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Research and the Information Landscape

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RESEARCH AND THE INFORMATION LANDSCAPE

LIBBY WHEELES AND HELENA MARVIN

CONTENTS

Introduction: Research and the Information Landscape

This open textbook accompanies the University of Missouri -St. Louis class INTDSC 1010: Research and the Information Landscape. Intended for undergraduates new to academic research, the course covers practical search and evaluation skills as well as a basic introduction to the world of scholarly communication. In Fall 2025, the course's learning objectives were:

1. Evaluate whether a source is appropriate for college-level research.
2. Navigate library search tools to find relevant results and improve research efficiency.
3. Analyze the goals and limitations of non-library tools in the research landscape.
4. Explain the basic history and current broad practices of scholarly communication.
5. Contribute to a small-scale version of the "scholarly conversation."

Future versions of this book will reflect significant edits and restructuring in response to instructor reflection on the success of previous semesters. This version is our first iteration, used in Fall 2025. We preserve this version of the text to accompany the Fall 2025 Student Bibliography, available at the end of the book, which includes the sources cited and annotated by students for their final project. The course was taught by UMSL Librarians Libby Wheeles and Helena Marvin, who developed this textbook with contributions from Tim Nelson.

PART I

1: WELCOME!

1.

ABOUT WEEK 1

Welcome to Research and the Information Landscape!

We are excited to have you in this class as we explore the basics of academic research (and beyond!) We have two main goals this week:

1. Get familiar with class expectations, your instructors, and your classmates
2. Introduce the library and some important research concepts

Please read through the Week 1 content in order. Before we get started, here's what you can expect from Week 1:

Learning Objectives

By the end of this week, you will be able to:

1. Understand this course's goals, structure, and policies
2. Explain the library's role at UMSL
3. Navigate to the library's website and main research support services
4. Differentiate between paywalled and open material
5. Consider your research experiences and goals

Week 1 Activities

- Read through this week's course content
- **By 10 PM Wednesday, Aug. 27:** Introduce yourself on the Week 1 Discussion Board
- **By 10 PM Sunday, Aug. 31:** Complete the Syllabus Self-Check Quiz
- **By 10 PM Sunday, Aug. 31:** Complete the Week 1 Self-Check Quiz
- **By 10 PM Sunday, Aug. 31:** Respond to at least one of your classmates on the Week 1 Discussion Board

Let's get started!

2.

ABOUT THE INSTRUCTORS

Instructors and OER Creators

The instructors of this course are Libby Wheeles and Helena "Lena" Marvin. We are reference librarians at the University of Missouri-St. Louis.

Libby Wheeles

Libby Wheeles

I am the UMSL librarian for students in English, Language & Cultural Studies, Art, and Music classes.

Helena Marvin

I am the Institutional Repository, Open Educational Resources and a reference librarian at the University of Missouri-St. Louis library. I run

the UMSL Institutional Repository Library, help faculty use and develop Open Educational Resources, and provide reference and research help to the UMSL community. I also help students and faculty with navigating the Zotero citation management tool.

I am the UMSL Librarian for the Honor's College, College of Business, Economics, Gender Studies, Sociology, and all students who haven't yet decided on their major.

What is an OER?

OER stands for Open Educational Resources (OER) and they are are teaching materials freely available to the public. This work, **Research and the Information Landscape**, is licensed under an Creative Commons CC BY (attribution) license which allows for free use, adaptation, and redistribution of this work.

3.

WHAT IS RESEARCH?

What is Research?

At its most basic, research is the process of "finding things out." You have a question, or a topic you'd like to learn more about, and you go out into the world to find what, or who, can give you the answers to that question. Rather than a *thing* you discover, it is the ***activity*** of brainstorming, searching, evaluating, and synthesizing. You are actively engaging with the world around you – bringing your own ideas and experiences to the table – to build and sometimes share knowledge.

Along the way, you interact with materials (both physical and digital), people, organizations, and larger systems that are steeped in history and impacted by social, economic, and legal norms and expectations. Some of these structures are visible, and some are not. All of them influence how information is created, preserved, organized, and shared. Learning these influences will help you navigate the research process successfully and thoughtfully.

Not only is this "information landscape" deceptively complex, but the act of research is sometimes like an iceberg – simple at the surface, but much larger-scale than your initial expectations as you dive deeper. You may find yourself overwhelmed by the massive amounts of information available. Where do you start? What makes one source better than another? What do you do with all that information once you have it?

Don't worry. We aren't expecting you to become advanced researchers in eight weeks. Finding, navigating, evaluating, and even producing information is a skill you'll be developing your whole life as society and technology changes around us. Plus, some of you may pursue research as a career, in which case you'll get rigorous training on expectations for your field in later coursework.

Our goal is to focus on the essential skills you need to get started, plus some background knowledge that will help you think critically about the "information landscape" as it exists today. We are focusing on just a few steps of the larger research process.

Steps of the Research Process

Saying that research happens in "steps" is a bit too simple. In reality, you'll probably bounce between different steps as you discover new knowledge, make new connections, and decide to pursue different paths. However, it is helpful to know what these steps are as a starting point:

1. **Choosing a topic**. Before you can start searching, you need to know what information you're looking for! Keep in mind that your starting topic may adjust or change entirely based on what you find once you start searching. You may get new ideas, find a more specific topic you find interesting, or have trouble finding sources on your original idea.
2. **Getting background information**. If you're new to a topic, you may need foundational knowledge before doing deeper research. You may use either the Internet or library resources (like encyclopedias) to define new vocabulary, explore historical timelines and contexts for an issue, learn about important people and places, and more.
3. **Finding sources**. This is the process that most people are referring to when they say "research," and it's also going to be a significant focus in this class. Finding sources requires knowing what different source types are, where and how they're organized, and how to locate them with modern search tools.
4. **Evaluating sources**. In other words, how do you decide whether a source is trustworthy and relevant to your research? We'll also cover evaluation basics in this class.
5. **Synthesizing information**. This stage – where you make connections between sources and use those ideas to support your own argument and voice – is closely linked to the writing process, or whichever other medium you use to share your findings.
6. **Citing sources**. This stage is often forgotten by beginner researchers, but it is **VERY IMPORTANT**. Research builds on the work of scholars who came before us and involves sharing our own findings with our peers. To do so, it's crucial to correctly share which sources we used to create our own work.

Again, for this class we're focusing on just some of these stages – finding, evaluating, and citing sources – plus taking a broader look at why the "information landscape" works the way it does. We hope these new skills and knowledge base will provide a helpful support for you as a beginner researcher!

Key Takeaways

- Navigating today's information landscape requires interacting with seen and unseen social, economic, and legal structures that influence how information is created, preserved, organized, and shared.
- Research is a **process** with steps that include include choosing a topic, finding background information, finding sources, evaluating sources, synthesizing information, and citing sources.
- Moving back and forth between research steps is common as you use new knowledge to adjust your original ideas.

4.

THE SCHOLARLY CONVERSATION, CITATIONS, AND PLAGIARISM

The Scholarly Conversation

Research involves finding what other people (hopefully experts) have said about the topic you're investigating. In fact, these experts may have been talking about your topic – doing research, sharing their findings, reading each other's work, and then using that information to do new research – for many years.

Jumping into this conversation can be overwhelming! Each article, book, video, or other source you find is someone's contribution to that conversation. When you use that information as part of your own assignments, **you are now part of the conversation!** If you publicize your own work eventually, someone else interested in the topic might find it and use your ideas as part of their research. Thus, the conversation continues.

Citations

Citations are an essential part of the scholarly conversation. In order to give credit to other people's contributions, and so your readers can find the sources you used, you **must** provide citations for any information you include that isn't your own work. This information includes quotes, paraphrased ideas, images, data, and more.

Later, we'll learn how to properly format a citation. (You are, of course, encouraged to watch our citations overview video ahead of time if you like.) For now, it's just important to know that they are **not optional**. If you're ever not sure how to format a citation, **do your best** instead of skipping it. At minimum, include the title, author, and date if you can find it. For online sources, include a link.

Examples

Here's a couple examples of what citations look like:

Vancouver Aquarium. "Sea Otters Milo and Otis Holding Paws." *YouTube*, September 30, 2011, https://www.youtube.com/watch?v=zHIIzcWqsP0.

Jorgensen-Wells, M. A., Shawcroft, J., Taylor, L. D., & Spencer, E. (2025). Romantic ideas and ideals in popular music: A content analysis of the Taylor Swift musical catalog. *Psychology of Popular Media*. https://doi.org/10.1037/ppm0000606

Plagiarism

Plagiarism is including information from outside sources without credit or claiming someone else's work as yours. It is a very serious academic offense. **Do not** submit work that isn't yours or skip citations for outside sources. You risk losing credit for your assignment, not to mention more serious consequences from the university.

Please reach out to your professors, the writing center, the library, or another appropriate person on campus if you're not sure whether part of your assignment constitutes plagiarism. We're happy to work with you.

All that sounds scary, but good news – if you don't already know how to cite outside sources, you'll learn in this class!

Key Takeaways

- The scholarly conversation involves researchers sharing their findings on a topic and others responding to/building on those findings to create a larger body of knowledge.
- Citations acknowledge where you found outside information and are an essential component of the scholarly conversation.
- Plagiarism is claiming other's work as your own.

5.

UMSL LIBRARIES

Your Library: An Introduction

Many people consider the library the heart of a campus. At UMSL, we are a primary hub of research and learning for students, faculty, and staff. We facilitate access to essential research materials, teach students how to find and evaluate sources, provide study spaces, and more.

Before we jump into the nitty-gritty of research, it's important to understand the library's role on campus and how we can support you during your time UMSL (and maybe, beyond).

What do libraries do?

As we've covered already, the "information landscape" is enormous and complex. It includes people, organizations, print and digital materials, and the systems that link them together. When you do research, you navigate this complicated network to find the specific information you need.

A university library has several roles in supporting this process:

1. Collecting and providing access to **reliable** materials that are **relevant** to the research needs of **our** students and faculty. We purchase books, we subscribe to databases, and we recommend reputable free online resources. We can't buy everything (and we don't have space for it), so we focus our efforts on the assignments and research endeavors of our UMSL community.
2. Guiding students and faculty on **how** to find materials and navigate library search tools. We visit classes, we host workshops, we hold one-on-one research appointments, we create online guides and tutorials, and more. And, we teach this class!
3. Providing **space** for individual and group work on school assignments, research activities, and more. The library building at UMSL is in the final stages of an exciting renovation. When everything is completed, we'll have open work spaces, computers, study rooms, a floor for silent study, and an information desk to help you navigate or answer other research questions. Many of these spaces are open already!

Facilitating access, helping patrons use and evaluate materials, and providing space are the major goals of any library, whether it's an academic library (in other words, at a college/university), a public library, a K-12 school library, or one of many "special" libraries (for example, a medical library). They provide an essential service in a world where information is complex, often expensive, and possibly inaccurate.

What materials does a university library have?

We have more than you think! The specific materials a library owns differ by library and the needs of their college/university. Most of our materials are:

- Books (print and digital)
- Academic journal articles (print and digital)
- Newspapers (online or on a special preservation material called microfilm)
- Special print materials like music scores or government documents
- Other digital materials accessible through online databases (including primary sources, streaming video or audio, and more)

Many libraries also have **special collections** – usually older documents, photographs, and other materials that require special care – related to the unique focus of their library or institution. At UMSL, there are multiple libraries that share one building, and two of them hold unique special collections. (See more detail below!)

Library materials: are they free?

Although books, articles, and other library materials are usually free to patrons, most of them are not free to the library. If patrons tried to access them outside the library, they would cost money (often a LOT of money, especially resources for academic research).

We talk more about the "information economy" – who profits from limiting and selling access to information – in Week 6. For now, we want to introduce few concepts:

1. **Paywall**. If you try to access most academic research materials online – for example, scholarly books and articles – outside of your library access, you'll hit a paywall. For example, you may see a screen asking you to pay $30 for individual access to one academic article. **Don't pay this fee!** Instead, reach out to the library to see if we already pay for access to this item. We can even often get access through other

libraries if we don't have it ourselves.
2. **Open access (OA)**. Some materials **are** available for free online. There is a growing movement to make scholarly research (and other materials) available for free. Again, we talk more about OA in Week 6.
3. **Open educational resources (OER)**. OER are free resources created by educators to support student learning. They replace traditional costly textbooks. **We are building an OER in this class!** As the class progresses, we are publishing most of the week's content online so that you and future students can access the material for free. Part of your final project will involve a small contribution (anonymous, if you wish) to this resource. Like OA, the OER movement is an exciting and steadily growing movement to made education more affordable and accessible.

Libraries at UMSL

Though we share the same building, there are actually **three** libraries on the UMSL campus. Knowing the basics about each one will help you navigate our resources.

Thomas Jefferson Library (TJ)

TJ is the **main campus library**. Your instructors are both reference librarians at TJ Library. We provide access to print and digital materials to support UMSL students, faculty, and staff, we schedule research appointments, we work with different departments on campus, and we provide work space in the library building.

Important TJ Library Services

The library offers several crucial services to support research and learning on our campus.

Research Appointments

Meet with an UMSL Librarian either in person or over Zoom. We meet with students at all stages for a variety of research needs or questions. We help students adjust their research topics, navigate library search tools, and

choose which resources are best for their project. You can schedule an appointment based on availability or select the librarian assigned to your subject area.

Other Research Help

You can also get research help by visiting the **Public Service Desk** (we even have librarians available on most weekends) or using the **online chat**. Find the chat by visiting our website and looking in the lower-right corner. The chat is best for quicker questions rather than in-depth research help. It is NOT a bot: real librarians are available to assist you!

Events

We host a combination of fun events and workshops to level up your research skills. Visit the calendar on our website for details.

Interlibrary Loan

If we don't have access to something you need, we can help you get it (at no cost) from another library. There are two options to make requests:

1. **MOBIUS**. MOBIUS is a consortium of academic, public, and research libraries that work together to share materials. You can search for print books on the MOBIUS search, then log in to request specific items. You'll receive an email notification when the item is at the TJ Library front desk for pickup.
2. **Interlibrary loan**. For articles or books not available through MOBIUS. Fill out the online request form, then keep an eye on your UMSL email address. Digital materials will come in as a scanned PDF. Print materials will be sent to the TJ Library front desk for pickup.

The St. Louis Mercantile Library

The **Mercantile Library** is the oldest general library in continuous existence west of the Mississippi. Founded in 1846, it relocated to the UMSL campus in 1998 from its original home in downtown St. Louis.

The Mercantile is a research library with collections concentrated on Western Expansion and the history, development, and growth of the St. Louis region and of the American rail and river transportation experiences. You can find the Mercantile on the lower two floors of the library building under the signature glass pyramid. UMSL students are welcome to schedule appointments with Mercantile curators for specialized research assistance and access materials (again, by appointment) in the Reading Room. Also, keep an eye out for the opening of the new art gallery on Level 2 of the library building. Along with the Mercantile's exhibit space on Level 1, the gallery will host rotating showcases of the library's unique holdings.

State Historical Society – St. Louis

The **St. Louis Research Center** of the Missouri State Historical Society is hosted on Level 2 of the library building. Their holdings trace the evolution of greater St. Louis through unique collections that document important groups ranging from labor organizations to environmental activists. They preserve the diverse history of the city and its surrounding area within a statewide context. Reach out to them for research help on St. Louis-specific topics!

Key Takeaways

- The library's three main goals are to facilitate access to materials, to help patrons find and evaluate those materials, and to provide a physical space for work and study.

- Thomas Jefferson (TJ) Library is the main campus library supporting student and faculty research.
- Some important library services include research appointments, other research help (like answering desk questions or supporting the online chat), events, and interlibrary loan.

PART II

2: FOUNDATIONS OF ACADEMIC RESEARCH

6.

ABOUT WEEK 2

Week 2: Foundations of Academic Research

In Week 2, we introduce the building blocks of academic research: information sources and how we categorize them. We cover important **vocabulary** (for example, what is a "scholarly source"?) and discuss the basics of **why** you use different source types. We also discuss the **structure** of academic sources so you can read them effectively and begin building your own citations. Finally, we provide a brief overview of peer review, a major factor in searching for and evaluating scholarship.

Learning Objectives

By the end of this week, you should be able to:

1. Identify common source types used in academic research
2. Choose an appropriate source type based on a research need
3. Identify the structure of scholarly books and journal articles
4. Explain (briefly) the purpose of peer review

The **knowledge** and **skills** you acquire this week will help you understand

what you're seeing in the results list of a library search tool (or Google search!) and choose appropriate sources for college-level research.

Introducing Source Types

A major goal this week is introducing common **source types** in academic research. We think about these source types in two ways:

1. **Purpose of the source** (Who created the source and why?)
2. **Purpose of the researcher – that's you!** (What type of information do you need from this source? How do you plan to use it?)

There is some overlap in different definitions of source "types." Additionally, although it is tempting to label different source types as good/bad (or reliable/unreliable), the truth is that the same source may be more or less appropriate for your research depending on **your** specific need. Take, for example, a questionable Instagram reel recommending peanut butter as a cure for the common cold. This source would be inappropriate for personal health or academic medical research, but it might be an excellent example in a research paper on social media misinformation.

This chapter covers **foundational vocabulary** you will see throughout this course. We encourage you to refer back to this chapter at any point for a review.

Expertise

As we discuss different source types, we use the terms **expert** or **expertise**. There are **many** ways to think about expertise, including academic expertise, lived experience, professional experience, etc.

We explore the complications of expertise later in this course (in Week 4: Source Evaluation). For now, we focus primarily on **academic expertise** – i.e., an advanced degree and research experience in a given field.

Week 2 Activities

- Read through this week's course content **in order**
- **By 10 PM Wednesday, Sept. 3rd:** Submit your first post to the Week 2 Discussion Board
- **By 10 PM Sunday, Sept. 7th:** Complete the Week 2 Self-Check Quiz
- **By 10 PM Sunday, Sept. 7th:** Submit your starter research topic
- **By 10 PM Sunday, Sept. 7th:** Respond to at least one of your classmates on the Week 2 Discussion Board

7.

POPULAR AND SCHOLARLY SOURCES

Introducing Popular and Scholarly Sources

First, let's cover two major source categories: **popular** and **scholarly** sources. For an overview, please watch the video tutorial below (time: 4:48):

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://umsystem.pressbooks.pub/information/?p=545#oembed-1

Definition Recap

A **popular source** aims to inform, entertain, or persuade the

general public. Most popular source creators are not scholarly experts on the topic in question.

A **scholarly source** is written by an academic expert to communicate original research or other academic discourse with other scholars.

Examples (SKIM)

Quickly skim these examples of a popular and scholarly source about the same topic: cats!

Popular Source Example

Veltman, C. (2024, July 5). Cats on leashes...yes, it's a thing. *NPR*. https://www.npr.org/2024/07/05/nx-s1-5021910/outdoor-cat-walk-leash

Scholarly Source Example

Ceccheti, M., Crowley, S.L., Wilson-Aggarwal, J., Nelli, L., &

McDonald, R.A. (2022). Spatial behavior of domestic cats and the effects of outdoor access restrictions and interventions to reduce predation of wildlife. *Conservation Science & Practice*, *4*(2), e597. https://doi.org/10.1111/csp2.597 (you may need to copy and paste this link into a new tab in your browser)

Fun fact: this academic article is **open access (OA)** which means you can access it for free without an UMSL login.

Popular & Scholarly Sources: Review Table

Popular and Scholarly Sources: Review Table

	Popular Sources	**Scholarly Sources**
Purpose	To entertain, inform, or persuade the general public	To communicate academic research and ideas
Audience	The general public (non-experts, beginners)	Other academics
Content	News, personal opinions or information, entry-level information, entertainment, etc.	Academic research or formal discourse
Length	Typically shorter	Typically longer
Citations	Few to none	Typically many
Peer Review	Not peer-reviewed. Some may go through a different editorial process.	Many articles are peer-reviewed.
Examples	News articles, social media posts, most videos, most websites, magazine articles, popular books	Scholarly journal articles and scholarly books

Key Takeaway

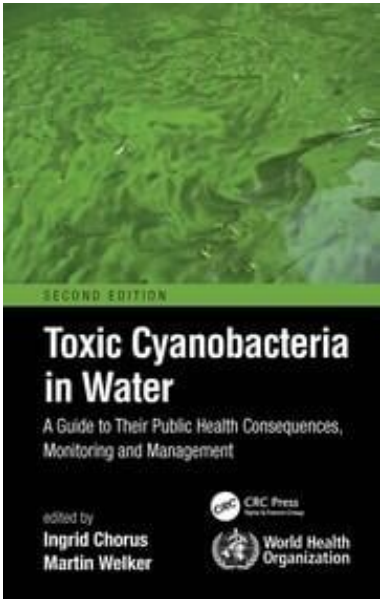
College-level research will **almost always** require or benefit from scholarly sources like articles or book chapters. Scholarly sources are written by and for other academics and they offer well-researched, in-depth information designed to support further research on the topic.

8.

SCHOLARLY BOOKS

Scholarly Books Overview

Scholarly books are written by academic experts and cover niche topics on an in-depth, scholarly level. They consolidate, explain, and evaluate previous research in their field primarily for an audience of other researchers or professionals. Students or the general public may also find these books useful for deeper reading on a topic of interest.



Toxic Cyanobacteria in Water, editors Ingrid Chorus and Martin Welker

Cover for The Poetry of Being and the Prose of the World in Early Greek Philosophy

The Poetry of Being and the Prose of the World in Early Greek Philosophy, Victoria Wohl, 2025

Cover of Archiving Machines (2025)

Archiving Machines, Amelia Acker (2025)

Organization of Scholarly Books

Unlike popular books, scholarly books often **do not follow a single narrative from start to finish**. Instead, many are a **collection of essays** related to a larger theme. Although one or more editors oversee the entire work, each chapter may have different authors and their own reference lists. Even books with a single author may include chapters on different topics that don't need to be read front to back.

This structure means that (with some exceptions) you **do not** have to read the entire book to get helpful information. You may find that 1-2 chapters are useful, while the others are irrelevant to your project.

Cover for Black Disability Politics, 2022

Black Disability Politics, Sami Schalk, 2022

Search tip: Browse a book's **Table of Contents** to help you decide whether any individual chapters are relevant to your research topic. It is common to read and cite a single chapter from a scholarly book in your reference list.

For example, here's the Table of Contents for Dr. Sami Schalk's 2022 book *Black Disability Politics*:

- Black Disability Politics Table of Contents

If you are working on an assignment for a psychology class, you may focus on Chapter 2: "Fighting Psychiatric Abuse." For a political science project, you may want Chapter 1: "We Have a Right to Rebel."

Activity: Skim a Scholarly Book

The library has many examples of scholarly books both in print and digitally. Since we have not yet learned how to search the library site, here are some examples that are available open access. Choose one and quickly browse the Table of Contents plus 1-2 chapters. You can read in depth if you like, but the goal here is to get familiar with the overall organization, style, and scope.

- *Bandits in Print: "The Water Margin" and the Transformations of the Chinese Novel*, Scott W. Gregory (2023)
- *Synthetic Frontiers: Ocean Plastic and the Persistence of Trash Islands*, Kim de Wolff (2020)
- *How the World Changed Social Media*, Daniel Miller et al. (2016)

Additional Notes

- **Textbooks do not count as scholarly books**. Textbooks communicate well-known information in a field that typically does not need to be cited unless you are quoting directly. Additionally, their primary audience is students rather than other scholars. Keep in mind that not every book assigned for class reading is a textbook.
    - Check with your professor if you are not sure whether a book you're assigned to read for class is a traditional textbook or another scholarly work. They can help you determine whether the information in the book can be cited for an assignment.
- Myths about print books:
    - **Myth 1: print books are out of date**. Academic libraries still purchase plenty of new books in print for a variety of reasons. The percentage of books available in print vs. online may vary by institution, but if you discount print resources, you may be missing out on valuable information. Also, older ideas and information are not automatically less useful (depending on your field of study and research topic).
    - **Myth 2: book sources will take too long to read**. First, we encourage choosing sources based on their relevancy to your topic, not how quickly you can read them. Second, as we explain above, it is common to cite just one relevant chapter from a longer work. Many book chapters are not meaningfully different in length than a journal article.

9.

JOURNALS AND JOURNAL ARTICLES

Overview

Journals (and the articles they contain) are one of the primary formal ways that researchers communicate with each other. Scholars keep up with current research by reading journals that are important in their field, or even by reading articles published by a specific scholar. When they share their own research, they typically write about it in a journal article for publication in a journal they know their colleagues will read. By reading and publishing articles, they contribute to the scholarly conversation.

Scholarly Journals

A **scholarly journal** publishes articles written by academic experts on topics relevant to the theme of the journal.

