also work with word processors such as Word and Google Docs to automatically insert citations and bibliographies in a document. You pick a style manual, and the tool customizes your citations to match. If you're working on a group project, you can create a shared folder for your sources that everyone can add to and update.

Always double check that your citations are complete and formatted correctly. Some websites, indexes, and even the source files themselves may contain errors, which then become errors in your citations. These tools are only designed to use the information they're given, even if that information is incorrect.

The ISU Library provides support for three options: Zotero (free), EndNote (basic version free), and Mendeley (free). If you are new to this, our citation management tools Library Guide can help you get started.

5.4 PLAGIARISM

Plagiarism is defined as using someone else's words, ideas or other creative works without giving credit to that person. Sometimes you may get distracted or overwhelmed and forget to cite your sources. This is still plagiarism. To avoid plagiarizing, make sure you keep track of and properly cite all of your sources.

Tips for avoiding plagiarism

- Don't procrastinate. Good research takes time. Procrastinating makes it likely you'll run out of time to complete your assignment before you need to turn it in. Plan your research well in advance, and make sure you have enough time to get everything done.

- Take careful notes about where the ideas you're using come from. One good practice is to clearly label which ideas are your own and which come from others. For example, in your draft, you could write (ME) after your own ideas, and note citation information (author, date, and especially page numbers) after the information from your sources. You'll need this information for your bibliography anyway, so you'll benefit from having it at the beginning.

- Ask for help when you need it! Your professor or a librarian can help you better understand your assignment or what resources to use. The Academic Success Center or Writing and Communication Consultations can help you improve your study habits, learn better time management skills, and get tutoring or writing support. If you've got a quick question about how to find or cite a source, use the library's Live Chat service or stop by the main desk at the library and ask.

Did you know?

Plagiarism detection software is something you may encounter during your time in college. These tools check your words for text that is overly similar to other published or previously submitted papers. To avoid having your papers flagged by plagiarism detection software, take extra care to put things in your own words and correctly cite your sources. Be aware: these tools aren't perfect and they can flag text that is not plagiarized but is coincidentally similar to other papers. This is why it's especially important to keep good notes as you write to show where your information came from.

Reusing your work

Sometimes you might be tempted to reuse old papers or projects you've completed for another class, especially if that work is applicable for your current assignment. However, this type of recycled work could be flagged as plagiarism by plagiarism detection software, and will be unacceptable in many courses. Different disciplines have differing attitudes toward this kind of recycling, ranging from tolerance in very specific situations to absolutely forbidding it in all cases.

Before you resubmit work or assignments you have completed for a different course or purpose, you should always discuss with your instructor whether it is permitted to recycle your own work like this, whether in part or in its entirety.

5.5 COPYRIGHT

Copyright refers to laws to protect the works and the rights of authors. These laws determine how or if someone else's protected work can be legally copied, shared, performed, reused, or modified. **Copyright infringement** means copying or distributing someone else's copyrighted material without permission. As soon as you create something that is your own work, such as a short story you've written or a video, you hold that work's copyright in the United States.

Copyright can also be sold or licensed to another person or company, who then has control over what happens to the copyrighted content. For example, authors are often required to sign over their copyright upon publication, effectively handing over the rights to the companies that publish their work. This model enables publishers to charge outrageously high prices for journals, books, and textbooks. This is also why you cannot stream the tv series you like on every platform, and why Nintendo doesn't let you livestream their video games.

Public domain

Not all creative works are copyrighted. Works that are not protected by copyright are in the **public domain**. This means that you don't have to ask for permission from a copyright holder to reuse the content. Materials in the public domain typically fall into one of two categories.

- Materials that are not copyrighted: Published US government documents are, by design, never copyrighted because they are meant to be open to all. For example, transcripts of congressional hearings are government documents, as are images from NASA, and the data from the US Census. Other materials that cannot be copyrighted include simple mathematical equations and food recipes.
- Materials whose copyright has expired: Books published 95 years ago or longer in the US are another example of public domain materials. Their copyright protection has simply expired. The original intent of copyright law was to protect an author's rights

of redistribution and sales, but authors of works published so long ago are probably not alive anymore. Thus the need to protect that author's profits is also gone.