Journals, just like newspapers, publish **periodically** – meaning they publish a collection of new articles on a regular schedule. This schedule could be once a month, every three months, once a year, etc. The journal's name will usually give you a clue to what the articles are about. The *Review of Educational Research*, for example, publishes education articles. The *Journal of Fish Biology* publishes research on fish and fisheries.

Unlike most newspapers, scholarly journals offer rigorous, in-depth information – often original research from experts in a given field. Scholars become very familiar with which journals are important to read to keep up with new research and where they should publish their own ideas so their

colleagues will read them. If you pursue a degree or a career that requires reading or publishing your own research, you'll also start to recognize certain journal names (and certain scholars' names as well).

In addition to articles with original research or reviews of past research, journals publish:

- book reviews
- editorials (short essays sharing the personal opinion of a researcher on a topic related to the scope of the journal)
- other non-peer-reviewed content

More articles get submitted to scholarly journals than are actually published. It is a competitive process for a researcher to get their article accepted in a prestigious journal. We talk more about this process in the chapter on peer review.

Scholarly Journal Articles

A **scholarly journal article** is an article published in a scholarly journal to communicate research or other academic ideas. You may also see the term **academic journal article**.

Journal articles are one of the primary ways that researchers communicate with each other. Most journal articles follow a similar structure, which can be helpful to understand to make reading them quicker and easier.

Before we explore articles in depth, complete the following activity:

Activity: Skim a Journal Article

Follow the link. Then, **read the title** and **skim** each section of the article.

Reira-Sampol, A., Rodas, L., Martínez, S., Moir, H., & Tauler, P. (2022). Caffeine intake among undergraduate students: Sex differences, sources, motivations, and associations with smoking status and self-reported sleep quality. *Nutrients*, *14*(8), 1661. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9029267/

Notice the layout and section headings of this journal article. They are very similar to the organization of the scholarly article about cats you saw in the chapter about popular and scholarly sources. In the next chapter, we'll discuss the purpose of each section and point out how to use information about the article to create citations.

Key Takeaways

- Publishing articles in scholarly journals is one of the main ways researchers communicate with each other.
- Scholarly journals publish articles relevant to the topic of the journal on a regular schedule.

10.

ANATOMY OF A JOURNAL ARTICLE & CITATIONS

Reading Journal Articles

Academic journal articles can seem long, dense, and tedious to beginner researchers. They may describe research strategies you are unfamiliar with, include complicated graphs or data tables, use field-specific vocabulary (we call this **jargon**), or assume you have background information on the topic that you don't actually have yet. This is because these articles are written by experts for other experts to read.

Don't worry! Every researcher out there was once in your position. It's okay if you don't understand everything in an article right away. As you get more familiar with research, you'll improve in your ability to comprehend articles and know which parts are the most relevant to your work. It takes **practice**.

To start with, it helps to know two categories of information: information *about* the article and sections *within* the article.

To demonstrate, we'll look in detail at the article you skimmed in the last chapter. If you didn't skim it then, please do so now:

Activity: Skim a Journal Article

Follow the link. Then, **read the title** and **skim** each section of the article.

Reira-Sampol, A., Rodas, L., Martínez, S., Moir, H., & Tauler, P. (2022). Caffeine intake among undergraduate students: Sex differences, sources, motivations, and associations with smoking status and self-reported sleep quality. *Nutrients*, *14*(8), 1661. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9029267/

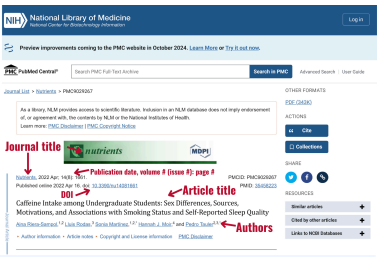
Information About the Article

Another name for information *about* an article, book, etc. is **metadata**. You should be able to find the following information by skimming a journal article:

- Article title
- Journal title
- Publication date
- Volume and issue number
- Page number(s)
- DOI (or, digital object identifier)
    - The DOI is simply a unique number attached to an article to identify it. You can think of it like your student ID number.

You need all these pieces of information to create a citation for an article. For the Reira-Sampol et al. article on undergraduate caffeine intake (2022), we can find all this information near the top of the screen:

Here's the full citation for the article again. This time, we're including the DOI instead of a link. See if you can find each piece of metadata:



Metadata labeled for Reira-Sampol et al. (2022)

Reira-Sampol, A., Rodas, L., Martínez, S., Moir, H., & Tauler, P. (2022). Caffeine intake among undergraduate students: Sex differences, sources, motivations, and associations with smoking status and self-reported sleep quality. *Nutrients*, *14*(8), 1661. https://doi.org/10.3390/nu14081661

We'll go into more specifics about creating citations later. For now, comparing each piece of information should give you an idea of where to look for it and how it fits into a bigger citation.

Parts of a Journal Article

Watch the video below from the North Carolina State University Libraries for an introduction to reading journal articles (run time 7:03). Things to look out for:

1. Where should you always start reading a journal article?
2. How are articles different in the humanities vs. sciences and social sciences?

One or more interactive elements has been excluded from

this version of the text. You can view them online here: https://umsystem.pressbooks.pub/information/?p=590#oembed-1

Definition Recap

An **abstract** is a short overview of an article's purpose, research methods, and main takeaways. It's the first part of a journal article you should read to get an overview of the content and decide whether the article is relevant to your research.

Some other video takeaways:

1. Journal articles are tough! Give yourself time and grace when reading a new article, especially if it's in a field outside your area of expertise.
2. You don't always have to read the entire journal article for it to be useful, nor do you have to read it in order. You might read different sections for different reasons:
    1. Results/Discussion/Conclusion: For the main results of the study and the authors' primary takeaways.
    2. Literature Review: For a helpful summary of previous research on the topic.
    3. Methods: For details on **how** the study was conducted.
3. Journal articles in the humanities are less rigidly structured than those in the sciences/social sciences. It might make more sense to read humanities articles from start to finish.

Let's review the parts of a sciences/social sciences journal article by reexamining Reira-Sampol et al. (2022). Were you able to find the following sections?

Abstract

Read first for a short overview of the article.

Introduction (or Literature Review)

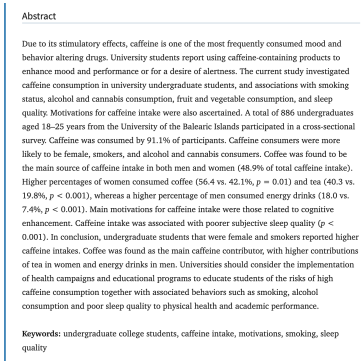
An introduction to the topic which often includes a review of previous relevant research. Extremely helpful if you need background information on the topic. This section will also usually identify "gaps in the literature" – i.e., concepts that have not yet been studied that this paper is hoping to address.

Methods

Details about **how** a study was done. Helpful if you are new to research methodology in your field or want to evaluate the chosen methods.

Results

The results of the study. Unlike the discussion section (which will interpret the results and put them into context with previous research or notable considerations from the study) the Results section is usually straightforward reporting of data alongside tables, graphs, and charts.

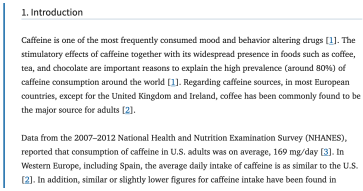


Abstract

Due to its stimulatory effects, caffeine is one of the most frequently consumed mood and behavior altering drugs. University students report using caffeine-containing products to enhance mood and performance or for a desire of alertness. The current study investigated caffeine consumption in university undergraduate students, and associations with smoking status, alcohol and cannabis consumption, fruit and vegetable consumption, and sleep quality. Motivations for caffeine intake were also ascertained. A total of 886 undergraduates aged 18–25 years from the University of the Balearic Islands participated in a cross-sectional survey. Caffeine was consumed by 91.1% of participants. Caffeine consumers were more likely to be female, smokers, and alcohol and cannabis consumers. Coffee was found to be the main source of caffeine intake in both men and women (48.9% of total caffeine intake). Higher percentages of women consumed coffee (56.4 vs. 42.1%, $p = 0.01$) and tea (40.3 vs. 19.8%, $p < 0.001$), whereas a higher percentage of men consumed energy drinks (18.0 vs. 7.4%, $p < 0.001$). Main motivations for caffeine intake were those related to cognitive enhancement. Caffeine intake was associated with poorer subjective sleep quality ($p < 0.001$). In conclusion, undergraduate students that were female and smokers reported higher caffeine intakes. Coffee was found as the main caffeine contributor, with higher contributions of tea in women and energy drinks in men. Universities should consider the implementation of health campaigns and educational programs to educate students of the risks of high caffeine consumption together with associated behaviors such as smoking, alcohol consumption and poor sleep quality to physical health and academic performance.

Keywords: undergraduate college students, caffeine intake, motivations, smoking, sleep quality

Abstract of Reira-Sampol et al. (2022)

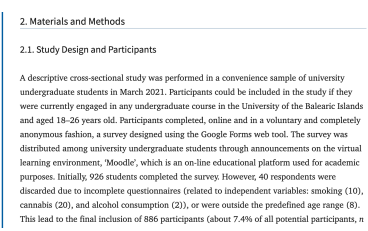


1. Introduction

Caffeine is one of the most frequently consumed mood and behavior altering drugs [1]. The stimulatory effects of caffeine together with its widespread presence in foods such as coffee, tea, and chocolate are important reasons to explain the high prevalence (around 80%) of caffeine consumption around the world [1]. Regarding caffeine sources, in most European countries, except for the United Kingdom and Ireland, coffee has been commonly found to be the major source for adults [2].

Data from the 2007–2012 National Health and Nutrition Examination Survey (NHANES), reported that consumption of caffeine in U.S. adults was on average, 169 mg/day [3]. In Western Europe, including Spain, the average daily intake of caffeine is as similar to the U.S. [2]. In addition, similar or slightly lower figures for caffeine intake have been found in

Introduction of Reira-Sampol et al. (2022)



2. Materials and Methods

2.1. Study Design and Participants

A descriptive cross-sectional study was performed in a convenience sample of university undergraduate students in March 2021. Participants could be included in the study if they were currently engaged in any undergraduate course in the University of the Balearic Islands and aged 18–26 years old. Participants completed, online and in a voluntary and completely anonymous fashion, a survey designed using the Google Forms web tool. The survey was distributed among university undergraduate students through announcements on the virtual learning environment, 'Moodle', which is an on-line educational platform used for academic purposes. Initially, 926 students completed the survey. However, 40 respondents were discarded due to incomplete questionnaires (related to independent variables: smoking (10), cannabis (20), and alcohol consumption (2)), or were outside the predefined age range (8). This lead to the final inclusion of 886 participants (about 7.4% of all potential participants, *n*

Methods: Reira-Sampol et al. (2022)

Discussion

Discusses research results in the context of the study's goals, former research, study limitations, etc.

Conclusion

The article's main takeaways and implications for practice or future research.

Bibliography

The complete list of sources the authors referenced in their article.

3. Results

3.1. Characteristics of Participants in the Study

Of the participants in the study, 69% were women. This percentage is slightly higher than the proportion of female students in the university (about 59%). Table 1 shows the general characteristics of participants in the study as a whole and stratified by sex. For men, a significantly higher prevalence of cannabis consumption ($p < 0.001$) was found. However, the prevalence of alcohol consumption was higher among women ($p = 0.034$). Regarding diet, a higher consumption of fruit and vegetable servings were found in women ($p = 0.010$). Self-reported sleep quality was poorer in women than in men as indicated by the higher score in the MOS-sleep scale ($p = 0.014$).

Table 1.

General characteristics of participants in the study.

	All (n = 886)	Men (n = 278)	Women (n = 608)	p Value (Cohen's d)
Age (years)	20.6 ± 2.1	20.6 ± 2.1	20.6 ± 2.1	0.705 (−0.027)
Course year				0.036 *
First	283 (31.9)	105 (37.8)	178 (29.3)	
Second	261 (29.5)	80 (28.8)	181 (29.8)	

Results: Reira-Sampol et al. (2022)

4. Discussion

The aim of the present study was to determine the pattern of caffeine and caffeine sources' consumption and the motivations for caffeine consumption among undergraduate students from the University of the Balearic Islands. The main results of the present study are the differences found between men and women, and also between smokers and non-smokers, regarding the pattern of caffeine consumption. Undergraduate university female students reported a higher daily consumption of caffeine, with higher prevalence of coffee and tea intake. On the other hand, men reported a higher prevalence of energy drink consumption. Higher caffeine consumption was associated with habits such as smoking and alcohol consumption, as well as with a higher intake of fruit and vegetables. Caffeine intake was also associated with poorer subjective sleep quality.

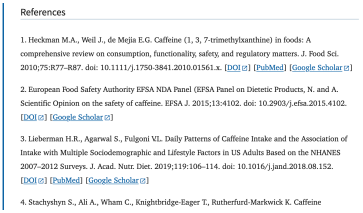
Caffeine was consumed by 91.1% of participants in the present study. This value was very similar to studies performed in university or college students from the US [6] or Netherlands [5]. However, it should be noted that in the present study, about 16% of consumers reported

Discussion: Reira-Sampol et al. (2022)

5. Conclusions

Women and smokers of university undergraduate students reported higher caffeine intakes. The faster metabolism of caffeine in both women and smokers could be the main reason leading to this higher intake. Coffee was found as the main caffeine contributor, with higher contributions of tea in women and energy drinks in men. Caffeine intake was also found to be associated to poor subjective sleep quality. Main reasons for caffeine intake among university students were related to increased mood and alertness, together with enjoying the taste. Universities should consider the implementation of health campaigns and educational programs to educate students of the risks of high caffeine consumption and poor sleep quality to physical health and academic performance. Associations reported in the present study could allow implementing appropriate educational strategies to address behaviors in combination such as smoking, alcohol consumption and excessive caffeine intake, all of

Conclusions: Reira-Sampol et al. (2022)



References

1. Heckman M.A., Weil J., de Mejia E.G. Caffeine (1, 3, 7-trimethylxanthine) in foods: A comprehensive review on consumption, functionality, safety, and regulatory matters. J. Food Sci. 2010;75:R77–R87. doi: 10.1111/j.1750-3841.2010.01561.x. [DOI] [PubMed] [Google Scholar]

2. European Food Safety Authority EFSA NDA Panel (EFSA Panel on Dietetic Products, N. and A. Scientific Opinion on the safety of caffeine. EFSA J. 2015;13:4102. doi: 10.2903/j.efsa.2015.4102. [DOI] [Google Scholar]

3. Lieberman H.R., Agarwal S., Fulgoni VL. Daily Patterns of Caffeine Intake and the Association of Intake with Multiple Sociodemographic and Lifestyle Factors in US Adults Based on the NHANES 2007–2012 Surveys. J. Acad. Nutr. Diet. 2019;119:106–114. doi: 10.1016/j.jand.2018.08.152. [DOI] [PubMed] [Google Scholar]

4. Stachyshyn S., Ali A., Wham C., Knightbridge-Eager T., Rutherfurd-Markwick K. Caffeine

Bibliography: Reira-Sampol et al. (2022)

Note: Even though you **can** read just some sections of a journal article (or read them out of order), you **should read an entire journal article if you're going to cite it in your assignments**.

Key Takeaways

- Locate an article's title; author names; publication date;

journal name, volume, and issue number; and DOI to create a citation.

- All modern journal articles should offer an abstract. Read the abstract first to get an overview of the article and decide whether it's relevant to your research.
- Humanities and sciences/social sciences journal articles have different structures. Sciences/social sciences articles have more rigid sections that can be read out of order depending on the information needed.

11.

PEER REVIEW

Introduction

Peer review is an important step in the publication of scholarly articles. We introduce peer review now so that you know what this term means when we start exploring library search tools next week. We'll also be doing a small-scale version of peer review as part of our final project for this class.

Peer Review

As we discussed earlier this week, scholarly sources are written by academic experts for other academics to read. Scholars share information in a variety of formats. We've covered scholarly books and research articles, but academic journals may also publish other types of content like editorials or book reviews.

Everything published by an academic publisher goes through review by a professional editor. However, research articles often go through an additional process called **peer review**.

> **Peer review** is the process by which academic journal articles are reviewed by experts before they can be published. Reviewers with experience on the topic evaluate whether the article presents original ideas, uses sound methodology, and comes to reasonable conclusions.

For an introduction to peer review, please watch the video below (run time 4:08):

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://umsystem.pressbooks.pub/information/?p=185#oembed-1

We will talk more about peer review in Week 4: Source Evaluation. For now, it is just important to know the following:

- The primary goal of peer review is to promote the publication of high-quality, reliable research.
- You may need to seek out peer-reviewed articles for an assignment or, eventually, your own research.

Key Takeaways

- Peer review is when experts review research before publication to make sure it is high quality.
- Despite valid criticisms, peer-reviewed research is still considered the "gold standard" of scholarly publications.
- You may need to find peer-reviewed research for some assignments.

12.

BEYOND POPULAR AND SCHOLARLY

Other Source Types

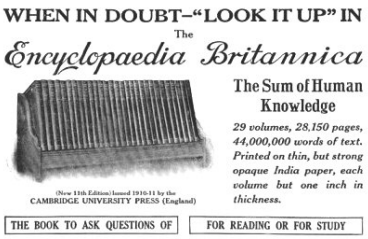
Popular and scholarly sources represent **most** of the source types you'll use as beginner researchers. However, you may see other source types in a results list or use them yourself. Here's a quick look at other source types you may come across:

Reference

A **reference source** provides introductory or background information about a topic, directed at students or the general public.

Examples of reference sources include:

- Encyclopedias
- Dictionaries
- Maps
- Your class textbooks



An advertisement for the 11th edition of the Encyclopedia Britannica, published in the May 1913 issue of National Geographic

These sources provide overviews and timelines, define new vocabulary, and sometimes even recommend additional reading material.

Use these sources to review facts and get ideas for further research, but do not include them as sources in your assignments. Their contents are considered common knowledge (aka, not original ideas), and therefore the information does not usually require citation unless you quote it directly. If you make a direct quote it should be in quotes and cited. When in doubt, check with your professor or a librarian.

Do we still need reference sources in the age of Google (or AI?) Short answer: yes. Reference materials offer **reliable** information that has been reviewed by a **real person** – plus, they sometimes direct you to additional helpful sources.

Wikipedia

Wikipedia is a reference source. (It is also a popular source.) Unlike most encyclopedias, it does not go through a traditional editorial process, nor are many of its authors considered experts in their field (though some are). Instead, volunteer editors contribute to articles in their area of interest, leading to a crowd-sourced hub of information that is free to access and updated *much* quicker than a formal encyclopedia.

Caution is warranted when relying on information from Wikipedia. Without the same oversight as other reference sources, Wikipedia articles may contain incorrect, incomplete, or misleading information. Depending on the popularity of the article, and how many volunteer editors are keeping an eye on it, a mistake may live on the site for some time. (Note: Some popular articles limit editing access due to frequent "vandalism.") However, it's also true that Wikipedia's reliability and comprehensiveness has increased dramatically since its founding in 2001.

Example

During the 2014 FIFA World Cup, the US men's soccer team played and lost against Belgium. However, US goalkeeper Tim Howard managed an impressive 16 saves against the Belgian offense. Admiration for Howard quickly spread across the Internet. Shortly afterwards, a mischievous Wikipedia editor changed the entry for the U.S. Secretary of Defense from then-Secretary Chuck Hagel to Tim Howard.

Image credit: Jared Campbell

The joke was caught and corrected quickly. However, this example demonstrates how quickly and easily an anonymous Internet user can edit articles on a site that many rely upon for quick, accurate information.

UMSL Libraries' reference materials are on **Level 2** (in print) and online!

Government Information

Government information is any documents, data, laws/policies, etc. produced, collected, or disseminated by a federal, state, or local government.

This category includes a variety of information types and formats: laws and regulations, data (e.g., census data), agency reports, government websites, etc. Examples of information you could get from government sources include:

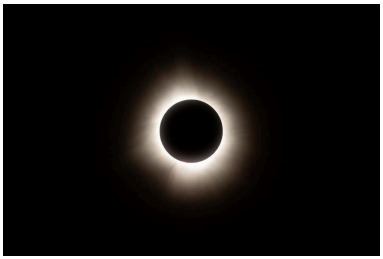


Photo credit: NASA/Jordan Salkin, 2024

- changes in demographic trends over time (from census data)
- current policy or laws on federal student loans (from the Department of Education website or Congress.gov)
- photographs of the 2024 solar eclipse (from the NASA Image and Video Library)
- local zoning ordinances/maps (e.g., St. Louis Zoning Map from the St. Louis city government website)

Did you know? You can search for government information by going to specific .gov sites **or** typing your topic into Google with the phrase **site:gov**.

Professional or Trade Publications

A **trade publication** communicates recent news and trends in a profession to members of that field. Trade publications are less formal than scholarly journals.

In addition to articles about major trends and updates, trade publications include other information of interest like targeted advertisements, job postings, or conference announcements. The author of an article in a trade publication may be a practitioner in that field or possibly a journalist with field expertise.

Browse through one or two of the following examples of trade publications (accessible freely online):

- *Design News* (engineering)
- *Supermarket News* (supermarkets)
- *Pizza Today* (pizza/pizzerias)
- *ARTnews* (art)
- *American Libraries* (libraries)

December 2024 issue of Pizza Today, a magazine for professionals in the pizza industry. Image © held by Pizza Today.

Conference Proceedings

Conference proceedings are collections of research papers or other information presented at a conference.

Conference proceedings may or may not be peer-reviewed (we cover peer review in an upcoming chapter). Sometimes, they offer an early glimpse of research findings that will be published again later as an independent journal article or in another publication. You are not likely to use conference proceedings in an undergraduate research assignment, but you may see them when searching library databases or Google Scholar.

Theses and Dissertations

Theses and dissertations are intensive student research projects completed as requirements for a master's degree or Ph.D.

These publications are student works and, although they are supervised, are not peer-reviewed (we cover peer review in an upcoming chapter). In most cases, they are **not appropriate to cite in your research assignments**. However, if you find one relevant to your research topic, they can be excellent **guides** to additional sources relevant to your topic. Again, you may see these sources in the results list of a library database or Google Scholar.

Key Takeaways

- You'll find many source types in the results list of a library search tool or other search engine. Even if you don't use all of them for your research assignments, it's helpful to recognize what they are and their target audience.
- Reference sources (including textbooks or Wikipedia) are helpful for gathering background information on your topic, but you shouldn't cite them as sources for your assignments because they usually don't contain original research or ideas.
- Unlike reference sources, government information, or (possibly) trade publications, you might not use conference proceedings or theses/dissertations in undergraduate research. But, you might still see them in a results list.

13.

PRIMARY AND SECONDARY SOURCES

Firsthand information or expert analysis?

In addition to understanding a source's origin and target audience, we can also consider how that information contributes to your topic. Would your research benefit from a firsthand account of an event? Do you want to support your argument with an expert's well-researched opinion? Do you need help finding new sources? You may need a combination of **primary**, **secondary**, or even **tertiary** sources for a given research project.

Memorizing this terminology is less important than understanding that you, a student and beginning scholar, can and should approach each source with an idea about how you intend to use it. What type of information do you need? What *kind* of source would be the best place to get it?

Primary and Secondary Sources

For an overview of primary and secondary sources, watch the video below (run time: 3:55):

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://umsystem.pressbooks.pub/information/?p=564#oembed-1

Definition Recap

A **primary source** is a firsthand, original account of information. It is captured or recorded as the topic in question is happening, in the immediate aftermath of an event, or from a person with a direct connection to that information.

A **secondary source** is a discussion or interpretation of information that originated somewhere else. Rather than providing a direct connection to the topic, it reviews or builds on that information.

Tertiary Sources

A **tertiary source** summarizes information available in other sources; it does not provide additional new information or content. Reference materials (e.g. encyclopedias) are examples of tertiary sources.

Tertiary sources simply restate information which originated elsewhere or is commonly known: there is no new analysis or interpretation. You can use journal articles or book chapters (or Wikipedia) as tertiary sources by searching their reference lists for new sources on a topic!

Key Takeaways

- Primary sources offer firsthand information about a topic. In addition to historical materials, images, literature, etc., primary sources include original research data or ideas published in academic journal articles.
- Secondary sources review or analyze primary information. They include books, documentaries, or the literature review section of journal articles.
- When searching for sources, consider your research on a broad scale. What kind of information would best demonstrate or explain your topic?

PART III

3: EXPLORING THE INFORMATION LANDSCAPE

14.

ABOUT WEEK 3

Week 3 Overview

It's time to explore **where** and **how** to find sources to support your research. If you're new to college-level research, this week will provide you a solid foundation in using library search tools as well as some "free" public options (i.e., Google and Google Scholar). For those of you who have done library research before, this week should provide a helpful refresher and enough information to compare library vs. non-library options.

Learning Objectives

By the end of this week, you will be able to:

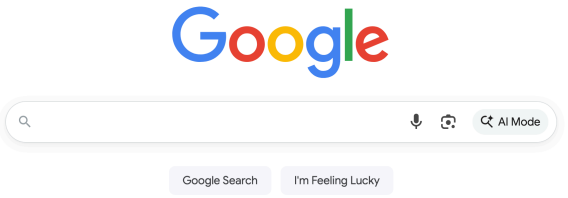
- Identify differences in availability, results, and search strategies for Google, Google Scholar, and library search tools
- Create an effective search string to use in a library search tool
- Use search tool features like limiters, save folders, and citation generators to improve research specificity and efficiency
- Access print and digital materials found in library results lists

Week 3 Activities

- Read through Week 3 content in order
- Participate in the Week 3 Discussion Board by **10 PM Wednesday, Sep. 10**
- Complete the Week 3 Self-Check Quiz by **10 PM Sunday, Sep. 14**
- Respond to a classmate's post on the Week 3 Discussion Board by **10 PM Sunday, Sep. 14**
- Submit your first (draft) source for your final project by **10 PM Sunday, Sep. 14** (see details on page 3.10: First Source Draft)

15.

STUFF YOU SHOULD KNOW ABOUT GOOGLE



Why We Talk About Google

You've almost definitely used Google before for personal information needs – to look up basic facts, to find websites, to get directions, etc. It's so ubiquitous that "Googling" has become its own verb.

Because it's so frequently used, most people are unaware of how Google works "behind the scenes" or of what they *can't* find on Google. Much of this lack of awareness is by design. Like other large tech companies, much of Google's technological underpinnings and corporate decisions are kept private. Of course, it would be unusual for a company to advertise its own limitations.

However, as a researcher (and as a personal user), it's important to be aware of the basics of how a search engine like Google works, what it's well-suited for, what it's NOT well-suited for, and some other major criticisms. In this chapter, we offer a short introduction to things we think you should know as you decide which search tools to use in class and at home.

Google: The Basics

Google is the most widely-used **search engine** in the world.

> A **search engine** takes your query – in other words, what you type into the search bar – and gives you a list resources relevant to your search. To provide the list, it compares your search with its own index of resources, which it compiles by periodically "crawling" billions of websites.

The basic steps of Google's process are:

1. Google "crawls" the web and retrieves text, video, images, etc. This process is largely automated.
2. Google **indexes** the content it finds. It stores information about this text and media in a large database.
3. When you submit a search, Google compares the words in your search with the information in its database. If there is a match, a link to that source shows up in your search results.

Your Search Results

Search tools use **algorithms** to decide what shows up on your search page and in what order.

> An **algorithm** is a set of rules a computer uses to do calculations and solve problems. At its most basic, an algorithm takes the form of "if X, then Y." Or, "if you receive X input, give Y output."

Google's algorithm uses many criteria to decide how high a result shows up in your results list. These criteria include 1) **information about the web page** and 2) **information about YOU**.

Web page information

Google's algorithm will prioritize sites that meet the following criteria (among others):

1. **Other sites link to it**. If many other sites link to this source, it is more likely to be useful and reliable (in theory).
2. **Older publication date**. Well-established sites are prioritized over newer sites.
3. **Keyword frequency**. The algorithm will prioritize web pages that include your keywords multiple times (vs. just once on the page).
4. **Keyword location**. The algorithm will prioritize pages where your search terms are included in the title/headings vs. the body of the text, for example.

Google will also prioritize **sponsored** results, meaning that companies who have paid Google a lot of money will have their sites promoted at the top of the results list for any searches relevant to their content.

Information about YOU

Google tracks certain information about you, and that information can influence your search results. (It's important to note that tracking is still possible even if you're not signed in to a Google account.) This information includes:

1. **Your geographic location**. For example, a search for restaurants will return results that are close to you.
2. **Your search history.** Your history includes past searches as well as the types of pages you click on. For example, a page you've clicked on multiple times in the past will show up at the top of the results list for any relevant searches.
3. **Your search settings**. You can adjust the types of sites you get in your results by modifying your search settings.

And what else…?

It is important to know that Google's algorithm is proprietary. In other words, their automated hierarchy of rules that generates your results list –

what you see *and* don't see about your topic – is **not transparent**, and it changes over time. Are you comfortable relying on Google to show you the information you need? Are you comfortable with all the data they track about you?

Problems with Google

Bias

Google results depend on cues like keyword frequency, company sponsorship, and other stand-in indicators for reliability, rather than thoughtful, well-informed evaluation and curated resources. Sometimes these indicators provide appropriate results...and sometimes not. Often, material related to marginalized communities can be overlooked or misrepresented.

While watching, keep in mind:

1. This video uses examples from over 10 years ago. Your Google results today won't look like how they're described in the video. Nevertheless, the processes that result in either accidental or intentional bias still impact search engine results today (as well as "information" you get from AI tools trained on web content).
2. **CONTENT WARNING:** There is no graphic content in this video, but links to graphic content and a couple suggestive photographs are shown in screenshots as examples of sexism and racism in search results. Skip the video if this content is of concern for you.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://umsystem.pressbooks.pub/information/?p=212#oembed-1

Again, though the examples provided in the video are older, similar examples with different topics and groups can still be found in Google results today. If this topic interests you, we recommend Dr. Noble's 2018 book *Algorithms of Oppression* (available at UMSL online and in print).

Privacy

By default, Google tracks your search history, the results you click on, and even your behavior on other websites. This information, collected and associated with your account and/or IP address, allows Google to adjust your search results to better match your "profile" and target you with personalized ads. These personalized ads will even show up on other websites besides Google. One of Google's sources of income is AdSense, which allows websites to host ad content powered by Google and influenced by your online activity.

Did you know you can turn off the "search personalization" setting?

Google & AI

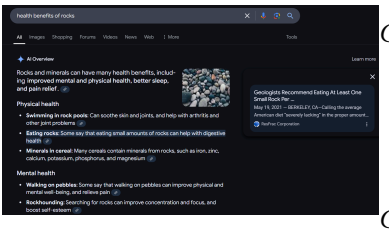
Google's AI Overviews – concise, AI-generated responses to your search query – launched in 2024. They provide an overview of your topic generated from content within your search results, alongside links, images, or other media. A major goal of these overviews is to consolidate and organize helpful information without you having to explore multiple sources, with a goal of saving you time and energy.

As you might expect, there are some major and valid concerns about Google AI. One criticism (which applies to all AI-generated content) is that, rather than Google driving traffic to helpful sites and thus benefiting the people who created them, AI trains on and repackages the content other people put together to provide answers without users actually visiting the original sites.

A second major issue is **accuracy**. As we cover in more detail in Week 7, generative AI does not "know" the answer to your question. Instead, it **predicts** language based on patterns in its training data that is mean to look like an answer. As a result, this technology can offer incorrect information or misrepresents content, even in sites it links to directly.

Below, we highlight a humorous example, but the implications of people relying on AI-generated content can be very serious. For now, we **do not recommend** relying on information in AI overviews, even for personal research. We have seen too many examples of false information. Clicking actual links will at least give you the context for the information provided, allowing you to evaluate whether you trust the creator.

Note: This example seems to have been corrected since our screenshot (taken Feb. 17, 2025). The original error was available for months. The AI recommendation was generated from a webpage from ResFrac, a software company that linked to an *Onion* article which used a photograph of one of their employees. (For those who are unfamiliar, *The Onion* is a satirical news site). Anyone reading either site would have likely had enough context to know that no, geologists do not in fact recommend eating rocks regularly.



Screenshot of Google AI Overview for "heath benefits of rocks," February 17, 2025.

ResFrac article:
Geologists recommend eating at least one small rock per day. (2021, May 19). ResFrac. https://www.resfrac.com/blog/geologists-recommend-eating-least-one-small-rock-day

Original *Onion* article:
Geologists recommend eating at least one small rock per day. (2021, April 13). *The Onion*. https://theonion.com/geologists-recommend-eating-at-least-one-small-rock-per-1846655112/

Is Google Useful for Academic Research?

Yes and no.

Scholarly Sources on Google

Google is a poor choice to search for academic sources (like scholarly books or journal articles) for several reasons, including:

1. **Too broad in coverage.** Google is built to scan as much of the web as it can. Therefore, your results **may** include some academic results, but they will also include **many** non-scholarly sources like news articles, blog posts, YouTube videos, Reddit threads, other websites, etc. Unlike the library website, Google is not set up to easily sift through these materials to locate actual scholarly sources.
2. **Paywalls.** Even if you do find an academic source through Google, it will probably be locked behind a **paywall** (in other words, you need to pay to read it). Access to most scholarly research is extremely expensive. Your library/university pays for access to these kinds of sources, but only if you access them on campus, through a link on your library's website, or via your university's VPN. This way, the site hosting the resource knows you are affiliated with a specific school that has paid for access.
3. **Harder to evaluate results.** Anyone can publish anything on the Internet. More importantly, anyone can design their website so that Google finds it easily (called **SEO** or **search engine optimization**). Well-designed websites, or sites that come up first in your Google

results, might look appealing and be easy to access. However, it does not necessarily mean that these sources are appropriate for your research or even offer accurate information. By contrast, the library's search tools **only** include sources (both scholarly and non-scholarly) that have been evaluated for their **relevance** to academic research and the **accuracy** of their information.

Search Tip: To find scholarly sources, it's best to avoid the general Google search.

Non-Scholarly Sources on Google

Google can be an excellent tool to find non-scholarly sources, including news articles, government information, multimedia, and more. Whether Google is the **best** place to find sources depends on the type of research you're doing and the type of source you need.

Some notes on different source types:

1. News/Magazines
    1. Google can be a great place to find popular and easily accessible news and magazine articles. However, it's important to keep in mind:
        1. **Paywalls**. You still might not be able to access news/magazines that require subscriptions. **Good news though**: the library offers access to many major news outlets! You can either a) use the main library search tool to locate news articles, or b) search an individual news outlet via your library access. You can read popular national newspapers like the *New York Times* or local papers like the *St. Louis Post-Dispatch*.
        2. **Reliability**. Not all news outlets are equally reliable. A Google search does not limit its results to well-respected outlets, making it harder for the general public to decide whether a given source is accurate, politically biased, etc. We cover the basics of source evaluation online in Week 4.
2. Government Information
    1. Google can be a helpful tool to search for government documents across many government websites (in addition to exploring specific sites – for example the Centers for Disease

Control and Prevention [CDC], National Park Service [NPS], or National Aeronatics and Space Administration [NASA] websites).

Search tip: You can conduct your search across only government sites, rather than all of Google, by targeting the .gov extension that all government websites have in common. In the Google search bar, type your search, then type **site:gov**. Now, your results will only include hits from sites hosted by the US government.

"Free"* Alternatives to Google

*These tools make money from advertising revenue. These ads may or may not rely on tracking your online activity.

1. Bing: the major search engine competitor for Google. Bing offers its own independent indexing.
2. DuckDuckGo: a web browser/search focused on **privacy**. They do not collect/save your search history, track you across different websites, or target you with personalized ads (ads are still present). They do not offer automated lists of search suggestions as you type. They also block 3rd party trackers. DuckDuckGo results rely on Bing rather than Google's index.
3. Ecosia: an "**eco-friendly**" search engine. A significant portion of Ecosia's profits, which rely on ad revenue through Microsoft, are donated to plant trees around the world. Ecosia's search results also rely on Bing. Their financial reports (and donation amounts) are public on their website.
4. Brave Search: another search engine focused on **privacy**. Like DuckDuckGo, Brave is also a web browser. Brave offers its own indexing rather than relying on Google/Bing, though you can simultaneously (and anonymously) search Google. Brave does not save IP addresses by default.

Key Takeaways

- Google is not the best search tool for scholarly sources, but may be appropriate for sources like news or government information. Don't forget, you can also find many of these sources through your library.
- Google tracks information about you to influence your search results.
- We **do not** recommend relying on Google AI overviews.
- Bias in search recommendations and results + privacy concerns are two major criticisms of Google.

16.

SEARCHING THE LIBRARY

Introduction

The UMSL TJ library provides access to millions of resources, of all types – journal articles, scholarly and popular books, government documents, images, you name it. These resources come in different formats, "live" in different places, and may use different names than you are used to. So, how do you sift through this trove of *stuff* to find the specific stuff you actually need?

This chapter introduces you to some foundational search strategies that will help you through your entire academic career, and probably in your personal life as well. We cover these strategies because library search tools **do not work like Google**. There are some similarities, but the library's search tools search a different collection of materials and offer more sophisticated options to find what you need.

We cover two main topics:

- How to search, including an introduction to keyword searching with Boolean operators
- Using a general-purpose library discovery tool like Discover@UMSL

These skills will get you started and also transfer to searching databases, which we cover in the next chapter.

Keywords & Boolean Operators

For an introduction to keywords and operators, please watch the video below (run time 4:45):

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://umsystem.pressbooks.pub/information/?p=214#oembed-1

To recap, here's some important vocabulary:

Keywords represent the main concepts of your research topic. Searching for keywords in a library search tool looks for those words or phrases in the resource's title, author list, abstract, and other metadata (and sometimes, the full text).

Boolean operators like **AND** and **OR** can narrow down or expand your search results. Adding keywords after **AND** gives you fewer results, while using **OR** gives you more.

Here's a more visual way to think about our operators:

In addition to keywords and Boolean operators, we can also use parentheses and quotation marks to create a more precise search.

- Quotation marks allow us to search an exact phrase, e.g. **"William Shakespeare"** or **"national debt."** Without the quotation marks, the results list includes resources that use these words separately.
- Parentheses tell the search which words go together in an OR list, e.g. **(school OR education OR teaching)**.

IMPORTANT: There's no such thing as a perfect search. Test different versions of your search using new keywords or combinations of terms to see how they impact your results.

Examples of Well-Formatted Searches

Example A: How did the industrial revolution impact American women?

Well-formatted searches:

- "industrial revolution" AND "American women"
- "industrial revolution" AND America AND (women OR girls)

Example B: Should using ChatGPT for writing in college count as cheating?

Well-formatted searches:

- "college writing" AND ChatGPT
- AI AND cheating AND (college OR university)
- (ChatGPT OR AI OR "artificial intelligence") AND (cheating OR plagiarism) AND writing

Discover@UMSL

Now that we know *what* to type, *where* should we begin searching?

Most academic libraries offer a general-purpose discovery tool – an easy search bar that lives on the library's home page that you can use as a starting point for your research.

At UMSL, this search tool is called **Discover@UMSL**. It allows you to search print materials that UMSL owns plus digital resources like articles, videos, images, etc. that we have access to through annual subscriptions.

For an introduction to using the Discover@UMSL search, please watch the video below (run time: 4:47):

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://umsystem.pressbooks.pub/information/?p=214#oembed-2

Another term for the Discover search is the **discovery layer**. Discovery layers are common at many libraries. We use them because libraries have many collections of information – our print books, our online journal/database subscriptions, and more. A discovery layer allows you to search many of these places at once, rather than searching each individual collection.

Activity: Test Searches

Follow these steps:

1. Scroll back up to the section labeled "Well-Formatted Searches." Choose either Example A or Example B.
2. Copy and paste the search examples into the Discover@UMSL search tool and explore how the different keyword choices impact the results.
3. Then, test out some of the limiters you learned from this video (e.g., publication date, peer review, source type). Skim the search results to explore how each limiter impacts the listed resources.

Important Things to Remember About Discover@UMSL

As the video mentioned, Discover is a great **starting point** for your research. It's important to know that there are some downsides:

1. Discover searches **many, but not all,** of our databases. Therefore, you will not see every source you have access to as an UMSL student.
2. Some databases "talk" to Discover better than others. Therefore, results from some library vendors (the companies that sell libraries things like books/journal access) will show up more easily in the results list than others. Some results may have odd or incorrect labeling (for example, a video listed as an eBook).
3. Because it is built to search many information collections, with different source types and subject coverage, it offers very **general** search features. For advanced research options, try a database. We cover databases in the next chapter!

Key Takeaways

- Library search tools work differently than Google or other general-web search engines. Therefore, you have to be more thoughtful about **how** you type your search into the search bar.
- Keywords represent the most important parts of your research question.
- Connect your keywords with **AND** to narrow your search results. Use **OR** to expand your results.
- Use the library's main search tool, Discover@UMSL, to search many of our print and online resources at the same

time. It's a helpful starting point.

17.

DATABASES

Introduction to Databases

A library database offers access to sources like journal articles, newspapers, data/statistics, multimedia, and more. Importantly, they offer access to **resources that don't show up in the main Discover search** as well as **advanced searching options**.

For an introduction to databases, please watch the video below (run time 4:59).

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://umsystem.pressbooks.pub/information/?p=217#oembed-1

Let's recap some important vocabulary/points:

A **database** is a digital, searchable collection of articles, primary sources, eBooks, and other information. They can be multidisciplinary or focus on a specific subject/source type.

Databases also offer advanced searching capabilities. As beginner researchers, some options that you may find helpful are:

- **Unique search limiters**. For example, if you are searching an education database, you may limit your results by school year/

education level. In a business database, you may see a search bar that allows you to search by company name. A psychology database may allow you to search by research method or participant age group. There are also unique limiters for various source types – for example, a newspaper database that allows you to search by geographic location. Explore databases in your subject area to see what search options are common for researchers in your field.

- **ILL integration**. You may have noticed that some results tell you a resource's title, authors, subjects, publication date, abstract – but without giving you access to actually read the source. This is because some databases provide access to **metadata** – or, information **about** a source – without providing the source itself. **Why?** Not providing the full text is usually due to budget constraints. However, discovering that a source exists is still helpful for your research! Don't miss out on sources – click the "Request this item through Interlibrary Loan" button to auto-fill the request form.

Activity: Exploring Databases

Familiarize yourself with how to navigate the library's database options:

1. Visit the library's A-Z Database List.
2. Use the Subjects drop-down menu to see databases in your subject area/major.
3. Click into at least 2 of the databases. Explore the unique search features available in that database and what types of resources are offered. How is the search function different than the main Discover@UMSL search?

Key Takeaways

- Databases are digital, searchable collections of resources to support your research.
- Databases offer more advanced search options than the main Discover@UMSL search, and they also provide access to resources that sometimes do not show up in the main results list.
- You can search databases in your subject area for a more specific search.

18.

MOBIUS & ILL

Introduction

As you search, you may come across materials that would be useful for your research topic, but we don't own them here at UMSL. Either they are print resources that are not in our collection, or they are digital resources that are unavailable through any of our databases.

> Through a system called **interlibrary loan (ILL)**, libraries work together so researchers can access materials beyond their home library.

In addition to regular interlibrary loan, many libraries participate in groups called **consortia**. Your library's **consortium** is a network of libraries (typically within the same state) that coordinate to make sharing materials smoother.

Whether your library charges for this service depends on their unique policies and which groups they are members of. At UMSL, there is no charge for borrowing from other libraries, since you already pay to attend the university. The university allocates a budget to the library every year, part of which supports our ILL staff (both full-time professional employees and student workers), shipping costs, consortium membership dues, software costs, and supplies.

MOBIUS

MOBIUS is a consortium of academic, public, and research libraries, mostly in the state of Missouri, that work together to share **print** materials.

You can search the **MOBIUS** catalog online either for a specific book or for a general topic. If you find a book you're interested in, sign in and indicate that you want the book shipped to the UMSL TJ Library Public Service Desk. When the book is ready for pickup, you'll receive a notification to your UMSL email address.

Did you know: Public libraries also participate in MOBIUS! That means you can get books for casual reading as well as other public library materials sent to UMSL via MOBIUS.

Interlibrary Loan

Use the regular interlibrary loan request form to ask for materials unavailable in MOBIUS.

- print materials from non-MOBIUS libraries
- electronic resources unavailable at UMSL (mostly academic journal articles)
- digital scans of book chapters (either from UMSL or non-UMSL books – usually limited to 1 to 2 chapters for copyright reasons)

Make sure to select the correct type of material at the top of the request form. Articles usually come through as a scanned PDF, while print materials will be shipped to the library. You'll receive an email notification when the item is ready for viewing or pickup.

Auto-Filling the Request Form

Sometimes, you'll come across a link in a library record that says "Request

Item." Usually, that means we have access to the item's metadata (name, authors, date, etc.), but not the full text. Clicking the "Request Item" will usually auto-fill most of the ILL form for you. Simply add in your student status and department, then click "Submit."

Things to Know About ILL

- Not all materials can be loaned or digitized. There are limitations on unique or older print materials, digital materials that have access restrictions, popular items that need to remain available to the original library's patrons, and more.
- Timelines to receive ILL materials can vary. Print materials will typically take longer to arrive than digital scans because of the amount of time it takes them to go through the mail system.

Search tip: Search for non-UMSL materials early in your research process. Make requests in enough time for those items to arrive before your assignment due date.

Key Takeaways

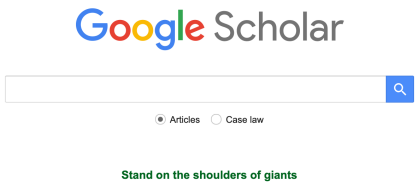
- ILL is an important library service that helps researchers access materials outside their home libraries. Though it may not require payment from patrons, it still relies on funding through the university or other sources for staff,

supplies, dues, and more.

- MOBIUS is a Missouri consortium of academic, public, and research libraries that lend materials to each other.
- Regular ILL is useful for requesting journal articles, non-MOBIUS print materials, and digital scans of 1-2 book chapters.

19.

GOOGLE SCHOLAR



Introduction

Google Scholar is a **search engine**, free to the public and run by Google, that exclusively searches scholarly work on the web.

Search results include typical scholarly sources like journal articles and books, but also student works (like theses/dissertations) and other resources. If you are searching for scholarly sources (vs. news, gov info, or other sources), Google Scholar is **much more useful** than regular Google.

Google Scholar vs. the Library

There are some benefits to adding Google Scholar to the list of search options for your research project. These include:

1. You may find links to sources that are unavailable through the library or don't come up in the library search (especially if they are open access).
2. The Google Scholar search is sometimes easier to navigate using natural language (vs. a formal search structured with keywords and Boolean operators)
3. You can connect Google Scholar to your institutional library access, letting you read materials behind a paywall **if** your school subscribes to it.
    1. In Google Scholar, visit Settings.
    2. Click "Library Links" (on the left side)
    3. Search for "University of Missouri – St. Louis"
    4. Check the box next to UMSL

However, there are some major drawbacks/considerations:

1. **No print access**. Many disciplines rely heavily on print resources. You will need your library to find and access these materials.
2. **Possibly no digital access**. Many Google Scholar search results offer an access link to the right of the screen. Some of these materials are available free online, while others have been uploaded (by the authors or otherwise) in a pre-published version (aka, a **preprint**) or on a hosting platform other than the original publisher's. Some of these uploads are technically breaking copyright. If there is no access link, you'll need to go through your library to access the resource. (**Good news:** You can link Google Scholar to your home library to make searching easier! See instructions below.)
3. **Includes student works**. Student publications like theses and dissertations can be fascinating to read and offer niche bibliographies to explore for your own research. However, because they are not published through traditional avenues and are written by students, they are often **not appropriate to cite** in your research assignments. If you are new to scholarly research, it can also sometimes be difficult to tell the difference between these materials and regular scholarly publications. Check with your professor or a librarian if you're not sure if a specific source is appropriate for your assignment.
4. **Lack of search limiters/subject searching**. Google Scholar allows you to limit your results by publication date, but does not offer other limiters that would be helpful to new researchers, like the ability to search by a source type (articles, books, etc.) or whether a source is peer-reviewed. You also cannot limit your search to a specific subject (e.g., psychology, business, art).

We recommend **starting your search at the library**. However, especially for advanced researchers, Google Scholar can be helpful to be aware of as a supplementary tool.

Key Takeaways

- Google Scholar is a free-to-the-public search tool, run by Google, that searches scholarly sources on the open web.
- Benefits of using Google Scholar include a slightly friendlier search bar and the ability to link it to your institution.
- Major drawbacks of Google Scholar include a lack of important source types in the results (e.g., print materials), a lack of sophisticated search limiters (e.g., source type or peer review), and the inclusion of source types that might not be appropriate to cite in an undergraduate research project.

20.

CREATING CITATIONS

Introduction to Citations

As we've already established, citations are a crucial part of participating in the scholarly conversation. By now, you've seen multiple examples of citations for various types of sources as part of the reading for this class (books, journal articles, videos, etc.).