Does this mean that you can copy content from a US government website, such as this image from NASA, without asking for permission? Yes, you can!

Can you use it in an assignment without citing the source? No, that would be plagiarism. It's important to always credit the source, regardless of whether or not it is in the public domain.

Figure 5.1 The first image of a black hole and its shadow, EHT Collaboration (2019)

You can find a lot of public domain works on the internet using tools like Google Books and searching for works published 95 years ago or earlier. The Internet Archive is another good source of public domain books, films, and other materials. If you don't know whether something is copyrighted, it is best to assume everything you find online is copyrighted unless you find an explicit statement indicating otherwise.

Licensing copyrighted works

Most works are under full, "all rights reserved" copyright. This means that they cannot be reused in any way without permission from the copyright holder. One way you can get permission to use someone else's work is through a **license**, a statement or contract that allows you to reuse a copyrighted work in specific circumstances. For example, the copyright holder for a popular book might sign a license to provide a movie studio with the rights to use their characters in a film.

Creative Commons licenses

Creative Commons licenses are a type of copyright license that lets the creator specify the ways others can reuse their work. They were created to encourage sharing by making it easy to identify which works can be shared. These licenses help users understand what they can and can't do when reusing someone else's work.
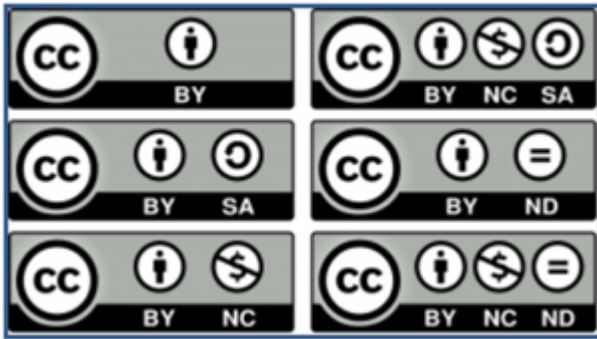
Figure 5.2 Creative Commons licenses are easily recognizable by their design. Have you noticed them on any websites you've visited?

There are six Creative Commons licenses, each with different rules, and attaching a license to your work lets others know how they may use your material. For example, a creator can use one type of Creative Commons license to specify that others can reuse their work but not make money off of it. Alternatively, they might use a license that says users cannot modify their work in any way. Want to learn more? Explore these licenses on the Creative Commons website.

Popular sites like YouTube, Wikipedia, Flickr, and many others have used Creative Commons licenses for years. You can even search for images available under a Creative Commons license using Google Image Search.

How does copyright affect you?

Copyright affects you both as a user and creator of information.

As an information user, you need to know:

- whether a work you want to share, copy, or modify is still under copyright or in the public domain;
- what license is applied to the work, such as a Creative Commons license that specifies conditions for reuse, or a commercial license that requires a fee; and
- who holds the copyright, so you know who to ask for permission to reuse their work.

As an information creator, you need to know:

- that your creative works are protected by copyright law;
- that you have the right to decide how your works can be used or shared, such as by applying a Creative Commons license;
- that you can keep or sign away your copyright; for example, when you post to a social media platform, you might be signing away your rights for that content as part of the

company's terms of use.

If you want to learn more about copyright law, copyright.gov from the U.S. Copyright Office is a good place to start.

5.6 COPYRIGHT INFRINGEMENT VERSUS PLAGIARISM

Because plagiarism and copyright infringement are both related to the ethical reuse of ideas and content, it can be confusing to understand where one ends and the other begins. One way to differentiate between the two is to examine the consequences of each.

When someone commits copyright infringement by sharing materials without permission from the copyright holder, this is a legal offense and can incur financial penalties. The consequences of these actions could include having something taken down from the internet, fines, or even jail time.