If you do not cite your sources properly, it can appear as though you are claiming someone else's work is your own. This is called **plagiarism**, an extremely serious academic infraction. Therefore, we ask you to give your full attention to creating your citations, both for this class and others. **Giving your best attempt at a well-formatted citation is preferred to not attempting the citation at all**.

For our students who are experienced with creating citations, we hope this chapter will be a helpful refresher for you. For those of you who are brand new to citations, please give careful attention and reach out to your librarians for assistance if needed. We know citations can be tricky, and we want to help you.

For a overview of why we cite and how to format citations, please watch the video below (run time 4:44):

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://umsystem.pressbooks.pub/information/?p=647#oembed-1

Citation Tips

- Recommended steps for manually creating citations:
  - 1) Identify the type of source you are citing.
  - 2) Identify the citation style required for your assignment.

    - 3) Search the citation style guidance for instructions on creating a citation for your source type (e.g., journal article or newspaper article).
    - 4) Follow the provided template and plug in each piece of information in the correct spot.
    - 5) Make sure to format each part of the citation **exactly how you see it in the template**. For example, if the journal name is italicized in the template, it should be italicized in your citation too. If there are parentheses around the date in the template, include the parentheses in your citation.
- It is okay to use citation generators through the library or online (e.g., EasyBib) **if you double check the result against the official style instructions**. Citation generators can often make small mistakes.
- When in doubt, reach out to the library in person or online.

Citations For This Class

We recommend using **APA style** for this class. You can find the full APA style guide at the library front desk. Or, you can use shorter guidance you can find for free online. We recommend the Purdue OWL website.

PART IV

4: SOURCE EVALUATION

21.

ABOUT WEEK 4

Week 4: Source Evaluation

In Weeks 1-3, we covered library basics, what types of sources you might use for academic research, and how to search for them using library search tools. Now, it's time to decide what to do with all those sources you found!

Source evaluation is an important step in the research process. It's when you decide whether a source is relevant, trustworthy, and rigorous enough for your unique research need. This week offers some important considerations, a step-by-step method for navigating the complicated digital world, and basic markers of credibility and rigor in scholarly research.

Learning Objectives

By the end of this week, students will be able to...

1. Identify different sources of expertise (academic, professional, lived experience) and understand their value to scholarly research.
2. Apply the SIFT method to quickly evaluate a digital source's credibility.
3. Choose appropriate scholarly sources using basic markers of credibility and relevancy (e.g., publication date, peer review).

4. Understand why the desire for “neutrality” can overlook marginalized perspectives.

Week 4 Activities

- Read and watch Week 4 content.
- Participate in the Week 4 Discussion Board by **10 PM Wednesday, Sep. 17**.
- Complete the Week 4 Self-Check Quiz by **10 PM Sunday, Sep. 17.**
- Respond to a classmate’s post on the discussion board by **10 PM Sunday, Sep. 17**.
- Turn in your First Source Annotation by **10 PM Sunday, Sep. 17**.

22.

EXPERTISE

Introduction

For beginner research assignments, you will mostly be searching for information other people have created or collected, rather than generating your own data. There are many factors to consider when deciding whether a source is trustworthy and relevant. One of these factors is **expertise** – the knowledge or skill the author(s) specialize in and how they developed that skill. In other words, does this author know what they're talking about? How do you know?

Deciding whether an author has relevant expertise helps you answer the question: Is this the **best** source I could use for this information, or should I look elsewhere?

This chapter briefly covers three dimensions of expertise you could consider when gathering sources. We cover these categories to help you understand what "counts" as expertise more broadly than just "they have a Ph.D." – although that is certainly a good starting point.

For this discussion, let's pretend you are researching college students with physical disabilities. Which people or organizations have expertise on this topic?

Academic Expertise

As we've mentioned before, college-level research assignments (and beyond) usually require scholarly sources. Scholarly sources are written by and for people with academic expertise

People with **academic expertise** typically have advanced degrees in their field, giving them in-depth knowledge of a

specialized topic **and** training on appropriate research methods. They often work at a university or another research center, conduct research in their field, and publish their findings so other scholars can read them.

Many topics are interdisciplinary, which means you may find scholars in a variety of fields publishing on that topic from different viewpoints. For example, specialists in education, architecture, health, or technology (and more) may publish relevant research on the topic of college students with disabilities.

Activity

First, **skim** the article below. Then, **Google** the authors. Note their degrees and previous publication record. These authors are examples of scholars with academic expertise.

Note: To access this article, follow the "Find it at UMSL" link. You may need to log in with your UMSL SSO.

Madaus, J., Gelbar, N., Faggella-Luby, M., Dukes, L.L. III, and Langdon, S. (2024). A systematic review of the literature on physically disabled students in postsecondary education. *Journal of Postsecondary Education and Disability*, *37*(3), 229-241. Find it at UMSL

Professional Expertise

Your research may also benefit from people or organizations who do work on your topic. Longtime professionals and respected organizations often have in-depth knowledge of the day-to-day realities of doing work in a given field, may have produced/collected data, reports, and other publications, and may have helpful connections or additional resource recommendations.

For our research on college students with disabilities, entities with **professional expertise** could include:

- professionals who work in a university disability office (along with any web pages, publications, videos, etc. they produce)
  - this category may include admin, but also specially trained aides like interpreters
- organizations such as:
  - National Center for Collect Students With Disabilities
  - Association on Higher Education and Disabilities
  - Other organizations which focus on a specific condition or group of people

Keep in mind there may be overlap between professional and academic expertise. Academics with degrees and research experience in a given subject, for example, may also be involved in a reputable organization and contribute to their data collection, publications, outreach efforts, and more.

Lived Experience

Finally, people with **lived experience** related to a topic can provide invaluable perspectives. Their input can be particularly crucial for topics that aren't well represented in academic research, either because they are new areas of interest, they are related to very recent events, or they relate to underrepresented groups.

You can get information on a topic from a person with firsthand experience in a variety of ways. If the person is living and willing, you could directly interview them, or analyze any other words, images, etc. they produce. Examples could be a book they've written, interviews they've given to someone else, photographs or videos they've either taken or been featured in, etc. If the person or event you're researching is historical, old photographs, newspapers, and even objects can serve as useful primary sources.

Bringing It Together

Different research topics will benefit from different types of sources. While most college research assignments should use scholarly sources, many may also incorporate other sources of data and information, including from firsthand perspectives.

Search tip: When considering the **best** sources for your project, consider whether each creator has relevant expertise, and if so, how that expertise adds to your topic.

Key Takeaways

- Depending on your topic, your research may benefit from a variety of sources of expertise, including academic expertise, professional expertise, and lived experience.
- Considering an author's expertise will help you identify trustworthy and relevant sources. If a source's author or creator does not have any form of expertise relevant to your topic, look for a different source.

23.

THE SIFT METHOD: EVALUATING WEB SOURCES

Introduction

In both your research assignments and personal life, you need to locate information online. Unlike library resources, web-based content (e.g., web pages, YouTube videos, social media posts) is usually not vetted by scholars or other professionals with relevant expertise. High-quality, relevant information can feel difficult to find amidst confusing, misleading, or even malicious content.

Increasingly, poor-quality and incorrect information is available in formats that **look** appealing. They've been recently updated, they have professional-seeming graphics, websites, or videos, and they use language that mimics reputable organizations or people. As we mentioned in this week's intro, older markers of reliable content (recency, .org or .gov domains, a lack of spelling or grammar errors) are **not exclusive to well-researched material**. This content shift means that you cannot just look at a domain name or how professional/up-to-date a website *looks* to determine whether it's accurate.

Search tip: Do NOT rely on the following criteria to decide whether a source is appropriate for research:

- Flashy and/or professional images, graphics, or video quality
- The domain name (e.g., .org)
- The About page from the organization's own website (helpful to read, but sometimes provides misleading

information or obscures an organization's real purpose, especially regarding controversial topics)
- Well-written text without spelling/grammar errors

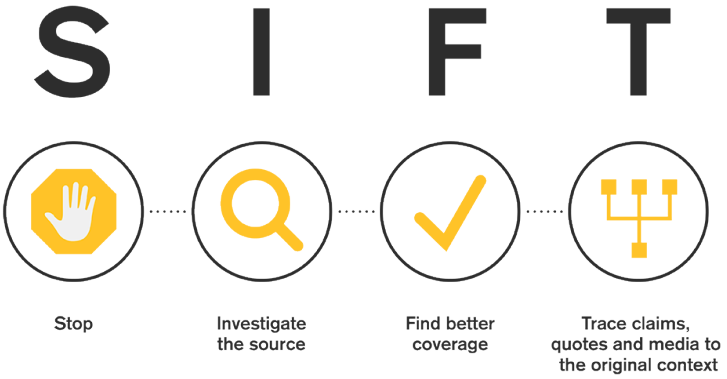
Not relying on easy visual cues can make vetting online information seem overwhelming. However, you can't just skip using digital resources either. The Internet is still an important gateway to all kinds of information, including complex and/or controversial topics. How can you be sure you're getting information or advice from a reputable source?

The SIFT Method

For evaluating digital content, we recommend the SIFT method. Developed by researcher Mike Caulfield, the SIFT method allows you to **quickly** and **reliably** evaluate information online by relying on the defining feature of the Internet – its easy interconnectedness to other sources.

The steps of the SIFT method are:

1. **S**top.
2. **I**nvestigate the source.
3. **F**ind better coverage.
4. **T**race claims back to the original source.



SIFT Infographic sourced from "SIFT (The Four Moves)" by Mike Caulfield (2019), licensed CC-BY 4.0

Watch each of the four videos below for an introduction to the SIFT method. These videos are **short, straightforward, and practical**. In other words, for a short time investment, you can gain essential skills for navigating the modern world.

Step 1: STOP

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Step 2: INVESTIGATE

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Leaving a source to investigate its reputation from other sources/sites is called **lateral reading**. This is different from **vertical reading**, which involves evaluating information or cues from the source itself.

STEP 3: FIND BETTER COVERAGE

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Search tip: In addition to finding coverage from reputable news outlets, try a fact-checking website like Snopes.

STEP 4: TRACE CLAIMS BACK TO THE ORIGINAL SOURCE

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To recap, the goal of the SIFT method is to use the structure of the Internet to our advantage. We *leave* the original source to explore the creator's reputation (**lateral reading**), see if other reputable sources are covering that topic the same way, and identify the actual originator of the information. For a more detailed, but still accessible, discussion of these strategies, we recommend *Verified: How To Think Straight, Get Duped Less, and Make Better Decisions About What To Believe Online* (2023) by Mike Caulfied and Sam Wineburg (Find at UMSL).

Key Takeaways

- Because both reliable and unreliable (and sometimes, malicious) sources can have professional websites/videos/graphics, "reputable" domains such as .org, and well-edited recent content, you **cannot** rely on these cues alone to determine whether a source is reliable.
- The SIFT method relies on using the interconnected web to **leave the original source** to:
    - explore a person or organization's reputation from **other** sources
    - see whether other well-known sources are covering a topic in the same way (or at all)
    - trace a quote, claim, etc. back to the person who originally said it

24.

EVALUATING SCHOLARLY SOURCES: THE BASICS

Introduction

Just like popular sources you can find on the Internet, scholarly sources can vary in their purpose, quality, and relevancy to your work. Evaluating scholarly work can seem daunting as a beginning researcher, but there are several criteria you can use to get started. In this chapter, we cover some evaluation basics that you can use alongside your assignment instructions to get started with choosing appropriate scholarly sources.

Good news: you've encountered some of these topics already!

Note: The evaluation criteria below are not listed in any particular order. They may be more or less applicable to different assignments or fields of study.

But First: Is It Scholarly?

In Week 2, we covered how to identify several source types, including scholarly and popular sources. In Week 3, we covered how to search for these sources in a library search tool. Remember that by default, your search results may include **both** scholarly and non-scholarly sources.

> **Reminder:** Scholarly sources are written **by** academic experts **for** an audience of other researchers. Checking whether your source meets both these criteria is part of the evaluation process.

Most college-level research assignments benefit from (or require) scholarly sources. Before evaluating a scholarly source, make sure it is in fact scholarly (and meets any other criteria from your assignment instructions) using the guidelines we provided in Week 2. When in doubt, ask the library! (Or, your professor.)

Topic (AKA, Is It Relevant?)

This category may seem self-explanatory – of course your source should be on the same topic as your research question! However, deciding whether an article or book covers a topic relevant to your research can be tricky.

Common issues for beginner researchers

Looking for Exact Vocabulary

It's easy to get stuck looking for articles or books that use the exact same words as your research question. However, like we talked about in Week 3, including **alternative terms** in your search can help you find sources that are useful even though they use different terms or even cover a different, but related, topic. (For example, research about young adults may be relevant to a research question about college students, even if the article doesn't mention the words "college" or "university.")

> **Search Strategy:** If you are struggling to find sources on your topic, don't limit your search to the exact words from your research question. Looking for synonyms or similar concepts can help you find additional relevant sources.

Only Looking at the Title

For some sources, it may be obvious from the title that it is unrelated to

your research topic. For others, it may be unclear. It's also important to note that **part of an article or book may be relevant to your topic, even if the entire work isn't** – these sources can still be helpful for your research! If you're not sure of the exact coverage of an article or book, use the following strategies:

For Articles

Search Strategy: Read the abstract. This short overview of the article's purpose, methods, and main takeaways can give you more information on its subject matter and scope than just the title.

For Books

Search Strategy: Read the book summary **and** the Table of Contents. This information can help you determine the scope of the book and also whether a specific chapter is relevant to your needs.

Peer Review

We covered peer review briefly in Week 3. For a refresher, re-watch our peer review tutorial video.

Not all scholarly research is peer reviewed. A lack of peer review can happen for several reasons, and it doesn't always mean the work is of lesser quality. Some sources that are published in academic journals – for example, book reviews – don't go through the peer review process, because they don't reflect original research and serve a different purpose in the

world of scholarly communication. Some books also do not go through a peer review process.

Unfortunately, it is also true that the scholarly landscape includes low-quality or predatory journals which do not facilitate peer review (or the review process is perfunctory).

In general, peer-reviewed research is considered higher quality than non-peer-reviewed work. Two ways you can determine whether a source is peer-reviewed are:

1. Look in the library record for the article. Often, the record will say whether the source is peer reviewed.
2. Search for the journal website. The journal usually indicates its peer review status or process in the about page, an editorial page, or another notable place on the website.

Search Strategy: Use the "peer review" limiter in your library search tool/database to search only peer-reviewed works.

Publication Date

How recently a source was published can be a significant factor in whether it is appropriate for your research. Whether you need an up-to-date source can vary significantly depending on your field of study as well as your specific topic.

Publication date by discipline

Humanities (e.g., art, literature, philosophy)

Older sources are typically more useful and common in the humanities compared to other disciplines. For example, a philosophy paper may reference a text from Ancient Greece alongside a scholarly article written in the early 1900s. Both of these works may provide a valuable perspective on philosophical issues still being debated in the modern day.

Remember that perspectives change over time. For many humanities research topics, you may still want some or exclusively newer sources. For example, if you are looking for an explicitly feminist critique of a work of literature, you may want to include more modern articles or books. Even the priorities of a feminist analysis may have changed from, for instance, the 1980s to the current decade.

Social Sciences (e.g., psychology, political science)

Social science research can advance quickly, but not quite as quickly as some science and technology fields. Assignment instructions in the social sciences commonly say to use research published within the past 5-10 years.

Science & Technology (e.g., biology, computer science)

These fields can advance more rapidly than other disciplines. More recent publications are usually better, if you can find them. Some assignments may accept research in the last 5-10 years, while others may need research from the last 1-3.

Not sure where to start?

When in doubt, check with your professor or your assignment instructions.

Search Strategy: Use the publication date limiter in your library search tool/database.

Discipline Criteria

If you pursue advanced research in your field, you'll learn unique criteria

that will help you evaluate scholarly articles, books, and other materials in an in-depth way. For beginners, we won't spend much time on this topic. However, we offer the following examples as an introduction of the type of evaluation you might do in scholarly research down the road.

Examples of Advanced Evaluation Criteria

Methodology

Advanced undergraduate or graduate research assignments may ask you to look for studies that follow a specific research or analysis method. Some examples of research method vocabulary are:

- qualitative or quantitative
- case study
- textual analysis/close reading
- ethnography
- longitudinal study

...and so on. Different methods are more or less appropriate for different disciplines and different research purposes. If you pursue advanced study/research in your field, you'll likely take research methods courses or otherwise receive training in what methods are common in your field and how to evaluate a given work's methodology.

As a beginner researcher, it is just important to be aware that you may encounter different approaches in your field of study.

Journal Audience & Reputation

Different academic journals, even in the same field of study, have different audiences, goals, standards, content, etc. As a result, journals vary in their prestige and relevancy to your own research. Publishing articles in a highly-ranked journal can be very competitive.

As a beginner, it is impossible to tell the reputation of a journal just from the title. While there are metrics (the Journal Impact Factor or JIF) that advanced researchers can use to evaluate how "good" a journal is, the best way to gain familiarity is just time spent studying the field and input from experienced researchers.

It is worth noting that academic publishing has a complicated history, and it is very much a for-profit operation. Just like with people, relying only on a journal's "stats" can obscure other considerations of what counts

as "good" scholarly work and prioritize perspectives that are already established in academia.

We don't recommend worrying about a journal's "prestige" for most undergraduate research purposes. But, if you decide to pursue graduate study, and especially if you ever want to publish your own research, this information is worth considering. We'll touch on this topic again when we discuss the landscape of academic publishing in Week 6a.

Key Takeaways

- Basic evaluation criteria for scholarly sources include peer review and publication date.
- Appropriate publication dates to include in your research varies by discipline. Humanities research often includes older sources, sciences research frequently limits to very recent sources, and social sciences research is usually in the middle (~5-10 years).
- More advanced evaluation criteria include research methodology and journal reputation.
- Reading the article abstract, book summary, or Table of Contents are good strategies to decide whether all or part of a source has relevant information.

25.

IS NEUTRALITY A MYTH?

Introduction

Neutral, impartial, objective, unbiased. These are all adjectives that many people use to describe the ideal information resource and the ideal library. It is common to argue that librarians, journalists, researchers, etc. should not be biased in favor of a political opinion, a moral stance, a group of people (categorized by socioeconomic class, ability, race, and so on), or any number of other considerations. Information should be fact-based, without an agenda.

In theory, neutrality seems like a good goal. Whether we are conducting academic research, keeping up with current events, or making personal medical decisions, we want unbiased sources that offer real evidence without prioritizing anyone's preexisting opinions. We want "the truth."

The reality of our information landscape is that some sources **are** better than others for most purposes. These sources offer evidence-based advice, real-world data, rigorously fact-checked news, and other helpful information from experts who know what they're doing. This week, we've discussed basic strategies to help you decide whether a specific article, website, video, etc. is one of these high-quality sources.

However...

It is *also* true that when people say **neutral**, what they often mean is **how we already do things** or **what we already "know."** Neutral information can often mean information produced by, and for, people in positions of privilege in academia or the world at large, whether that is due to wealth, ability, race, gender/sexuality, nationality, etc. or a combination of factors.

This statement may seem extreme. Academic research often relies on hard data – surely numbers are as neutral as it gets? Surely scholars, who follow rigorous methods and mean well, would produce reliable, unbiased research that **applies to everyone**?

An in-depth exploration of "neutrality," privilege, and bias in the worlds of libraries, news, research, etc. would be deeply complex and beyond the scope of this course. Our goal below is to peek behind the curtain of so-called neutral information – **not** to argue that well-done research or

other sources are not useful, but instead to advocate for a more inclusive approach to which perspectives "count."

The Single Story

The talk below, from Nigerian author Chimamanda Ngozi Adichie, introduces the "danger of a single story." While she does not reference academic research, the main points are still relevant: that it can be difficult to identify when our own perspectives are limited, that globally prominent perspectives (i.e., Western) might not be universal, and that lifting unheard voices makes this world a richer, kinder place (run time: 19:17).

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The Single Story in Academic Research

As we mentioned above, critiquing the idea of "neutrality" in academic research is a complex endeavor. For beginner researchers, let's start by examining what the "single story" can look like in research data and analysis.

Either conscious or unconscious bias can influence:

- who is able to do research
- what research topics get funded
- what types of people/groups are "worth" studying

Many times, the complicated nature of scholarship can produce results that appear "neutral" or "universal" to the untrained eye, but have a more limited scope upon closer inspection.

This concept can be examined in different ways depending on your field of study. For now, let's look at an example of (often unintended) bias in psychological research. Watch the video below for an introduction to

WEIRD research and its implications for generalizing study results (run time: 4:36):

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Pointing out a lack of inclusivity in research participants is **NOT** to suggest that research on young, white, male, American college students isn't worth doing, or that those results aren't important. We simply mean that research on *other groups* is *also* important, because the results of studies on white, healthy men don't always apply to everyone else. And, this oversight can have **real consequences** – in fields like medicine, for example, where a historical lack of women in clinical trials has resulted in issues like improper medication dosages or a lack of awareness of different disease/condition symptoms.

Search Strategy: Be inclusive in your research. Intentionally consider which perspectives your own research, and the research you're citing, may be missing. Your projects, not to mention your outlook on the world, may benefit from additional points of view.

Key Takeaways

- It is difficult to describe academic research as truly neutral. Individual perspectives or bias as well as larger cultural and economic systems can influence which research topics get funded, who is able to achieve advanced degrees and pursue research, and who is included as study participants.
- Actively consider inclusivity in your own research. Consider whether your topic could benefit from additional perspectives, and be aware of potential limitations in the studies you cite.

PART V

5: HISTORY OF LIBRARIES & INFORMATION

26.

ABOUT WEEK 5

Week 5 Overview

In Week 5, we introduce important developments in the history of information organization and retrieval. We cover this history to help you understand how and why information is organized the way it is today and how that organization influences a researcher's relationship to information. Finally, we provide a brief overview of how data relates to information, knowledge, and wisdom.
Note: This week is something of a catch-all in terms of content. Don't forget that you can always refer back to each page later rather than worrying about memorizing a bunch of new vocabulary and concepts. Our goal is to just introduce some broad themes to provide context for your research.

Learning Objectives

By the end of this week, you will be able to:

1. Identify historic and recent milestones in the development of information technology.
2. Identify the different parts of a URL.
3. Describe the physical foundation for the Internet/the digital information landscape.
4. Perform a reverse citation search using Google Scholar.
5. Consider how different information formats, such as print,

microfilm, and digital formats, impact preservation, access, and the context of knowledge.

Week 5 Activities

- Read through the Week 5 content
- Participate in the Week 5 Discussion Board by **10 PM Wednesday, Sep. 24**
- Complete the Week 5 Self-Check Quiz by **10 PM Sunday, Sep. 28**
- Schedule a meeting with an UMSL librarian by **10 PM Sunday, Sep. 28**

Also: keep an eye out for your Peer Review assignment, which you'll work on next week.

27.

INFORMATION BEFORE THE INTERNET

Introduction

In this chapter, we discuss (very briefly) some major developments in information *technology* – the formats in which words, images, sound, etc. were preserved and transmitted before the advent of the Internet. In Part One, we touch on some foundational historical milestones; in Part Two, we focus in greater detail on the technologies of the near past (specifically, the 19th and 20th centuries).

How will knowing this information make you a better researcher?

Each new development builds on the expectations and conventions of the technology that preceded it. With a basic understanding of how one advancement led to the next, you'll be better equipped to understand research vocabulary, apply advanced search strategies, and consider the value of source formats beyond just articles and books.

Part One: A Few Important Developments

Oral Traditions

Humans have been communicating and preserving information across generations orally for thousands of years. Language and storytelling are ancient and culturally universal human traits.

Like the written word, spoken language can also be conveyed and preserved in different formats – not just regular speech, but also chanting, spoken poetry, ballads, and more. The combination of diction with

rhythm, rhyme, music, or physical movements can not only create beautiful and engaging works of art, but also aid in memory.

Many modern-day traditions and stories trace their roots to information transmitted orally for generations before eventually being written down. These include religious texts (e.g., the Old Testament) and ancient epics, like the *Iliad*.

Oral traditions are **still an important art form and cultural preservation mechanism today**. Genealogy, folklore, songs, and more are still transmitted orally, but they are also recorded in the form of audio or video in various mediums.

Writing

The independent invention of writing systems in several locations/cultures (Mesoamerica, Mesopotamia, Egypt, and China) represents a dramatic change in our abilities to communicate and preserve information. A (relatively) stable, visual representation of spoken language meant that information could:

- be communicated consistently across farther distances
- include *more* information than a single person could reliably memorize
- be more easily preserved and standardized over long periods of time

How effectively early writing samples were preserved is dependent on a variety of historical and environmental conditions, one of which is the physical medium on which they were inscribed. Today, our primary (non-virtual) medium for the written word is **paper**, first invented in China around the 2nd century CE.

Other materials include:

- clay tablets or pottery
- papyrus
- stone tablets or monuments
- parchment
- fabric
- wood

Plimpton 322, a Babylonian clay tablet, with numbers written in cuneiform script. Written around 1800 BCE.

Writing & Libraries

With the invention and spread of various writing systems came the need for **libraries**, in two parts: (a) physical spaces to store and

organize tablets, scrolls, etc. and (b) staff to do the collecting, organizing, and retrieval of those items.

The very first (known) library was that of Ashurbanipal, an Assyrian king in the 7th century BCE. This royal library held clay tablets on all kinds of topics, gained through both the copying work of his own scribes and military conquest. The famed *Epic of Gilgamesh* is the most well-known surviving work from this library.

Since then, libraries have played a crucial role in supporting research and preserving history. Historically, many libraries were funded and managed by governments, religious institutions, or wealthy private individuals. The first truly public library, funded by taxpayers rather than individual subscriptions or other sources, opened in America in the 20th century.

The Printing Press

Johannes Gutenberg (of Germany) invented the printing press in the 15th century, which again revolutionized the information landscape. Books not only became more affordable, but were more easily standardized. The result was an explosion of increasing literacy rates and the more rapid spread of new ideas across the European continent and beyond, impacting culture, education, scientific advancement, and more.

Notably, the printing press resulted in what we now call "mass communication." Communication to enormous audiences was no longer limited to those with traditional wealth or authority, such as political or religious leaders, ushering the new "middle class" to a more prominent role in information consumption and dissemination.

Part Two: 19th and 20th Century American Libraries

Now, we take a big time jump to America. We're focusing on this time period and cultural context to cover some important technological foundations in how libraries and research were organized. Although you may not use these technologies, the precedent they set has influenced how information is organized in the digital world, and knowing this vocabulary will help you navigate research online.

Card Catalogs

A **library catalog** is an organized record of all bibliographic items found in a library's collection.

Prior to the mid-1700s, these records were kept in lists (e.g., on tablets, scrolls, paper, etc.) or handwritten/printed ledgers. As the sheer amount of items in most libraries escalated, these ledgers were replaced with slips or individual **cards** to represent each item.

In fact, card catalogs use **multiple** cards for the same item. This system allows users to browse the card collection organized in different ways: by titles, by authors, or by subjects.

Card catalogs become popular in libraries by the mid-1800s. There were multiple advantages to the card system, the main being:

- Flexibility: Using individual cards for each item made items easier to add, edit, or remove.
- Easier discovery: Library patrons could browse for books by author, title, or the subjects covered in the material.

Although many modern-day libraries have moved to digital catalogs, some others do still have functional card catalogs to support research, especially to locate older materials. Here's a short video highlighting the current status of the card catalog at the Library of Congress, the world's largest library (run time: 2:20):

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://umsystem.pressbooks.pub/information/?p=242#oembed-1

MARC and OPACs

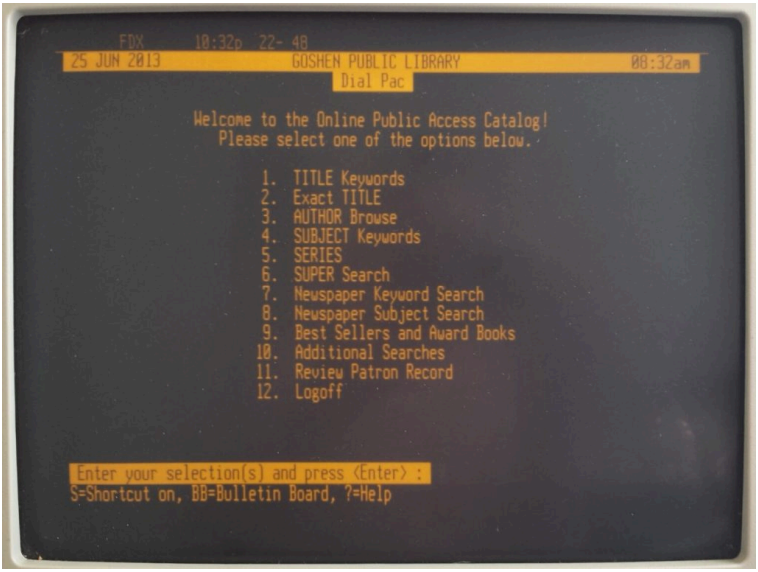
Henriette Avram, a computer scientist, created the MARC standard in the 1960s.

> **MARC (Machine Readable Cataloging)** is a standardized rule set for how to format the descriptions of library items so they can be read and shared by computers.

MARC has become the international standard for formatting and sharing bibliographic data, although there are several versions of it.

When you look at a MARC record, you'll see numerical fields that each correspond to the type of information you're supposed to enter into that field. For example, the main author goes in field 100. In field 260, you put the publisher.

MARC allowed for the computerization of the card catalog system and the development of **online public access catalogs (OPACs)**, which allowed patrons to search for materials on a computer rather than printed cards. Dynix is an example of a popular, early-days digital and searchable catalog.



Dynix search menu. Photo credit Skylarstrickland, licensed CC-BY-SA 3.0.

Indexing

The continued rapid uptick in library content, especially in academic journals, increased the need for formal indexes.

> An **index** is a list of names, subjects, and other notable content discussed in a larger work alongside the specific location those entries can be found (e.g., page numbers). Indexes which cover multiple works (e.g., many journals in a given field) often used standard vocabulary to refer to the same concepts, even if unique language is used in those journals or articles.

The purpose of many 20th-century print indexes was to help researchers

locate articles on specific topics or from specific authors in their field, even if they were published in different journals or different issues of the same journal. They could go to the print index, search for their topic (or authors' names, or another criterion), and find the specific location of relevant articles.

These indexes were the precursor to modern-day **databases.** Like we learned in Week 3, databases allow you to search millions of journal articles by typing in a subject, title, author, etc. without needing to search through individual journals in your field, which could cover a variety of topics in each issue.

Technology Preservation

When discussing preservation, it's common to think of older historical materials, often paper-based. Modern technology (specifically, the Internet) is touted as the obvious way to digitize and preserve these documents.

However, there are two considerations that impact this transition:

1. Digital access is not foolproof. It is less accessible for people who struggle with or can't afford technology, it often relies on 3rd-party platforms that may decide to stop hosting that material, and it can be extremely expensive for libraries to either purchase digital materials or digitize materials themselves.
2. Technology is not just a tool *for* preservation. As we continue to make scientific advancements, we must consider preservation *of* technology.

Throughout the 19th and 20th century, rapid technological developments meant that information was created and stored on a variety of non-paper and non-digital formats. Some of these mediums include floppy discs, cassettes, CDs, and VHS. Not everything can or should be converted to a digital format, and deciding the best way to store and prevent the degradation of these materials is an ongoing discussion.

Microfilm

Microfilm is an excellent example of an older technology that is still a preferred and frequently-used tool for accessing historical materials even in the digital age. It preserves documents in a compact and stable format.

Microfilm comes in plastic reels of very small-scale photographs, typically of extensive and hard-to-preserve documents like old newspapers or government documents. A researcher can feed the reel through a reader, which increases the size of the image on a screen for easy viewing.

A library patron reads the New York Times on a microfilm reader. Photo from University of Haifa Younes and Soraya Nazarian Library, licensed under CC-BY-SA 3.0.

Did you know: We have a microfilm reader at UMSL? You can find it near the Public Service Desk.

Key Takeaways

- The modern-day research landscape is dependent on (a) major developments in how humans communicate, and (b) specific, pre-Internet technologies that influence today's digital research organization.
- We cannot take the importance of writing, print, or libraries for granted, no matter how ubiquitous or inevitable they seem today. Nor can we discount the influence that oral traditions still have on preservation and the transmission of knowledge.
- Card catalogs, the MARC standard, and indexes are all examples of technology from the recent past that, even though we don't often interact with them physically today, are important to be aware of to understand the back end of how digital research systems are organized.
- The interaction of technology and information preservation includes both how we can use technology to preserve older materials as well as how we preserve technology itself.

28.

THE INTERNET

A Very Short History of the Internet

A full history of the Internet could cover an entire class. For now, let's cover some important developments that will help you understand why the Internet works the way it does today.

A Short Timeline of the Internet, 1957 – early 2000s

- **1957**. The Soviet Union successfully launches the Sputnik satellite, catalyzing US government investment in scientific and technical projects in a "space race" with the Soviet Union. One major goal was to discover a reliable way to transmit information in the event of a nuclear attack.
- **1960s.** The US Department of Defense and scientists develop **ARPANET** (Advanced Research Projects Agency Network), a computer network that lays the foundation for today's Internet. The first two computers connected are at UCLA and Stanford. Later, additional research institutions, government agencies, and businesses are connected.
    - ARPANET is **decentralized**, meaning that if one node of the network fails, the remaining computers can still communicate with each other, providing a safeguard against missile attacks or other damage.
- **1973/4**. Vint Cerf and Bob Kahn develop a standardized protocol that allows different networks to communicate (TCP/IP). ARPANET later adopts TCP/IP.
    - Internet Protocol (IP): provides unique but standardized addresses for every device so that messages arrive at their correct destination.
    - Transmission Control Protocol (TCP): a system to guarantee that all parts of a message are delivered and in the right order.
- **1983**. Debut of the Domain Name System (DNS), allowing users to type domain names (e.g., abcd.com) rather than numerical IP

addresses.
- **1989**. Tim Berners-Lee develops the World Wide Web (WWW) while working at CERN. The WWW relies on **hyperlinks**, allowing users to easily access interconnected resources. Visit the world's first website!
- **1995**: The Internet commercializes. Digital financial transactions become safer through encryption. (Two examples of businesses that start in 1995 include Echo Bay, later eBay, and Amazon.)
- **1997**: The advent of Wi-Fi allows users to connect devices to the Internet via radio waves.
- **1998**: Google debuts. Although other search engines have created user-friendly portals for finding and accessing web sites, Google pioneers PageRank, aka, an algorithm to better return relevant results.
- **2000s**: Broadband speeds up Internet connections beyond former telephone-based lines, increasing the use of graphics, video, games, etc.

How The Internet Works

Note: This video is longer than our usual videos (nearly 20 minutes). We encourage watching the whole thing if you find this topic interesting; it's an excellent video. However, you can get the information you need **in the first 10(ish) minutes**.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://umsystem.pressbooks.pub/information/?p=256#oembed-1

Organizing the Internet

The Internet and the World Wide Web, often used interchangeably, are not actually the same thing.

The **Internet** is the connected computer network that provides the infrastructure for the World Wide Web (WWW), as well as email, file transfers, private databases, and other non-WWW content, to work. It allows computers to talk to each other. The **WWW** is all the public websites and pages you access through a browser like Chrome or Firefox.

All content on the Internet – WWW or otherwise – is hosted on **servers**. Servers are physical computers, typically hosted in large **data centers** that depend on a significant amount of power and cooling infrastructure. When you access a resource online through a browser, it determines the server "address" and requests a copy of the site, page, app, etc. to be sent to your device. The content is sent from the server to your device in small **data packets,** then reassembled by your browser for viewing.

The Hierarchy of the Web

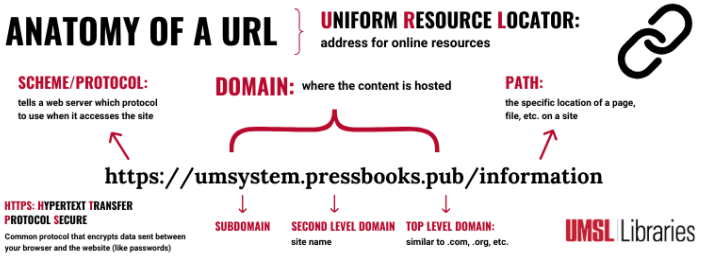
The WWW is largely organized into websites, like wikipedia.com or google.com. The **top-level domain** (e.g., .com or .org) depends on the purpose of the site and the type of organization hosting it. The **domain name** (e.g., "Google" or "UMSL") is the name of the site.

Within each website are various web pages, which act as files organized in relation to each other and the site's home page. The specific organization of the site depends on type of content. A common structure is similar to a "tree," where a main page branches into multiple lower-level pages.

Although what you see on a web page is typically well-formatted text, graphics, and other content, the underlying code is primarily **HTML**, a standardized way to tell a browser how to format and display the page content (for example, indicating that text should be in **bold** or *italics*).

You can often follow the organization of a website by looking at the **URL**.

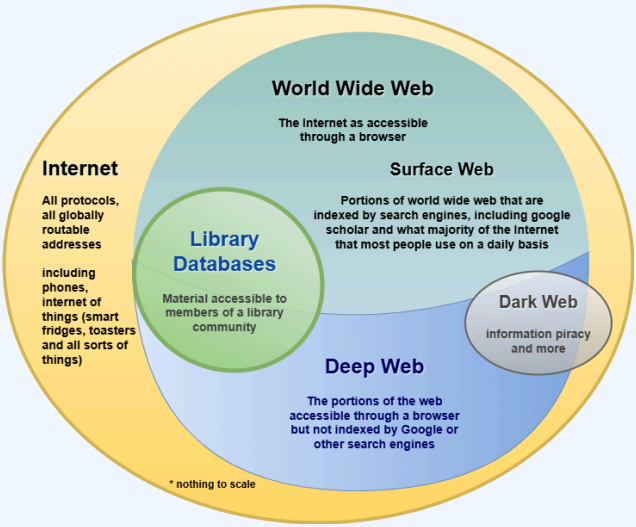
URL stands for Uniform Resource Locator. It is the string of text, punctuation, and sometimes symbols you type into a web browser to visit a website or access a file on the Internet.



For example, the content of this page is pulled from a freely-available online textbook (if you are reading it in Canvas – otherwise you're already directly on the textbook site). The textbook is hosted on a larger site called Pressbooks, which hosts many other open educational resources. Pressbooks is both the site name and the main domain that hosts all that content. Its top-level domain is .pub, which is often used for sites that host web-based publication. The "umsystem" portion of the URL is the subdomain – in other words, the portion of the site that hosts publications from the UM System. The "/information" path refers to our specific book.

The Deep Web

Most content on the Internet is not actually publicly accessible on a web browser. The **deep web** refers to content that is hosted on a private server or protected by login credentials. Importantly, this material is not indexed by public search engines (like Google). Therefore, you won't typically find these resources with a regular Google search.



This diagram visually distinguishes between the Internet, the World Wide Web, and its various layers: the Surface Web, Deep Web, and Dark Web, also highlighting the position of Library Databases within this structure.

The deep web includes subscription-based library databases. (Other examples include your personal email account or medical records.) **Takeaway:** a LOT of helpful scholarly information is **NOT** easily discoverable on Google. Instead, use a library search tool.

Key Takeaways

- The modern-day Internet relies on several important developments from the latter half of the 20th century, including the creation of ARPANET, standardized communication protocols, the advent of the WWW, and user-friendly ways of finding and interacting with websites (such as the domain name system and ranked search results).
- Internet content is stored on physical servers and relies on physical connections to transfer from one computer to another.
- A URL can give you clues to how a website is organized.
- Not all Internet content is publicly accessible on the WWW.

29.

FORMAT INFORMS INFORMATION

Introduction

Throughout history, the *format* in which we store information has shaped what gets saved, what gets forgotten, and how we access knowledge. Whether recorded on parchment or preserved in the "cloud," the format of information affects how we read, cite, and discover ideas.

In libraries today, you'll encounter a wide range of formats: physical books and journals, digital eBooks, microfilm, PDF articles, and more. These formats reflect how technology has evolved and how our ways of preserving and accessing knowledge have changed. It is easy to assume digital = best, but many factors influence whether the sources we need are available in the format of our preference. A print book, for example, may be easier for one researcher to annotate, while another appreciates the ability to increase the font size on their eBook. Another book may *only* exist in print; there are *many* sources out there that have not been digitized. Perhaps a microfilm reel is the only surviving copy of the old newspaper you need. A digital article may be easily discoverable via a library databases, or maybe you need to request it as a PDF scan from another library.

Each format shapes what is visible and what might be overlooked.

Containers of Knowledge

Most people's first thought of libraries is as *physical* spaces where information is organized in "containers": books on shelves and journals bound into numbered volumes. Before the advent of digital databases, researchers could find articles in a print journal and then find related articles by flipping through the same issue or exploring other volumes on the shelf. Book readers could achieve the same goal. These physical containers helped give information a place and structure, making it clear to researchers where their information was coming from.

Our physical periodical collection, with shelves of bound journals. The systematic arrangement by title, volume, and year highlights the importance of organization in accessing information for academic research and demonstrates how print resources are managed in a library setting.

Free-Floating Articles in a Digital World

Today, online articles are often separated from their original containers. You might find a single article through Google Scholar or a library database without it always being obvious to you what journal it came from or what else was published alongside it. Digital search can speed up research, but it can also create loss of context. You might miss an editorial that introduced a journal issue's theme, or not realize an article was part of a special collection on a specific topic.

For researchers, the takeaway is this: **if you're only using open web searches, you're missing out on a huge portion of high-quality, credible information that lives below the surface.**

The Role of Metadata

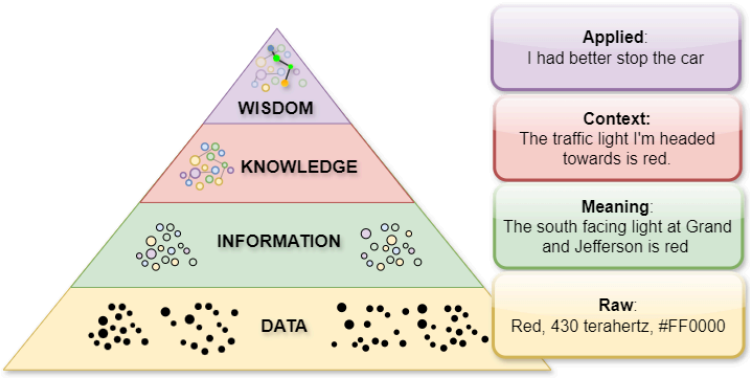
Metadata is "data about data": the information that describes and provides information about an item.

- Descriptive metadata is information like the author, title, or publication date: information that tells you *about* an item and which allows a researcher to search for and retrieve it.
- Structural metadata identifies the organization of information within the item (e.g., a Table of Contents).
- Technical metadata includes information like file type or size.

Identifying metadata about a source allows you to effectively search for that item as well as cite it. You don't need to memorize these terms – just be aware that all these types of information about individual resources exists and can be useful for research purposes.

The DIKW Pyramid

The illustration below is the **Data-Information-Knowledge-Wisdom (DIKW) Pyramid.** It provides one framework for understanding how raw data transforms into meaningful insights. The HTML can be understood as data, unprocessed, and your browser is rendering it into information. Knowledge is what you gain when you read and learn from this material, and wisdom is what you do with that knowledge.



Data can be hard or impossible to understand on its own because it is raw and unprocessed. **Information** is when data is provided with more context and meaning. **Knowledge** is the result of information being interpreted by you. **Wisdom** is what results when you put that knowledge to use.

Think of research as a journey up a pyramid. At the bottom, you have tons of raw data. As you go through it and find context, it becomes useful. When you understand that information and how it connects, you gain knowledge. When you can apply that knowledge in a meaningful way, you've reached wisdom. Good research isn't just about collecting or presenting a pile of data. It's you using your critical thinking skills to climb the pyramid, and join the scholarly conversation.

The Internet and libraries, with our immense range of content, provides resources that exist as data and as information; what you do with it turns it into knowledge and wisdom.

Key Takeaways

- Format heavily influences which sources are visible (or not visible) via various search tools and strategies, including in

a library search tool. Relying only on the open web means missing out on (a) potentially helpful sources and (b) important contextual information for why and how your source exists.

- Metadata offers information about a source, and it is a critical component in information organization and discovery.
- Constructing large-scale information from individual data points is a complicated process, and mirrors how the Internet converts data to a user-friendly presentation of digital knowledge.

30.

BEYOND A SINGLE SOURCE: PAST AND FUTURE

Introduction

So far, we've covered a bit of information history at large, focusing in greater detail on how the technological advancements of the 20th century have informed how we organize and access information today. We've also discussed the foundations of the Internet, an indispensable tool for navigating information in the 21st century.

However, information history can also refer to the history (and future) of individual sources. In this short chapter, we cover two important research strategies: **exploring the bibliography** and **reverse citation searching**.

Strategy One: Exploring the Bibliography

As we covered in Week 2, most scholarly books and journal articles (and even some popular sources) include a **bibliography**: a list of sources at the end of the work that tell a reader which other articles, books, and other materials the author referenced.

Search Strategy: Reading an author's bibliography can give you clues about additional sources that might be useful for

your own topic. Sometimes, this strategy can be quicker and more useful than a keyword search in a library search tool.

Researchers have been using this strategy for a long time. It's part of the reason proper citation is so important. Even before the ease of digital searching, scholars could find a print article in a bound journal on a library shelf, read the bibliography, then locate the journal, volume, issue, and page numbers of a different but still relevant article somewhere else in the building. Today, a quicker strategy might be to copy and paste the new article title into the library search to see whether we have access.

Though the bibliography is only a small selection of what has likely been written on the topic, it offers a peek into the history of that field of research.

Strategy Two: Reverse Citation Search

Historically, journal articles and book chapters could be found physically anchored to the journals or books they were published in. If you wanted to find out who **later** used that source in their own articles (i.e., the article's future, rather than its past), it would be a cumbersome task, requiring sorting through massive print indexes. This task was rarely undertaken by anyone but the most dedicated specialists.

In the modern information landscape, individual journal articles or book chapters are often visually decoupled from their larger context (i.e., the journal or book they were published in). They are independent digital objects with unique identifiers, like a DOI. This new paradigm means that digital tools can more easily track when an article is cited in a later-published work. This strategy, which has several names (**reverse citation search**, forward citation search, or citation tracking), allows you to find updated publications relevant to your research topic. You search the "future" of the article's influence on its field post-publication.

Search Strategy: Use **reverse citation search** to see which publications have come out *after* your original source that use your source as a reference. This strategy can give you updated information on your topic.

There are some library databases that make this strategy relatively easy (e.g., Scopus), but you can also achieve the same goal through Google Scholar. Take the following steps:

1. Find your source in Google Scholar. The easiest strategy is to copy and paste the title, if you have it.
2. Find the entry for your source in the search results.
3. Click the blue "Cited by" link.

Note: This strategy doesn't always yield helpful resources (especially if you've selected a newer publication that hasn't had time to accumulate a high citation count), but it is a worthwhile tool to have in your searching tool belt.

Remember: You can connect UMSL Libraries to Google Scholar – review the Google Scholar reading to find out how.

Key Takeaways

- Exploring a source's "past" and "future" can help you get a wider picture of research in your field of interest and identify new relevant sources.

- Exploring a source's bibliography will help you identify previously published work that was foundational to the source you already found.
- A reverse citation search will help you identify newer publications that use your source as a reference, possibly giving you updated information on your topic.

PART VI

6: THE INFORMATION ECONOMY

31.

ABOUT WEEK 6

Week 6 Overview

Our primary goal this week is to cover where the **money** goes in academic scholarship. This information is helpful for beginner researchers for several reasons:

1. It will help you understand why research access is expensive.
2. It will situate the role of the library in mediating between researchers and publishers.
3. It will help you begin thinking critically about traditional models of scholarly publishing.

As part of this discussion, we also introduce the idea of **open** materials: why and how some scholarship (along with other works) are freely accessible online, while others are not.

Learning Objectives

By the end of this week, you should be able to:

1. Describe the roles of authors, reviewers, editors, publishers, and librarians in the scholarly publishing model.
2. Explain what a paywall is and the library's role in providing research access.
3. Explain the goal of interlibrary loan services.

4. Identify Creative Commons licenses as a common mechanism for open publishing.

Week 6 Activities

- Read and watch the Week 6 Content
- Participate in the Week 6 Discussion Board by **10 PM Wednesday, Oct. 1**
- Complete the Week 6 Self-Check Quiz by **10 PM Sunday, Oct. 5**
- Respond to a classmate on on the discussion board by **10 PM Sunday, Oct. 5**
- Submit your Peer Review by **10 PM Sunday, Oct. 5**

32.

SCHOLARLY PUBLISHING

Libby Wheeles; Helena Marvin; and Tim Nelson

Introduction

This chapter offers a brief overview of **scholarly publishing**, the process by which **scholarly articles** and **scholarly books** are created.