In contrast, when someone commits plagiarism, they haven't broken any state or federal law and can't be thrown in jail for that offense. However, because plagiarism involves stealing someone else's ideas, it's still unethical. For students, this can lead to failing a course or being kicked out of college. After graduation, plagiarism could lead to the loss of professional credibility and even get them fired.

Copyright infringement in the context of research

Now that you understand some basics, let's compare plagiarism and copyright infringement in the context of being a college student. Building off of the works of other researchers is a core component of scholarship. You don't need anyone's permission to quote or cite their work, but you do need to carefully cite your sources to avoid committing plagiarism. Avoiding copyright infringement is more complicated.

Let's say you want to include some copyrighted photographs (not your own) in a paper you're writing for a class assignment. Your professor will read your paper, and perhaps your paper will be discussed in class, but it will not be shared outside of the classroom. You carefully cite the photographs in your paper, so you know you are not plagiarizing, but are you infringing on copyright? No, this is not considered copyright infringement because the photos will only be shared in your classroom.

The situation is very different if you want to reuse those photos outside of your class. Not only would you need to cite the images properly, but you would also need to contact the copyright holder and ask for permission to reuse their photographs. The copyright holder would get to decide whether to grant that permission and determine any fees or conditions for reuse. Failing to comply with those conditions would be copyright infringement and put you at risk to be sued.

5.7 UNDERSTANDING FAIR USE

Fair use refers to specific legal exceptions that let you use copyrighted material without having to ask for permission or pay any fees. One reason fair use exists is to make it easier for copyrighted material to be used in universities and other educational settings, where these materials are taught, shared as course readings, and used for research. Another example of fair use is when an artist or musician reuses or references someone else's creative work in something they create (e.g. the parody songs of "Weird Al" Yankovic).

Fair use is determined by analyzing four factors:

- The purpose and character of the use,
- The nature of the copyrighted work being used,
- The amount and substantiality of the work being used, and
- The use's effect upon the original work's value.

Figure 5.3 You can see how much of the original photograph's composition is made the core of this new poster when they are placed side-by-side

This means that not every reuse of copyrighted works is considered fair use. In one high profile example, graphic designer Shepard Fairey based his well-known "Hope" poster on a photograph of Barack Obama that was taken by photographer Mannie García, who was working for the Associated Press (AP).

Fairey did not acknowledge his source. When the source was revealed, Fairey tried to defend his work as fair use. However, the AP disagreed and took Fairey to court, where a judge decided Fairey's poster violated copyright law and was not fair use. Below, we review the four factors for determining fair use in more detail and how Fairey's work fails to meet them.

Purpose and character of the use

This factor considers what you'll be doing with the original work you use. Fair use favors uses that:

- transform a work instead of using it as-is,
- radically and significantly change a work from the original,
- provide a commentary, critique, or parody of the original,
- add new meaning to a work through its use, or
- facilitate teaching or learning.

In the case of the "Hope" poster, the graphic designer attempted to transform the photograph by color blocking it; however, he did not significantly transform the photo from the original. In addition, since the original was not cited or acknowledged, it would be difficult to consider Fairey's work as a commentary or critique of the original.

Nature of the copyrighted work

This factor considers the purpose and type of the original work you want to use. Specifically, fair use favors uses that:

- include factual material, such as biographies or technical articles, rather than creative works such as fiction writing, poetry, or music; and
- reuse published works that have already been shared, rather than unpublished works, which have not yet been shared.

Using someone else's artistic work, such as Mannie García's photograph, is less likely to be considered fair use. Copyright law was created to protect authors and artists so that they would create more. Mannie García's photograph was his own creative expression, another reason why the judge determined that Fairey's derivative poster was not fair use.

Amount and substantiality

This factor considers the amount of the original work you are reusing, and how substantial that portion is. Fair use supports the use of a small or less important portion of a work. Specifically, fair use favors uses that include:

- only a part, not all of the original work, or
- a nonessential piece of the original work, rather than the "most important" or "best" piece.