As a reminder:

> A **scholarly source** is written by an academic expert to communicate original research or other academic discourse with other scholars.

We cover the basics of scholarly publishing for two reasons:

1. To review what scholarly sources are and where to find them.
2. To introduce the main players in the publishing process, including the researchers, reviewers, publishers, and librarians.

The Basics of Scholarly Publishing

For the purposes of this discussion, we'll focus on how **scholarly journal articles** get from an idea in a researchers' head to the written article you can read through the library website or on the web. As a reminder, **scholarly** (or **academic**) **journal articles** are written by scholars to share their research with other experts.

Steps to Publication

1. **Research and writing**. First, the **authors** conduct their original research and write an article to share their results. This article usually combines previous research in the field (to provide background and support their methodology) and their own original work.
2. **Submission to a journal**. The author(s) find a **journal** that publishes articles similar to the theirs. This similarity is a good indication that the journal would be interested in their article and that they would reach their target audience (e.g., scholars who specialize in their field) by publishing in that journal.
3. **Editor review**. An **editor** who works for the journal decides whether the article is well-written and appropriate for that journal's scope. If it does, they send the article to **peer reviewers** who are experts on topics relevant to the article.
4. **Peer review**. Peer reviewers do not typically work for or get paid by the journal. Instead, peer review work is considered part of regular faculty responsibilities. Often, reviewers assess the strength of the argument, the clarity of the writing, and the overall contribution to the subject area. The final decision on whether to publish, however, rests with the **publisher. Important: Not all journal articles are peer reviewed.**
5. **Final revisions and publication**. The journal staff (who work for the **publisher**) facilitate final edits and make the final decision on whether to publish the article. If the article is accepted, it gets published alongside other articles in an issue of that journal. As a reminder, journals (which are a type of **periodical**) usually get published on a regular schedule, or periodically (similar to newspapers).
6. **Acquisition**. Access to academic research is very expensive. **Librarians** use their budgets to purchase journal issues or to subscribe to online databases that offer access to those journals. Importantly, libraries cannot purchase access to everything. They make decisions on what to purchase based on their budgets and the research topics that are important to the faculty and students at their university.

A review of most of this process is offered in our peer review tutorial:

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Important Roles

Authors/Researchers

The article's **authors** are the people who conducted original research and then wrote an article to share their results. The authors are paid to do research with the salaries from their universities and research grant funding that they have to apply for (for example, from federal government programs).

Journal Editor

When authors want to publish their work, they usually submit it to an academic journal. An **editor** who works for the journal makes the first decision about whether the article passes basic standards and is a good fit for their usual audience. They also facilitate the peer review process. The editor is paid by the **publisher** of the journal.

Peer Reviewers

Peer reviewers do not work for the journal, and they do not get paid extra from their universities for the labor of peer review. It is considered part of their responsibilities as researchers in their field. They review the article for originality, significance to their field, writing quality, and other criteria. They make recommendations to the journal about whether or not the article should be published.

The Publisher

Publishers act as the gatekeepers and managers of the publishing process. They are responsible for acquiring and selecting manuscripts with potential. Once a manuscript is accepted, the publisher invests financially in its production, which usually includes editing, proofreading, design, formatting, and printing. They handle the critical functions of marketing and distribution to ensure the work reaches its audience. The same publisher may publish many journals.

> Once a manuscript is published, the **publisher** (usually, but not always) owns the rights to that work. That means that the publisher, not the researcher, is the one getting paid when people purchase access.

Librarians

Libraries provide access to journal articles and other works by purchasing them (or licenses for them) from scholarly publishers. And, of course, they work hard to set up their websites and physical collections to make materials easy to find. They also spend a lot of time teaching students how the library works, what kinds of materials we have, and whom they can ask for help.

Our physical periodical collection, with shelves of bound journals. The systematic arrangement by title, volume, and year highlights the importance of organization in accessing information for academic research and demonstrates how print resources are managed in a library setting.

In addition to librarians who teach and provide research help, other librarians work hard **behind the scenes**. Staff and faculty who work in **acquisitions** do things like navigating complicated purchase agreements with publishers and making decisions on research priorities with tight library budgets. You might not ever see them, but they are working

hard to help you access the materials you need to learn and conduct student research.

Key Takeaways

- Scholarly publishers are gatekeepers and managers in the scholarly publishing process. They own and publish academic journals, in which researchers publish articles to communicate their work, along with other scholarly manuscripts.
- Authors, editors, reviewers, publishers, and librarians all play important roles in the scholarly publishing process.
- Often, publishers own the rights to and get paid for access to the scholarly work they publish (as opposed to the people who did the research).

33.

THE PAYWALL & OPEN ACCESS

Libby Wheeles; Helena Marvin; and Tim Nelson

Introduction

As we've mentioned in previous weeks, access to scholarly research can be very expensive. This chapter covers some important concepts to help you understand:

- who profits from high cost barriers to academic research
- why doing academic research on the open web is challenging (compared to using the library)
- why *some* research is available for free

This information will help you make informed decisions about *where* to search for scholarly sources. It will also provide you with helpful foundational information about the scholarly publishing landscape if you decide to pursue more advanced research.

Paywalls

Artist: David Revoy (2015), licensed CC-BY 4.0.

A **paywall** refers to the cost barrier between a potential reader/viewer and the content they wish to access. In other words, when you have to subscribe to a newspaper or streaming service to see content, or pay to individually access a journal article outside your library, you are encountering a paywall.

In theory, paywalls are not inherently a bad thing. Many people work hard to get scholarly materials from the idea stage to the well-formatted, accessible document/video/etc. that you view in print or on your computer. See the previous chapter for a review on the **roles** people play in the process of scholarly publishing (researchers, editors, reviewers, publishers, and librarians). Just like any other job, these people engage in labor and reasonably expect compensation for their time, skill, and materials.

Who Profits?

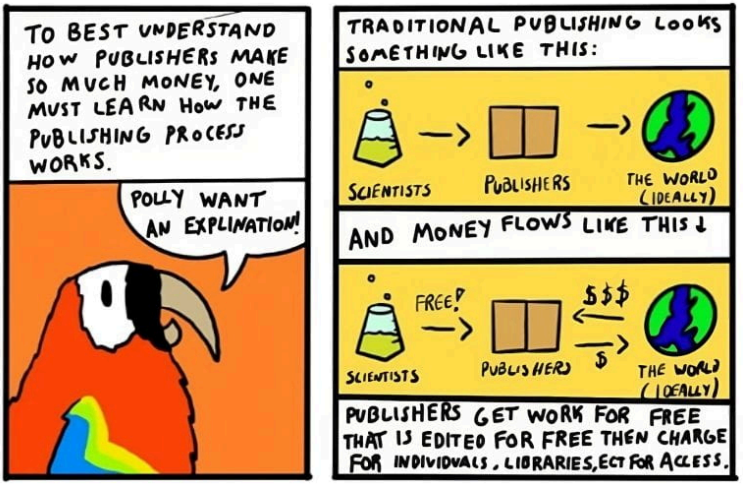
The traditional scholarly publishing model means that **publishers**, rather than researchers, see most of the profits from this work:

- Researchers receive salaries and grant funding to complete their research. (Much of this grant funding has historically come from the federal government.) Once the research is completed, they are typically no longer making money from that research.
- Peer reviewers do not receive any compensation for their work. Traditionally, it has been considered part of their responsibilities as fellow researchers in their field.
- Publishers **do add value** to the research process, which does require compensation. They facilitate the peer review process, often provide final editing and formatting, and publish/host/market the final product (in print, through digital platforms, or both).
    - Typically, **publishers**, not researchers, own the rights to the final version of a scholarly manuscript. When individuals, libraries, or other institutions pay for access, that money goes to the publisher.

Many people consider this system unfair for several reasons. These include:

- Many academic publishers set high prices for access to the research they publish. As an industry, academic publishing has high profit margins.
- Publishers are benefiting from work provided to them for free (from researchers and peer reviewers).
- Taxpayers are paying twice over for research: once, in the form of grants awarded to researchers to complete their work, and twice, in the form of libraries/institutions paying publishers to access that research, with government funds funneled to public institutions and library budgets.

Important: These disparities differ by **individual publisher** and **academic field**.



Artist: Rebecca Kyser (2024), licensed CC BY-NC 4.0 Full comic about predatory publishing at https://blogs.gwu.edu/himmelfarb/2024/05/29/comic-predatory-publishing/

Another take on this system (all rights reserved to the creator):

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The Role of the Library

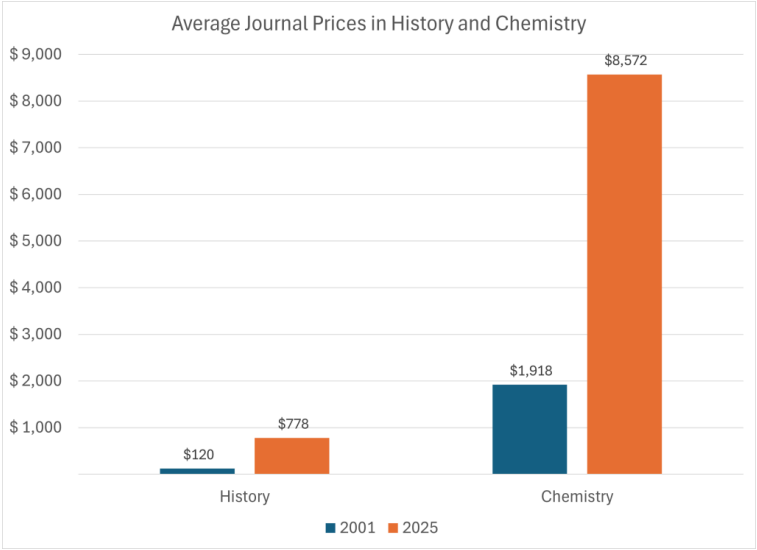
A significant portion of a library's budget goes toward purchasing individual materials as well as **subscriptions** to databases or packages of journals on an annual basis. Access to research is a requirement for a university to function well, and being the go-between between researchers and publishers is one of the library's most important jobs.

> Using the library's search tools helps you (a) find scholarly materials and (b) access those materials for free. You **will not find** everything that might be useful to your research topic available on the open web.

The Future of Library Budgets

Year to year, libraries face a rising challenge with affording the cost of scholarly research. Because libraries purchase access on an annual basis, the price can be increased every year, and libraries must do their best with flat or sometimes decreasing budgets to afford to keep the same journals they provided for their institution in previous years. These rapidly escalating prices are referred to as the **serials crisis** (the words *serials* and *periodicals* – things published periodically, like academic journals or magazines – are often used interchangeably).

The problem is especially apparent in sciences research (as compared to humanities). Here's a chart illustrating the price escalation in two disciplines from 2001 to 2025:



Romain, S., Albee, B., Elliot, C., & Bosch, S. (2025, April 25). Learning from the past: Periodicals Price Survey 2025. Library Journal. https://www.libraryjournal.com/story/learning-from-the-past-periodicals-price-survey-2025 Graph by Tim Nelson licensed CC0 no attribution required.

The price of library subscriptions has been rising faster than inflation for several decades, and the funds available to libraries have generally been declining. The chart above uses the average prices of History journals (one of the least expensive) and Chemistry journals (one of the most expensive) to demonstrate how quickly these costs have risen. Both are more than four times as expensive in 2025 as they were in 2001. In comparison, the Consumer Price Index (CPI), a general measure of inflation for everyday customer products like food and gasoline, only went up by 81% (https://www.bls.gov/cpi/) during this period.

An Alternative Model: Open Access

Scholarly sources that are published **open access** are available digitally for free under one of several license types (e.g., Creative Commons). Sometimes, articles are available open access because researchers have paid a fee up front to publish their work.

Open access is an increasingly popular option for publishing. It has several benefits:

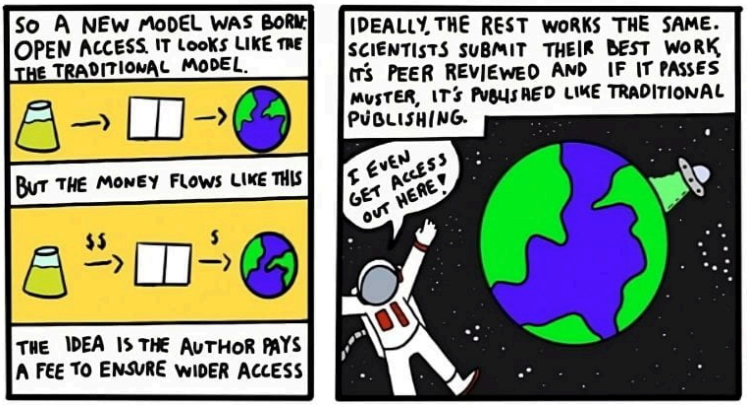
- Research that is published open access often gets more exposure, since more people can read it for free.
- Researchers from less well-funded institutions (either in the West or from developing countries) can access more materials.

Often, open access materials are marked with the open lock symbol (shown on the right).

Open access logo

Search tip: If you rely only on publicly available search engines (like Google or Google Scholar), a lot of the research you find is probably going to be materials that were published open access. This opportunity can be extremely helpful, but remember, **do not *only* rely on open access materials if you have access to a library.** A lot of scholarly research is still published under the traditional

model and you will miss valuable materials by not learning how to use your library for research.



Artist: Rebecca Kyser (2024), licensed CC BY-NC 4.0 Full comic about predatory publishing at https://blogs.gwu.edu/himmelfarb/2024/05/29/comic-predatory-publishing/

Watch the video below for an overview of open access and how it compares to previous publishing norms.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://umsystem.pressbooks.pub/information/?p=371#oembed-2

Problems with Open Access

Increasing the amount of scholarship that can be accessed free online is a

lofty goal. There are, however, some complications with different models of implementing open access. These include:

- Concerns about the quality of material published open access vs. through traditional publishing routes.
- Placing a financial burden on researchers hoping to publish their work. Often, materials are made open access because the researchers pay a fee (sometimes an exorbitant one) to the publishers to make their work open. This model costs more to researchers and prevents work from less well-funded institutions (including those in developing countries) and in less well-funded fields from being published.

For a humorous take on a serious issue in academia (all rights reserved to the creator):

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://umsystem.pressbooks.pub/information/?p=371#oembed-3

Key Takeaways

- Publishers are the main stakeholders who profit from the work of scholarly research.
- Access to academic research is increasingly expensive, putting strain on library budgets.
- Publishing open access is a helpful alternative model to traditional publication, but comes with complications like

quality concerns and undue fee burdens on researchers hoping to publish their work.

34.

COPYRIGHT AND INTERLIBRARY LOAN

Libby Wheeles; Helena Marvin; and Tim Nelson

Introduction

In previous chapters, we covered one of the basic truths that governs traditional scholarly publishing: in many cases, **publishers**, not researchers, own the rights to a final published scholarly manuscript.

This chapter covers what it means to "own" the rights to ideas, writing, images, etc. (**copyright**) and how that legal structure impacts a crucial library service, **interlibrary loan**. This information will help you understand why an important library function exists. It may also help inform where and how you publish your own work in the future.

What is Copyright?

> **Copyright** is a legal right that gives the creator of a work (written work, art, music, etc.) ownership over their own material. Other people can't replicate it, make money off it, edit it, or (with exceptions) share it with others without the permission of the copyright owner.

In the modern US, you don't need to register anything with the government to have copyright over your own work. You automatically have it once you record your idea in a fixed form.

This concept can be tricky to think about when comparing ownership of ideas versus ownership of physical things. If you have a loaf of bread and give it away, you no longer have the bread. Afterwards, the other person can do what they like with the bread. But, if you write a poem about bread and share it, you still have the poem (and, they do too). **Copyright** is intended to ensure that you still "own" the rights to your poem even if you, for example, share it online. It would be illegal for someone else to print copies of your poem and sell those – even if they found the text online, they don't own the copyright for your poem. It is your **intellectual property**.

Copyright and Academic Research

Copyright becomes trickier when you go through a publisher to share your work. Until they publish it, researchers retain copyright for their manuscripts (with some exceptions – sometimes, their employer considers it "work for hire," and the employer instead retains copyright).

In the traditional publishing model, authors rarely get to keep their copyright if they want to get their work published. Instead, they transfer the rights to their work to the publisher in a Copyright Transfer Agreement. The publisher now has the right to replicate, edit, and disseminate that research. That is how the publisher continues to make money from research rather than the original authors. The manuscript is now the **intellectual property** of the publisher, rather than the researchers. The publisher holds the **copyright**.

Why would researchers give up their copyright?

In short, they *have to* in order to advance their careers. Publishing scholarship is a requirement for tenure at pretty much any institution. Right now, publishers offer the main avenue through which academics' work can be disseminated to their colleagues and help them become recognized as reputable scholars in their field.

Licensing

Licensing is the legal tool used to define exactly how a copyrighted article can, or can't, be used by others. It is also the mechanism by which libraries gain access to scholarly material through a publisher, especially for digital works. When purchasing a license (for example, for an eBook), libraries are told the rules they must follow when providing access to their patrons. These rules could include how many people can access it and under what

conditions (e.g., How many people can read it at once? Does the patron have to physically be on campus? Is access limited to a particular group of faculty/students?) as well as whether the library can share that item with other libraries via **interlibrary loan**. Any use outside the paid license could be a violation of the publisher's copyright.

Interlibrary Loan

Interlibrary loan is the process by which libraries lend materials to each other. It is a crucial service that expands access for patrons whose home libraries may not own or license all the materials they need for their research topic.

We have already established that most articles have **paywalls** that prevent people from accessing them on the open web. By using a library search tool and logging in with your university credentials, you gain access to materials that your library has **licensed** from academic publishers. When you use **interlibrary loan** to get something, you are experiencing an escape hatch built into the legal framework to balance the restrictive nature of the economics of research. It is an extremely important (and sometimes underutilized) service that allows you to read materials even if your library has not purchased or licensed them.

If publishers own most copyrights, how can libraries send articles to each other without paying?

ILL is a right built into copyright law. Section 108 of the U.S. Copyright Act allows libraries to make and share copies of works for non-commercial, educational purposes. It is a provision that ensures knowledge isn't locked away because a single library can't afford it. When a researcher uses ILL, they are participating in a century-old tradition of library collaboration that, like open access, is operating in opposition to the idea that access to knowledge should be determined by what you can afford to pay.

Interlibrary Loan at UMSL

There is **no charge** to place interlibrary loan (ILL) requests at UMSL. There are two main ways to place requests:

1. Clicking a "Request this Item through Interlibrary Loan" button you see in a library search tool. Using this button auto-fills a request form that is processed by our ILL staff.
2. Manually completing an ILL request form. Make sure to select which type of resource you need using the tabs at the top of the form.

> **Search tip:** No library provides access to everything. Especially as you progress to more advanced research, consider expanding your scope to materials that you can get from other libraries.

Important: Just like managing budgets and handling complicated purchase/licensing agreements, ILL is an important library service that often happens behind the scenes. It requires staff, funding, software, and materials to function properly.

Key Takeaways

- People who create an original work have **copyright** over their material. Copyright is a legal right to replicate, adapt,

and disseminate (and importantly, make money from) that work.

- In order to publish their work, researchers often have to transfer their copyright to the publisher, who will now be the entity that makes money from selling access to that research.
- Interlibrary loan is an important library service that allows patrons to access materials from other libraries. Sharing materials between libraries is a right built into US copyright law.

35.

CREATIVE COMMONS

Libby Wheeles; Helena Marvin; and Tim Nelson

Introduction

In previous chapters, we discussed the increasing popularity of publishing scholarship **open access**: making materials freely available online. Open access publishing is just one aspect of the larger **open movement**: a movement (both within and outside of academia) to make materials free for viewing, for reuse, and for adaptation. Open materials include not just scholarship, but images, software, audio, video, data, and more.

One common mechanism for making materials open is publishing them under a **Creative Commons (CC)** license. CC licenses allow authors to make their materials open while still specifying certain conditions under which their work can be reused by others.

You may see some academic works published under a CC license. It's also helpful to be aware of as you become a more advanced researcher and, perhaps, publish your own work online. This chapter offers a very short overview of different types of CC licenses you may encounter or use yourself.

Creative Commons

A **Creative Commons (CC) license** allows an author to make their work open for reuse, adaptation, or dissemination by others (or, some combination of these permissions).

CC licenses are standardized and recognizable by a common logo. You may recognize one of the CC licenses that UMSL uses for its video tutorials:

CC-BY-NC-SA license

Watch the video below* (from the University of Houston Libraries) for an overview of what Creative Commons licenses can do for your work:

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://umsystem.pressbooks.pub/information/?p=485#oembed-1

***Did you notice:** If you look in this video's description on YouTube, you can see that it was created using content they adapted from another university's video. That original video was under a CC license, which gave permission for the librarians at the University of Houston to adapt their ideas to create their own version. The new version is also under a CC license!

Below, read through a very short description of the different types of CC licenses. If you ever want to publish your own work under a CC license, carefully consider which permissions you'd like others to have when reusing your material.

CC Licenses

CC0

A **CC0** license places **no** restriction on how someone else may reuse your work. They do not have to give you credit, they may adapt your work, and they may make money off their version of your material.

CC BY

CC BY requires only that someone else credits you when they reuse your work. They are free to edit, share it under different permissions, and make money from your material.

CC BY-SA

CC BY-SA requires that someone reusing your work must (a) credit you and (b) reshare the work they created by building on your material under the same license you used (SA = "share alike"). SA requirements promote the publication of more open materials by people who use your work. They are still allowed to adapt your material or make money from the product they create using your work.

CC BY-NC

CC BY-NC prohibits someone reusing your work from making money from whatever their final product is. They can only reuse your work for noncommercial purposes. They must still credit you.

CC BY-ND

CC BY-ND (a) requires that people reusing your work must credit you and (b) are prohibited from editing your work in any way. They must use what you created in its original iteration (ND = "nonderivative").

CC BY-NC-ND

CC BY-NC-ND combines several of the previous license characteristics. This license requires that users must credit you and prohibits derivative works as well as commercial uses.

CC BY-NC-SA

CC BY-NC-SA combines several of the previous license characteristics. This license requires that users must credit you and share their own work under the same license. They are also prohibited from reusing your work for commercial purposes.

Key Takeaways

- Creative Commons are a frequently used tool in the open movement to publish works that can be reused by others under certain conditions.
- Different CC licenses have different permissions. Common requirements include having to credit the author or share their work under a similar license; common prohibitions include restricting commercial use or creating derivative works (i.e., adapting it from the original).

PART VII
GENERATIVE AI

36.

ABOUT WEEK 7

Overview

This week, we cover a rapidly advancing technology that is likely to significantly impact both personal and academic research: generative AI. Our goal is to help you understand what generative AI is, cover its limitations as a tool for emerging researchers, and discuss ethical considerations you should be aware of (whether you use AI or not).

Understanding AI can seem daunting. Please know that you **do not** have to have a computer science background to master the basics of how genAI works. You are capable! And, understanding these concepts will help you navigate the changing world around you, both in the classroom and after you graduate.

Also: you are **not required** to actually use AI to complete the assignments this week. Some of you may be coming to this class already informed about the ethical complications of AI use (such as heavy environmental impacts, biased output, or the use of pirated training data). We support your decision, and our discussion board this week offers both a chance to experiment with AI AND an alternative discussion prompt.

We do still encourage you to thoughtfully engage with the material this week. Understanding how AI works will help you navigate an information landscape in which genAI is likely to be increasingly integrated – in the future, you may not always have the option to not use a resource built with generative AI.

Learning Objectives

By the end of this week, you will be able to:

- Identify the basics of how generative AI tools, especially LLMs (Large Language Models), “learn” and generate output
- Describe why LLMs like ChatGPT have limited use for academic research
- Evaluate whether AI use for a given task is appropriate based on ethical considerations

Week 7 Activities

- Read and watch the Week 7 content
- Participate in the Week 7 Discussion Board by **10 PM Wednesday, Oct. 8**
- Complete the Week 7 Self-Check Quiz by **10 PM Sunday, Oct. 12**
- **OPTIONALLY** Submit your second annotation for feedback by **10 PM Sunday, Oct. 12**

37.

KEY CONCEPTS IN AI

Introduction

This chapter introduces basic concepts underlying AI, particularly popular language models like ChatGPT. Our goal is not to encourage or discourage the general use of AI, but instead to help you understand its foundational mechanics. We believe this information will become more and more essential to your education and work as AI rapidly becomes integrated into various technologies in our day-to-day life.

AI, Algorithms, & Machine Learning

> **Artificial intelligence (AI)** is technology that mimics human intelligence by completing tasks that would normally require a human to achieve: perceiving the world, learning from recognized "rules," and making decisions.

Older AI relied on humans designing complicated but explicit instructions for how to interpret input and generate output. At their most basic, these instructions, or rules, take the form "if X, then Y." "If a traffic light is green, then cars can go." "If text includes the phrase 'Dear So-and-so', then it is a letter or email." "If someone listens to Lana Del Ray, then they may also like Billie Eilish."

Sophisticated sets of rules governing AI "decisions" and output are called **algorithms**. You are probably familiar with algorithms in the form of social media feeds or recommendation services. Algorithms influence what you see in your Google search results, on your TikTok "For You" page, and in your Spotify recommendations. They are also the foundation to other

widely-used technologies, like image filters or "shortest path" calculations by your GPS. Recent tools like ChatGPT have popularized awareness of AI, but this technology has been in our lives for a long time.

Since the 1950s, AI has become more sophisticated through **machine learning:** processing extraordinary amounts of data and identifying patterns without explicit human programming. In other words, machine learning allows AI to work with more information, at greater speeds, and with more complex detail as it teaches *itself* (with human supervision) about the patterns found in its training input (text, images, code, audio, and more).

AI models that independently "learn" at high speeds, and with truly copious amounts of data to "learn" from, do tasks like categorize, write, calculate, summarize, prioritize, etc. in ways that **seem** closer to what an average human, with an average knowledge of the world around them, could do. As a result, we have seen the advent of new AI tools and rapidly improving capabilities for familiar ones. Increasingly complex AI tools, with mass troves of data, do things like interpret finer details in images, process and produce language for niche situations, and build/run complicated mathematical models, among other tasks.

AI models require guidance from people. Technology which is built on data patterns is only as good as that data and its own programming. We cover this topic in more detail in the next chapter, but AI can overgeneralize, make mistakes, and miss important details. It is common to assume AI is more capable than it actually is, sometimes in ways that can harm our learning, health, relationships, and more.

Our takeaway for now is: AI tools are more closely approximating human capabilities, but they **cannot** replace our powers of perception, logic, creativity, or moral reasoning.

Generative AI & LLMs

Generative AI (GenAI) uses patterns learned from training data to produce **new** text, audio, video, images, or other content.

GenAI models learn complicated networks of "rules" that they use to interpret input from a user and *generate* a unique output. The "unique" part is crucial. In theory, GenAI should not reproduce any of its training data, instead producing a new combination of words, images, and more that are nevertheless still dependent on the training data. (We briefly explore this replication concern and its implication for copyright in the Ethics chapter this week.)

Watch the video below for a short visual overview on generative AI (run time 5:01):

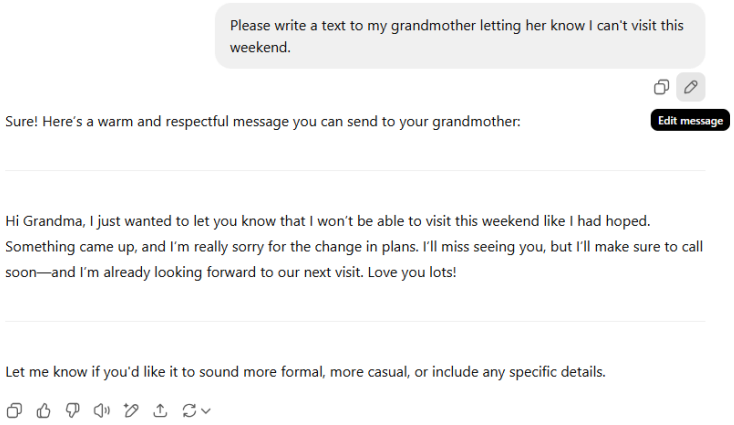
One or more interactive elements has been excluded from this version of the text. You can view them online here: https://umsystem.pressbooks.pub/information/?p=393#oembed-1

Large Language Models (LLMs) are a type of GenAI focused on *language*. ChatGPT, currently the most widely used standalone AI tool, is an example of an LLM. One reason for the popularity of LLMs, and skyrocketing public awareness of AI, is their the capacity for **natural language**, not just in *output* but in *input*. In other words, you can "talk" to the AI the same way you would talk to another human being. This feature allows you to use AI without needing to learn computer code or limiting yourself to a set of predetermined options. The only limit to your input (often called a **prompt**) is your own creativity, while the sophistication of outputs are continually evolving.

ChatGPT and similar tools work as though you are having a conversation with the AI. You type in a prompt, the AI responds, and then you can ask it to complete a new task or edit its previous responses based on further instructions from you. To a certain extent, it remembers your previous input as well as its own responses and can make adjustments

without you needing to repeat instructions in their entirety. Again, this feature more closely **approximates** a real human conversation, making the AI both more accessible and deceptively human-like.

Here's a screenshot of what a basic ChatGPT prompt and response looks like:



ChatGPT basic prompt and response screenshot, August 2025

As the response text suggests, you could then type in instructions and have ChatGPT adjust the tone of the text, make it longer, include specific language, and more. This example is basic, but people use conversational LLMs to do any of the following tasks:

- **Generating text**. People have asked LLMs like ChatGPT to generate emails, essays, scripts, and other text-like outputs like computer code. Whether you *should* use AI to do these tasks is a topic we cover in the next chapter.
- **Summarizing**. LLMs can – mostly effectively – summarize longer texts or groups of texts, including documents that you upload.
- **Translating**. LLMs can serve as reasonably accurate auto-translation tools, with caveats. For example, their accuracy may vary especially when translating less common languages underrepresented in their training data.
- **Interpreting and generating tone**. In addition to basic text generation, LLMs can "perceive" the tone of your input and follow instructions in generating output to match a specific tone, context, or intended audience.
- **Editing**. In addition to tone adjustments, LLMs can offer suggestions for basic grammar and spelling edits alongside more significant restructuring improvements for longer texts.
- **Providing information...maybe**. A major task people

frequently *try* to use LLMs for is answering questions or otherwise providing information. However, as we see below, the function of LLMs is *predicting words*, not fact-checking, evaluating sources, or often even linking to real web pages. **Finding real information, especially for college-level research, is generally not an appropriate use for an LLM!**

Training LLMs

AI models are trained on massive datasets of text, art, video, audio, and more. They "learn" rules for interpreting input and generating output through analyzing training data patterns, making guesses, and making corrections under human supervision. Through this process, they improve in their ability to generate "correct" responses.

Important points:

- AI models do not "create" content. Instead, they **predict** language, art components, etc. based on learned patterns.
- AI companies are often not transparent about their training data. Their use of copyrighted material without creator permission may violate ethical and legal standards. (See the Ethics chapter this week.)

Training data for LLMs include books, web pages, discussion boards, social media, computer code, and more. LLMs "learn" via a **transformer** that processes text as a sequence, analyzing word frequency in the context of the words and sentences around it. (A generative pre-trained transformer – a GPT – is the basis for the name "ChatGPT").

Activity

Scroll through this helpful explanation of transformers from the *Financial Times* for an understanding of how various LLMs, including ChatGPT, were trained. This information will help you understand what popular tools like ChatGPT can, and can't, do.

The fact that LLMs merely **predict** the next words in a sequence mean that they cannot fact-check themselves or truly understand the content they produce. They are helpful tools for generating language, but **not** for replacing true research, especially at the college level and above.

Key Takeaways

- AI is technology that mimics human capabilities. Modern AI models rely on machine learning, in which they teach themselves patterns from enormous datasets (guided and corrected under human supervision).
- Generative AI is AI that generates new content (as opposed to, for example, merely categorizing). LLMs (Large Language Models) like ChatGPT are a type of GenAI that focus on language.
- LLMs work by predicting the next likely words and phrases in a sequence. They cannot fact-check or truly understand their training data, input, or output in the way a human can.

38.

LIMITATIONS OF AI FOR RESEARCH

Introduction

If your exposure to AI has primarily been through friends, hype from the general Internet or news, or even teachers actively encouraging you to use it, you may view AI as an obvious go-to resource for anything from writing essays to finding sources to asking real-life advice. The fact that you can ask questions of a chatbot, which then appears to synthesize information, respond, and edit based on your feedback in a personalized and authoritative-sounding way, makes AI tools a more tempting option than using search engines, the library, individual resources like books or articles, or even asking a real person.

It's easy. It's free (for now). It answers your exact question in a confident and "well-written" response – sometimes with links! Why *wouldn't* you use it?

Our goal here is not to argue there aren't uses for AI, even in an educational setting. We leave that determination up to each professor and their goals for their own class. However, there are several **essential** points we'd like to cover:

- AI is not better than you. Even if you perceive your critical thinking or writing skills to be insufficient, they are automatically better than a machine's because they are real.
- AI tools have **serious limitations** that are **not obvious**, even sometimes to experienced academics. Their outputs are **specifically designed** to sound confident, accurate, and well-formulated, and yet, we have countless examples of false or misleading or poorly-supported AI output. It can be extremely challenging to navigate this reality as a beginner researcher or even just a regular person.
- Deciding whether to use AI for a given task is difficult in a world where (a) technology is changing rapidly, (b) expectations are different in different classes and different workplaces, and (c) AI companies are **not up front** about their tools' limitations or ethical decisions that might make you question whether you engage with their product.

Our goal with this chapter is to introduce some of these considerations so you can make well-informed decisions about what is right for you as a person, as a student, as an employee, or in other relevant areas of your life. Keep in mind this content is not comprehensive. We highly recommend further research (somewhere other than an LLM...) on any topics of interest.

AI For Research

A common use for tools like ChatGPT (or even the AI overviews on Google) is **finding information**. As we covered already, using ChatGPT (or Claude, Perplexity, etc.) is appealing because, unlike using the library search or even a search engine, you can type your question in a way that makes sense to you and get a response that (in theory) combines information across different sources. You don't have to click into a bunch of resources to piece together an answer, and if you do want to explore further, most of these tools link out to the "sources" they "pulled" information from – things like social media posts, websites, and even academic articles.

So what are the downsides? Turns out, there's a lot.

Hallucinations and Misinformation

The biggest problem with using AI for research (either personal or academic) is **hallucinations**.

> **AI hallucinations** are AI-generated content that is false or inaccurate. Examples include fake sources, links that lead nowhere, and false facts.

Other forms of misinformation from AI includes summaries that misrepresent the sources they are "referencing" and facts taken out of context.

LLMs like ChatGPT or Google's AI Overview feature are vulnerable to hallucinations because they are **prediction machines**. Rather than asking *what the answer to your question is*, they instead ask *what an answer*

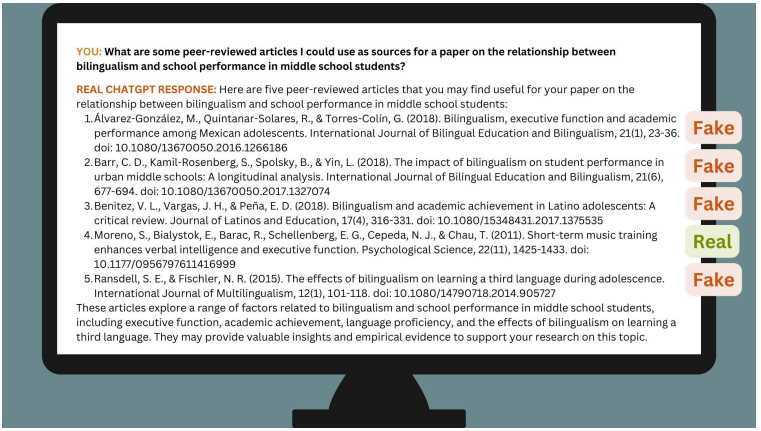
to your question would look like. You get responses that appear helpful at first, but are incorrect (or entirely made up) when you explore further.

Therefore, you get issues like:

- Incorrect facts
- Claims that are removed or rephrased from their original context, and therefore are entirely misleading
- **Completely fake sources and links**

These issues occur alongside problems like not accurately identifying key points of a source or even claiming a fact came from one source when it actually came from a different one.

Examples of AI Hallucinations

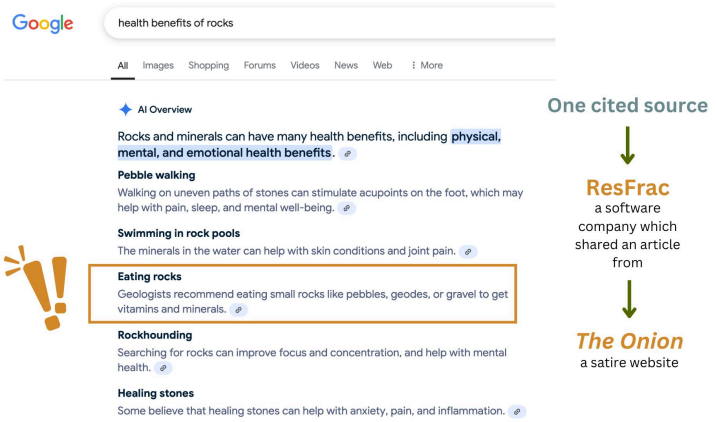


ChatGPT source recommendations, Fall 2023

The image above is from a workshop held by UMSL Libraries in the '23-'24 school year. Though AI models have advanced rapidly since then, hallucinations as seen in the response are still very common.

Importantly, they would not be obvious to a newer researcher. Hallucinated citations follow a pattern of being unusually well-suited to the proposed topic, sometimes with the names of real authors and article titles that are very similar to actual papers. However, a search to read the full text reveals that the article does not actually exist. The tool may even "hallucinate" a DOI or a link that leads to nowhere.

Importantly, this issue does not only happen with academic articles. AI will also generate fake but plausible-sounding news articles, web pages, books, etc.



Screenshot of Google AI overview, February 2025

It's also important to remember that AI does not "understand" or "read" the sources it cites. This limitation can result in misleading claims and a lack of important context.

In the Google screenshot above, the AI Overview claims that geologists recommend eating rocks to get valuable vitamins and minerals. However, by exploring the sources cited by the AI tool, we find an article from ResFrac, a software company, thanking *The Onion* for using a picture of a geophysicist who advises their company. Importantly, *The Onion* is a **satire site** (the original article was titled "Geologists Recommend Eating At Least One Small Rock Per Day"). Google's AI considered ResFrac to be a reputable site, but could not pick up on the context of an amusing reference back to a satire article. It would probably be worth second-guessing some of the other claims as well.

Source Type Limitations and Accessibility

LLMs are improving in their ability to link to real sources. Some tools (e.g., Perplexity) are even designed for online research and allow you to focus your efforts on particular types of sources. However, most of these tools **are still insufficient to rely on for college-level research** for multiple reasons:

- Most of these tools are bad at identifying the **type** of source they are referencing. As a new researcher, you may struggle with distinguishing sources types. Your generic AI tool is worse at it.

- Links are often **limited to materials that are available open access online.** We don't mean to suggest that if something is available for free online, that means it's inappropriate as a source for academic research. However, you would also be **missing a TON of helpful research** on your topic that you could be finding by using a library search tool. This content includes:
  - Materials that are digital, but locked behind a paywall so you can't actually read them. **Just reading a summary or abstract is not sufficient for college-level research**. Visit your library for access to paywalled articles.
  - Print materials. **Plenty of helpful and up-to-date content** is still published and purchased in print. Tools like ChatGPT will typically not reference these sources, nor will their content be included the training material used to generate its answers (the same is true for a lot of paywalled content).

Bias

AI can generate biased content as a result of its training data. LLMs like ChatGPT train on human-created texts, much of which reflect stereotypes and misinformation about various groups of people. Other types of AI that rely on non text-based data for tasks such as categorizing, recommending, and otherwise making decisions can also be impacted by unrepresentative training materials.

Finally, the decisions that people make using AI-generated content is also vulnerable to bias (as are most human thoughts and actions), especially if the people using these tools assume they are infallible and "neutral."

The video below provides a short overview of this issue (run time: 8:37):

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://umsystem.pressbooks.pub/information/?p=395#oembed-1

AI Misinformation and Research: Real Consequences

As a student, it may be understandably difficult to grasp why professors and others are so averse to relying on AI for in-depth research. However, it's important to remember that the **information gathering**, **source evaluation**, and **comprehension** skills you develop throughout your college classes are meant to prepare you for navigating the real world.

Our examples of AI hallucinations so far have been, technically, accidental. Untrue facts are the result of limitations of the AI model, not someone maliciously creating fake content. However, it's important to keep in mind that **both unintended and intentional misinformation** have the potential to have real negative consequences.

We have reached an era where some research articles, websites, and even government reports (that influence **real policy and public opinion**) have included fake citations (note: the goal of this example is not to critique a specific political party, but to illustrate the natural questioning of credibility that results from work built on sources that don't exist). Think about how you feel as someone whose health, finances, relationships, voting patterns, and other **real and important** decisions could be impacted negatively because someone in a position of responsibility inappropriately relied on AI rather than real research.

Eventually, **you will be the person with responsibility**. We encourage you to learn the source gathering and fact-checking skills you need to bear that responsibility with integrity.

These skills will also serve you well as we face a world where bad actors intentionally use generative AI to create fake content, either as a prank or for more malicious goals (like influencing elections, scamming people, etc.) Watch the video below for a short discussion of this problem (run time: 13:02):

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://umsystem.pressbooks.pub/information/?p=395#oembed-2

Key Takeaways

- Most generic AI tools like ChatGPT are not well-suited for research, either academic or personal.
- Significant research-related limitations of popular AI tools include frequent hallucinations, limitations in available sources, and possible bias.
- Relying on tools that can either intentionally or accidentally generate fake content can have real-world consequences. It is important to be aware of these limitations so you can manage your personal, academic, and work responsibilities with integrity.

39.

OTHER ETHICAL CONSIDERATIONS

Introduction

So far, we have covered the basics of how AI works and whether popular tools are appropriate for academic research. However, other ethical factors may influence your decision on whether or not to use AI, either in the classroom or outside it. This chapter provides introductions to these considerations so you can make an informed choice.

Copyright and "Stealing"

Training Materials

AI training depends on machine learning – the ability for a model to teach *itself* about patterns found in its training materials. Successful machine learning depends on a truly **vast** amount of data. More extensive and diverse data points typically result in better-tuned models.

However, the exact sources that popular tools like ChatGPT, Claude, Gemini, and others use for training are not fully disclosed. While some of these datasets are materials that are free for reuse or are old enough to no longer be subject to copyright, a significant portion of training data **is likely copyrighted material that has been copied and used to train AI models without the creators' permissions**. This material includes not just publicly available text on the Internet (which is still the intellectual property of its creators, regardless of whether it's been published online), but also the text of pirated books. The same concern applies to artists whose works have been used to train AI for image generation.

Many people have concluded that any AI use is ethically wrong in solidarity with the artists (in various mediums) whose work has been used to train highly profitable AI models without compensation.

Output

AI-generated work cannot be copyrighted. If you create text, images, or other content with generative AI, you do not have rights to that work.

Liability and Citation

An essential foundation to fields like academia and journalism is the ability to **cite sources.** When authors share data or make claims, they support those statements by sharing where or from whom they gathered that information. This practice means that authors SHOULD rely on credible sources, resulting in better information sharing; it also allows readers to evaluate sources themselves and track down sources for their own research.

AI tools taking others' words and ideas and remixing them for new output (that frequently contains errors) **means that there is no trail of responsibility** to the original source of information. Readers cannot fact-check an information source because there isn't one there. There is no author or organization whose reputation we can research; there is no research methodology we can critique.

If an AI tool produces incorrect facts – possibly with harmful consequences for a user who doesn't know that hallucinations are even possible – who is responsible? Is it the company who created the tool? Is it a specific person at the company? Can they wash their hands of liability and say "well, it's just a risk of the model"? This uncertainty has both ethical and legal ramifications that are still unfolding.

Note: There are ways to cite various AI tools or otherwise acknowledge that you used AI in a project. For specific assignments, check with your professor. One example strategy is the AI Acknowledgement tool created by Helena Marvin, UMSL Libraries, licensed CC0.

Power

Training and running AI requires an enormous amount of power and resources (e.g., water). This resource consumption has significant environmental and power bill ramifications, especially for individuals who live near AI data centers. Powering and cooling data centers has been a concern before the recent escalation in AI use – now, it is significantly increasing. See the video below for an example of recent conversations on this topic here in St. Louis:

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://umsystem.pressbooks.pub/information/?p=818#oembed-1

Privacy

Content You Share With AI

AI companies are not always forthcoming about when and how they harvest, retain, and use personal data submitted by their users. Some tool policies restrict what they do with user input (i.e., what you type into the prompt bar), but they may track your activity in other ways. Once collected, it's even more unclear about what these companies do with your data – store it indefinitely, use your conversations for review or training, or even sharing your information with other companies (possibly for profit).

Content You Share Online

AI is built on data scraping to extract massive amounts of data from the Internet in order to train models. You may never know if any information you put online has been used to train AI.

Your Other Activity

It is becoming more common for AI tools to request broad access to features on your device(s) in order to function, including calendars, photos, contacts, email, and more. Even if this data is stored locally on your phone or laptop, granting a tool access allows it to essentially capture a snapshot of your most personal information. In this way, you may never know what data it has gathered from you or what is done with that information.

Labor

Impact on Future Employment

AI can make some jobs more efficient, but its growing capabilities may also lead to unemployment. The Future of Jobs Global Report 2025 indicated that 41% of companies are planning reductions in workforce as artificial intelligence tools and models continue to expand, causing many to fear replacement by AI and the loss of their jobs. Current sectors most at risk are ones that lend themselves to automation, like customer service, banking, insurance, and even transportation. Other roles that could be impacted include factory/warehouse workers, research analysts, and computer programmers.

Yet in the same aforementioned report, AI was also identified as one of the fastest-growing core skills sought out by employers. This means workers will likely be expected to have a familiarity with and working understanding of AI moving forward, which can box out those who have had minimal experience with this technology. Skill divides may become even more exacerbated, and information literacies (technology literacy, AI literacy) will be more valuable than ever. While the future is very much uncertain, it is clear that AI implementation and reliance will impact and shape the labor market over the next several years.

Exploitation

Despite appearances, AI does still require human labor in order to perform effectively, especially when it comes to training and improvement. This industry, referred to as "crowdwork," "data labor," or "ghost work," has boomed with the increase in AI models requiring training and testing. People are needed to manually review, tag/label, annotate, and moderate data, which often results in exposure to disturbing and psychologically damaging content. In other cases, their roles involve inputting provocative prompts and assessing bias and/or offensiveness of the model's responses. Doing these tasks for hours a day can take an immense toll on one's mental health, and unfortunately, most of the time these workers are contract hires who receive minimal compensation. They do not have access to health benefits, cannot earn enough for the resources they may need, and can be indiscriminately fired from their jobs. These workers are considered "invisible," as their labor is largely unacknowledged by the companies they work for while also going unseen by consumers. When companies market AI tools/features as if they simply work like magic, it is easy to overlook the very real human cost.

Related to exploitation, see also the section above on Copyright regarding training models on content without compensating creators.

Best Practices

- Consider each usage of AI and whether another non-generative tool could be used.
- Be conscientious of your use of AI tools.
- Consider if your AI task is worth potentially giving up access to your personal information.
- Thoroughly review the privacy or data use policy of any AI tool you're considering using.
- Avoid putting any personal information (yours or anyone else's) into a chatbot or other AI tool.
- Do not upload any proprietary information or work (yours or anyone else's) into an AI tool, especially without permission.
- Acknowledge your use of AI.

Key Takeaways

- There are many ethical considerations to consider when choosing whether or not to use AI for a given task. These include potential harms for other people, yourself, and the environment. Some prominent topics are:
    - Copyright violations and lack of compensation
    - Liability and academic citation standards
    - Power use and environmental impacts
    - Privacy
    - Job market impacts and labor exploitation

*Some content on this page is adapted from:

- Missouri Library Association. (2025). "Missouri Librarian AI

Resource Summit." [link forthcoming]

PART VIII
CITATION MANAGEMENT

40.

Overview

This week, look ahead to your future as an academic researcher. As you explore areas of interest and grow your research skills, you will encounter specific topics and sources that you'd like to save, organize, refer back to, and cite during your studies and possibly after you leave UMSL.

Therefore, our final skillset to impart is **citation management**: the process of organizing and referencing your sources in an efficient way. There are multiple citation management tools out there, some free and some that cost money. In this class, we cover Zotero, which is both robust and free.

Learning Objectives

By the end of this week, you will be able to:

1. Identify the purpose of citation management tools
2. Use the Zotero software to:
    1. Save sources to your Zotero library via a browser plug-in
    2. Organize sources in a way that makes sense to you and your work
    3. Auto-generate citations from your Zotero library sources in a word processing tool like Word

This week, you also complete your final **annotated bibliography** and **research reflection.** The goals of these assignments are

to practice skills and reinforce new concepts you learned throughout this class.