Fairey's poster used nearly all of Mannie García's photo. While the poster omits the flag in the background of García's photo, the most substantial part, Barack Obama's face, was included in its entirety. This does not support the argument that his poster was fair use.

Effect upon the work's value

This factor considers whether your use could impact the sale and perception of the original work. Fair use favors uses that:

- do not negatively impact the market for the original work, such as how scanning a workbook replaces the need to buy the original workbook, and
- are not easily mistaken as the original work, and do not otherwise overshadow or replace the original.

The photograph in this example was Mannie García's original creation. However, Shepard Fairey's derivative work became so famous that most people would never know the poster was based on someone else's work. In other words, you could say that Mannie García's photograph and creative vision were devalued.

As we've seen in this example, fair use is determined by considering not one or two but all four factors. One common misconception is that everything is fair use if the material is used for an educational purpose. That's an oversimplification. The four key factors for determining fair use should all be considered together.

5.8 PROMOTING YOURSELF AS A STUDENT RESEARCHER

You may think that this discussion about copyright and fair use doesn't apply to you, since you are only creating papers to share in class. However, you can publish and share your work online, even while you are a student. As you progress in your studies and head toward your first professional job, you'll want to present yourself in the best possible light. Carefully consider what you want to share and how. Here are some things you can do:

- Join professional social networking communities such as LinkedIn that allow you to manage your professional identity. (The ISU Career Services offices can help you set up your LinkedIn page and give advice about your online presence.)
- There are some journals that publish student research specifically, like *Involve* for mathematics research or *Journal of Critical Thought and Praxis* for education research.
- If you participate in scholarly conferences, such as ISU's Symposium on Undergraduate Research and Creative Expression, consider sharing your research online. One place you can do this is ISU's Digital Repository.

Whenever you create something or interact with people online you leave behind a digital footprint: clues about yourself that future professors, colleagues, and supervisors will be able to find for years to come.

5.9 PUTTING IT ALL TOGETHER

In this course we have focused on information, how it's organized, and how you can find and evaluate relevant resources online and in research libraries. You've compared different types of search tools, such as search engines, library discovery tools, and article indexes, and you should have a general idea of the types of information you'll find when you use these tools.

Starting your research

When you're beginning a project, consider your scope and research question. Look for background information to acquaint yourself with the major ideas surrounding your topic. You can do this by researching your topic in encyclopedias, books, and yes–even Wikipedia. You can use this information to refine your key concepts into search terms.

Searching for sources

Once you have your search terms, you can begin searching for articles and other sources that meet your assignment's requirements and help support your project. Using Quick Search is a good first step for finding articles, books, and other sources.

Whether you're using Quick Search or an article index, you should start with basic keyword searches. If you get too many or too few results, try modifying your search by using Boolean operators, nesting your terms, or filtering your results. No search will meet all of your research needs on the first try, so try combining a few different techniques.

As you progress in college, you will need to do more in-depth research projects. You can use subject-focused indexes and databases to find peer-reviewed articles and other publications relevant to your specific major.

Evaluating your sources

Carefully evaluate the websites and other resources you use to learn more about your topic. Use the SIFT method to ensure your sources are reliable and meet your needs.

Writing up your results

Next, organize and carefully read through your sources, and analyze and synthesize the ideas within them. As you write, make sure you paraphrase and properly cite what you've found. By building on others' ideas and adding your own arguments, you will succeed in your college-level research.

Sharing your work

Finally, if you want to share the work you've done, you have copyright over your creations and can publish, present them at conferences, or choose to license and share them for free online. Just be careful where you share and remember: once your information is on the internet, it's a lot harder to take down than it was to put up.

This class has covered just the basics of college-level research, but there's always more to discover. In your ongoing studies, you will learn more about finding, evaluating, and using information. Don't be afraid to reach out to a librarian for more advanced research support.