Week 8 Activities

- Watch the Intro to Zotero video
- Submit your Final Annotated Bibliography by **10 PM Sunday, October 19**
- Submit your Research Reflection by **10 PM Sunday, October 19**

41.

Overview

Citation managers are software tools to help you save and organize sources and generate both individual citations and bibliographies.

Popular citation managers are EndNote, Mendeley, and Zotero. These tools can be invaluable assets to support your research as you accumulate helpful sources, explore diverse topics, and continue your research beyond UMSL and UMSL Libraries.

Zotero

Zotero is a free citation manager. In the recorded workshop below (hosted Fall 2024), your instructors Libby and Lena introduce how to install the software on your computer, how to easily save sources to your library while researching online, how to organize your sources, and how to connect your Zotero library to Word to easily generate citations and bibliographies.

Tip: Use your **personal** email address when signing up for a Zotero account. That way, you won't lose access to your Zotero library when you graduate and can no longer use your school email.

Activity

Watch the recorded Intro to Zotero workshop. Follow along on your own device to install Zotero + the browser plugin, save sources, and create citations.

Key Takeaways

- Citation managers can support your research by helping

you easily save, organize, and cite sources.

- Zotero is one of many options for robust citation managers. Unlike some other popular choices, it is free.

RIL Annotated Bibliography: Assignment Overview

Students submitted a short annotated bibliography as part of the final project for this course (alongside a research reflection). This project was heavily scaffolded across the 8 week course. Students first selected a topic of interest related to libraries, research, or information, then narrowed that topic as their search process progressed. Sample topics from this semester's students include:

- Health misinformation on social media
- How video game music conveys information
- Documentation methods to preserve endangered languages
- The impact of misinformation on Christian-Muslim relations in Nigeria

For their final annotated bibliography, they submitted two annotated sources cited in APA format. For each annotation, they were asked to summarize the source, evaluate its reliability, describe an interesting detail, and identify possible limitations.

Students in this entry-level course were, with some exceptions, brand new to academic research and, in some cases, brand new to creating citations. As part of their submissions, students selected their preferred Creative Commons license and name format. Not all students chose to publish their annotations.

The annotations below are presented exactly as students submitted them. Everyone received feedback and guidance on correcting citation errors, misunderstandings about their chosen articles, etc. for one of their two citations before submitting their final project. They also received feedback after their final submission, which is not reflected in the content below.

Goals and Lessons

Our goals in including our student bibliography as part of the published class textbook are to (a) allow our students to participate in the scholarly conversation through to publishing phase and (b) share our own lessons learned as instructors. To address the frequency of AI-generated "hallucinated" sources and misunderstandings of the chosen articles, we

plan to make significant adjustments to the future content and structure of this class.

Major future revisions include:

1. Significantly more time investment in how to read and comprehend academic journal articles;
2. Relocating necessary information about the limitations of AI to the beginning, rather than the end, of the course; and
3. Requiring students to link to sources from the main library search or individual databases.

AI-Generated Sources

AI-generated sources, annotations, discussion board posts, and other content was a significant challenge in this class. We will not be identifying individual students who submitted AI content. In the interest of growth for our own course and others, we want to share patterns of AI-generated sources submitted for this assignment:

- **Accurately formatted citations**. The submitted sources looked very real, followed APA formatting, and even included DOI links.
- **Real or realistic journal or newspaper names** – for example, the *New York Times.*
- **Article titles that are very similar to, but do not exactly match, real sources**, making it more challenging to identify whether a student used AI or just misread the article title in question.

As AI-generated content grows more sophisticated, ensuring students are engaging with real sources and achieving learning outcomes grows more challenging. We hope the revisions we mention above will provide more support for students in future semesters.

Fall 2025 Student Bibliography

Instructor Notes

The citations below are presented as submitted by students, corrected only for hanging indent and rearranged in alphabetical order. Some entries were either (a) fake sources generated by AI or (b) real sources with fabricated information, also influenced by AI. We indicate these sources in brackets where they would have gone if they were real citations.

Crawford-Franklin, C., & Robinson, L. (2013). "Even in an age of wonders": Radio as an information resource in 1920s America. Journal of Documentation, 69(3), 417–434. https://doi.org/10.1108/jd-08-2012-0108

[AI-generated citation submitted]

Crooks, P., & Wallace, C. (2018, January). *Construction/Destruction: The Public Record Office of Ireland (1867-1922)*. Virtual Treasury. https://virtualtreasury.ie/archive-fever/construction-destruction

Demartini, G., Mizzaro, S., & Spina, D. (2020). Human-in-the-loop artificial intelligence for fighting online misinformation: Challenges and opportunities. *Bulletin of the Technical Committee on Data Engineering IEEE Computer Society*, *43*(2), 65–74. http://sites.computer.org/debull/A20sept/A20SEPT-CD.pdf

Feijoo, B., Sádaba, C., & Zozaya, L. (2023). Distrust by default: analysis of parent and child reactions to health misinformation exposure on TikTok. *International Journal of Adolescence & Youth*, *28*(1), 1-17. https://doi.org/10.1080/02673843.2023.2244595

Ferrara, E., Varol, O., Davis, C., Menczer, F., & Flammini, A. (2016). *The rise of social bots. Communications of the ACM, 59*(7), 96–104. https://doi.org/10.1145/2818717

Huber, B., Borah, P., & Gil de Zúñiga, H. (2022). *Taking corrective action when exposed to fake news: The role of fake news literacy*. Journal of Media Literacy Education, 14(2), 1-14. https://doi.org/10.23860/JMLE-2022-14-2-1

[AI-generated citation submitted]

Jo, H.-K. (2024). Why nursing cannot be replaced with artificial intelligence. *Women's Health Nursing*, 30(4), 340-344. https://doi.org/10.4069/whn.2024.12.12

Kelly, H. (2024, July 15). How to avoid falling for misinformation and conspiracy theories. The Washington Post. https://www.washingtonpost.com/technology/2024/misinformation-ai-twitter-facebook-guide/

Kisa, S., & Kisa, A. (2024). A comprehensive analysis of COVID-19 misinformation, public health impacts, and communication strategies:

Scoping review. Journal of Medical Internet Research, 26, https://doi.org/10.2196/56931

Lee, J., Kim, Y., & Zhu, X. (2023). Liked and shared tweets during the pandemic: The relationship between intrinsic message features and (mis)information engagement. Behaviour & Information Technology, 43 (8), 156-1613 https://doi.org/10.1080/0144929x.2023.2222192

Liang, Y.-H., & Chou, T.-C. (2025). Developmental pathways for academic knowledge about public health and social media misinformation: A systematic review through main path analysis. Current Psychology, 1–17.

Makhasane, S. D., Onaolapo, A. A., & Onaolapo, D. G. (2023). Addressing religious crises in Nigerian secondary schools: Parents' and Teachers' perceptions of hijabs in Christian-named government schools. *Education Sciences*, 13(7), 688. https://doi.org/10.3390/educsci13070688

McKee, E. (2018). *The origins and development of the Public Record Office of Northern Ireland, 1922–1948*. Archives and Records, 40(2), 164–178. https://doi.org/10.1080/23257962.2018.1550715

[AI-generated citation submitted]

Michailovsky, B., Mazaudon, M., Michaud, A., Guillaume, S., François, A., & Adamou, E. (2014). Documenting and Researching Endangered Languages: The Pangloss Collection. *Language Documentation & Conservation*, *8*, 119–135. http://hdl.handle.net/10125/4621

Muenster, R. M., Gangi, K., & Margolin, D. (2024). Alternative Health and Conventional Medicine Discourse About Cancer on TikTok: Computer Vision Analysis of TikTok Videos. Journal of medical Internet research, 26, e60283. https://doi.org/10.2196/60283

Nintendo Life. (2024, Jan 2). *The Power of Video Game Music* [Video]. YouTube.https://youtu.be/2_UHEClhYi8

Pennycook, G., & Rand, D. G. (2019). *Fighting misinformation on social media using crowdsourced judgments of news source quality*. Proceedings of the National Academy of Sciences, 116(7), 2521–2526. https://doi.org/10.1073/pnas.1806781116

Pilati, F., & Venturini, T. (2025). The use of artificial intelligence in counter-disinformation: A worldwide (web) mapping. *Frontiers in Political Science*, *7*, 1517726. https://www.frontiersin.org/journals/political-science/articles/10.3389/fpos.2025.1517726/full

Raimi, L., & Boroh, S. E. (2025). How social media is shaping Christian-Muslim schisms: Towards an understanding of the spread of virtual fanaticism in Nigeria. *Informology*, 4(1), 41–56.

Raya, D., Juliebø-Jones, P., Pietropaolo, A., Bhojani, N., Kamal, W., & Somani, B. (2025). Unraveling online perspectives and misinformation surrounding urinary tract infections: A thematic analysis of 1,200 Instagram posts. Urology Research & Practice, 51(3), 84–88. https://research.ebsco.com/c/whjebw/search/details/jycthbthkz?limiters=LB%3ATEIgVU0gKg%3D%3D%26TEIgVU1TTCBMKg%3D%3D%26TEIgVU1TTCBNKg%3D%3D%2CFT1%3AY%2CRV%3AY&q=social+media+AND+health+misinformation+and+instagram&searchMode=all

[AI-generated citation submitted]
Sweet, M. (2015). The language of music storytelling in games. In *Writing interactive music for video games: A composer's guide*. Addison-Wesley Professional. https://learning.oreilly.com/library/view/writing-interactive-music/9780133563528/.
[AI-generated citation submitted]
Van den Berg, R. (2024). Lexicography and language documentation: Urgency, challenges, possibilities. *Lexicography*, *11*(2), 145–180. https://doi.org/10.3138/lexi.27796
Yildiz, E. (2025). Artificial intelligence in mental health nursing: Balancing clinical efficiency and the human touch- A quest for a new synthesis. *Journal of Psychiatric and Mental Health Nursing*, 32, 946-952. https://doi.org/10.1111/jpm.13173

Fall 2025 Student Annotations

Instructor Notes

The citations and annotations below are presented as submitted by students, corrected only for hanging indent and rearranged in alphabetical order. Some entries were either (a) fake sources generated by AI or (b) real sources with fabricated information, also influenced by AI. We indicate these sources in brackets where they would have gone if they were real citations. We also include our own annotations describing how we identified each AI-generated source.

Crawford-Franklin, C., & Robinson, L. (2013). "Even in an age of wonders": Radio as an information resource in 1920s America. Journal of Documentation, 69(3), 417–434. https://doi.org/10.1108/jd-08-2012-0108

This peer-reviewed article explains how radio became one of the main ways people got information in 1920s America. Crawford-Franklin and Robinson describe how it started as military and ship technology but soon became a tool for public communication. They note that early laws like the Radio Acts of 1912 and 1927 were written before lawmakers fully understood how radio worked, treating it more like land or oil than a new form of media. The authors also show how radio connected to education, farming, and culture farmers used it for market and weather reports, and schools used it to reach students in rural areas.

This article explains how radio reshaped the way people shared and received information in 1920s America. It shows how radio connected to different parts of society technology, culture, and policy and how it transformed communication much like the internet does today. The authors also compare the radio revolution to today's digital revolution, showing that each generation has its own "information age."

This source is a good choice because it was published in a respected academic journal and uses both primary and secondary research, making it trustworthy. It provides strong historical evidence and gives a deep understanding of how new communication systems can change society. It also offers valuable context for understanding the long-term impact of technology on learning, culture, and connection.

Summer Cartwright, October 18, 2025,

[AI-generated citation submitted]

This citation was likely generated by AI. It referenced a real source, but the DOI link did not lead anywhere and the volume/issue/page numbers were unrelated to the article in question. The publication year was also wrong. These errors were entirely off-base, rather than a result of typos. A likely cause is either searching for sources using an AI tool or trying to use AI to generate a citation for a real source.

Crooks, P., & Wallace, C. (2018, January). *Construction/Destruction: The Public Record Office of Ireland (1867-1922)*. Virtual Treasury. https://virtualtreasury.ie/archive-fever/construction-destruction

This source is a short academic article published in 2018, within The Virtual Record Treasury of Ireland's "Archive Fever" series, edited by Dr Peter Crooks. Its primary focus is the construction and destruction of the Public Record Office of Ireland (PROI). It dives into the history of how records were kept before the PROI, and its significant impact on the way Ireland as a country kept its records past 1867. This article describes not only how the building itself was constructed, but also the architectural structure of the original building. This not only provides a deeper understanding of which records were kept in which portion of the office, but also what safety precautions were put in place to prevent fires. This aids in providing background knowledge as to why the fire only impacted specific offices, as the fire-breaks found within the building were found

effective in 1922, but worked oppositely than intended. The source then dives into the collection of resources found within the PROI, including, but not limited to: land ownership records, copies of wills, census records back to 1841, records of the Irish parliament before 1800, and records of the Chief Secretary's Office. Finally, it focuses on the destruction of the record office and the large explosion that took place in the Four Courts complex in the building opposite the Record Treasury. The ensuing fire spread to the Record Treasury and consumed the building, destroying a significant portion of the records found within. The fire, which was sparked during the opening battle of the Irish Civil War, created a permanent gap in the historical record, impacting everything from the study of medieval law to modern family history.

This source is considered a reliable source because it was published by a state-funded initiative and is found on the Virtual Treasury website. The Virtual Treasury is a digital recreation of Ireland's Public Record Office and its lost collections. It was created to digitally restore and make accessible the historical records that were destroyed. The project is an online, open-access resource for researchers, genealogists, and the public to explore a vast digital archive of Irish history. A researcher would use this source if they were either looking into the structure of the building or isolating this specific event from the Irish civil war, as it provides a good background on the architectural history of the building, and it would be relevant for anyone attempting to research the downfall of the PROI. This source focuses more on the actual building itself rather than the political

tension that caused the conflict, unlike The Origins and Development of the Public Record Office of Northern Ireland, 1922–1948. Some limitations to this source naturally include a lack of perspective from the political front (as this was a significant factor in the destruction), and may provide a limited perspective due to the article being released on the website that acts as a digital recreation of the PROI. One fascinating detail is the introduction to figures that influenced the PROI, such as Sir Samuel Ferguson, as it provides a more human aspect of the destruction, showing that real people were involved and were impacted.

Em Laubscher, Oct 13th, CC BY-NC-SA

Demartini, G., Mizzaro, S., & Spina, D. (2020). Human-in-the-loop artificial intelligence for fighting online misinformation: Challenges and opportunities. *Bulletin of the Technical Committee on Data Engineering IEEE Computer Society*, *43*(2), 65–74. http://sites.computer.org/debull/A20sept/A20SEPT-CD.pdf

This is a journal article by Demartini, Mizzaro and Spina (2020) tells the reader the concept of human-in-the-loop artificial intelligence as a method to crack down on the misinformation on the internet. These authors propose a system where an AI model captures possible misinformation, crowd workers label the misleading info, and experts verify what the results should be. In the journal article they tell the readers some of the major challenges like data bias and

limited expert availability for their model. They also argue that adding human judgment with AI automation can improve accuracy and the reliability when filtering the misinformation online.

I say this source is reliable because it's an article that's been peer reviewed in a well-respected technical journal which is The Bulletin of the IEEE Computer Society Technical Committee on Data Engineering. This tells us the research is original, and it provides us with solutions that takes both computer science and human behavior into consideration. This resource would be helpful for someone whose studying misinformation or AI ethics because this journal article demonstrates a balanced and hybrid approach to decrease the amount of misinformation that spreads because of AI. One detail that stood out to me that I thought was interesting was how the authors imagined using "crowd workers" as a layer of security between AI and experts which could make fact checking for AI a powerful source for overcoming misinformation. The author did mention things that could hold the model back like human bias but still the model remains a valuable source for combating artificial intelligent's spread of misinformation.

Anonymous, Oct. 2025,

Feijoo, B., Sádaba, C., & Zozaya, L. (2023). Distrust by default: analysis of parent and child reactions to health misinformation exposure on TikTok. *International Journal of Adolescence & Youth*, *28*(1), 1-17. https://doi.org/10.1080/02673843.2023.2244595

Student chose not to publish their annotation.

Ferrara, E., Varol, O., Davis, C., Menczer, F., & Flammini, A. (2016). *The rise of social bots. Communications of the ACM, 59*(7), 96–104. https://doi.org/10.1145/2818717

Student chose not to publish their annotation.

Huber, B., Borah, P., & Gil de Zúñiga, H. (2022). *Taking corrective action when exposed to fake news: The role of fake news literacy*. Journal of Media Literacy Education, 14(2), 1-14. https://doi.org/10.23860/JMLE-2022-14-2-1

This article focuses on how one can take the correct measures into tackling fake news. The study uses survey data from U.S. respondents to conclude on how individuals who are more literate in recognizing fake news are more likely to take corrective actions. The authors point out that being familiar with news media does not necessarily translate to corrective action — you need to have specific literacy about misinformation. I find this source to be credible in that it appears to be in a peer-reviewed journal, provides empirical evidence, and expands its methodology and definitions.

This source would be used by a researcher since it is a build

on the first source by touching on the individual behavioral side of misinformation. One nugget that I found interesting: in accordance with the research, people's need for cognition crosses with fake-news literacy — so that two people might know equally as much about fake news literacy, but the one who tends to think harder about what they read will be more likely to act.

Dola Akter Reba, Oct. 2025, CC BY-NC

[AI-generated citation submitted]

This citation was likely generated by AI. There was no article with the given title discoverable in our library databases, Google, or Google Scholar. The citation referenced real authors who did write for the cited conference proceedings, but they did not publish an article under that title. The link provided in this citation led to an entirely different article from the same source.

Jo, H.-K. (2024). Why nursing cannot be replaced with artificial intelligence. *Women's Health Nursing*, 30(4), 340-344. https://doi.org/10.4069/whn.2024.12.12

This is a peer-reviewed academic journal article. This article

discusses that although AI does possess an added benefit to the nursing practice, it cannot fully replace the human aspect of nursing. Some of the benefits AI can give the nursing profession are a relief from burnout and turnover rates due to some of the burden being taken on by streamlined communication, improvement in medical treatment, getting diagnoses, prognosis, and treatment plans faster, aiding in research, and reduction of costs. AI, in collaboration with the nursing profession, can ease some of the pressures placed on nurses to provide quality care while dealing with increased responsibilities due to the shift in nursing practice. This article gives us a different perspective on nursing care from someone in another country (Korea); the general underlying values of nursing are still the same care and compassion, which comes from the human side and is something AI cannot give.

I believe this is a reliable source due to its being peer-reviewed and published in the Women's Health Nursing journal, and it has evidence of research being used to support her position. A researcher would use this source to explore a cross-cultural understanding of nursing and AI since the writer is talking about nursing and Korea; however, the fundamentals of nursing care and practices are generally the same everywhere, with the focus being on the patient. There is a limitation to the source as it is opinion-based. One thing that I found interesting is the ethical issue of collaborating AI with nursing, how the article even suggests that AI lacks the capacity to embrace the nursing philosophy that is grounded

in human dignity, and cannot be held accountable for its actions.

TDE, Oct 19, 2025, CC BY-ND

Kelly, H. (2024, July 15). How to avoid falling for misinformation and conspiracy theories. The Washington Post. https://www.washingtonpost.com/technology/2024/misinformation-ai-twitter-facebook-guide/

This article is a popular-press piece (a major newspaper article) from The Washington Post that explains how misinformation and conspiracy theories spread on social media and offers practical strategies for everyday users to show and resist them. It covers why misinformation exists, how emotional reactions like outrage play a role, and how platforms' design (like algorithms and engagement metrics) help false material spread unchecked. The article is reliable because it comes from a well-established, reputable national newspaper with editorial review and uses research findings and expert commentary to support its claims. A researcher would find this source useful because it offers a current, universally accessible overview of how misinformation changes the public, complementing scholarly literature by showing how the issue plays out in real-world settings. One limitation is that it does not go deeply into academic method or complex statistical analysis—its aim is public education rather than academic rigor. A particularly interesting detail I

learned is the advice to "slow down before you share" on social media, because instantaneous sharing is one of the major enablers of viral false claims.

Harmony Cooper, Oct.2025, CC BY-NC

Kisa, S., & Kisa, A. (2024). A comprehensive analysis of COVID-19 misinformation, public health impacts, and communication strategies: Scoping review. Journal of Medical Internet Research, 26, https://doi.org/10.2196/56931

This source is a peer-reviewed journal that analyzes how misinformation spreads during the outbreak of the COVID-19 pandemic as well as how this misinformation influenced and impacted the public health sector. In the journal, the authors describe the spread of information as an infodemic and emphasizes how it is misinformation can spread quickly. It also mentions that upon research social media was found to have played a big role in how misinformation about the virus spread.

The journal also addresses and clarifies some of the most common myths about the virus that people have put out on the internet. Some of these myths include fake cures and vaccines as well as where the virus originates from.

I believe that this source is reliable since it is peer-reviewed as well as published by a reputable institution. One interesting detail I found out was that misinformation can

cause people to become extremely anxious. This anxiety may prevent persons from getting vaccines or obeying other medical protocols like wearing masks.

A.C. October 18, 2025 CC BY

Lee, J., Kim, Y., & Zhu, X. (2023). Liked and shared tweets during the pandemic: The relationship between intrinsic message features and (mis)information engagement. Behaviour & Information Technology, 43 (8), 156-1613 https://doi.org/10.1080/0144929x.2023.2222192

This is a peer-reviewed journal article that analzes how exactly people interacted on social media as it relates to tweets about the COVID-19 pandemic. These tweets included both true and false information (misinformation) about the virus which the authors of the article took time to study the reason behind why people interacted with them whether that be liking or reposting/sharing.

While studying, they realized that tweets or posts that had more emotion to them were often shared more than the ones with no emotion attached. These emotional posts or tweets were often ones that had an angry or frigtened undertone. What I understood was that tweets and posts are more likely to be shared whenever high emotions are involved, therefore increasing the spread of misinformation.

I believe that this source is reliable because, like the first source, it is peer-reviewed as well as published by a

reputable institution. One interesting detail I found out from this article was that it may not be the actual misinformation that is being spread but it may be how exactly that information is shared. What I mean is that if misinformation has an emotional undertone, it is more likely to be spread than misinformation with a formal undertone due to the appeal to emotions whether through fear or anger. One limitation for this source is that it only focuses on one social media platform, Twitter.

A.C. October 18, 2025 CC BY

Liang, Y.-H., & Chou, T.-C. (2025). Developmental pathways for academic knowledge about public health and social media misinformation: A systematic review through main path analysis. Current Psychology, 1–17.

This scholarly article is a systematic review that examines how academic research on public health and social media misinformation has developed from 2000 to 2023. The authors use a method called main path analysis to trace key studies and show how knowledge in this area has grown. They found that misinformation on social media can strongly affect people's health decisions and shape public health policies. The article also explains how false information spreads quickly online and how it can lead to confusion and mistrust among the public.

This source is reliable because it was published in Current Psychology, a peer-reviewed journal reviewed by experts before publication. A researcher would find this source useful because it provides a clear overview of how misinformation studies have evolved and connects social media behavior to real-world health impacts. One limitation is that it reviews existing studies rather than collecting new data. An interesting detail I learned is that misinformation on social media can leave lasting effects on public attitudes toward health advice, even after the false claims are corrected.

Harmony Cooper, Oct.2025, CC BY-NC

Makhasane, S. D., Onaolapo, A. A., & Onaolapo, D. G. (2023). Addressing religious crises in Nigerian secondary schools: Parents' and Teachers' perceptions of hijabs in Christian-named government schools. *Education Sciences*, 13(7), 688. https://doi.org/10.3390/educsci13070688

The second source I chose is also a peer-reviewed article. It focuses on the ongoing conflict in Nigeria surrounding Muslim students who wear hijabs in Christian-named government schools. The authors used a qualitative case study and interviewed both parents and teachers to understand how they view the issue. They found that most participants were against the use of hijabs in these schools, claiming that it disrupts the school's Christian identity and unity. The study also highlights how these tensions can grow

into larger religious conflicts if they aren't addressed. The authors recommend that school leaders and government officials hold open discussions with all parties involved and create policies that respect religious diversity while maintaining peace and inclusivity in schools.

This source connects to my topic on misinformation and Muslim–Christian relations in Nigeria because it shows how misunderstanding and biased narratives can lead to mistrust between groups. Even though this particular conflict is centered around school dress codes, lots of the tension comes from assumptions and misinformation about each religion's intentions. I believe the source is reliable because it's published in a peer-reviewed academic journal and based on direct interviews. A researcher might find it useful because it provides insight into how misinformation and lack of communication can shape real-world conflicts. I also chose the source because as opposed to the first one, it highlights the positives and focuses on solutions to the tensions. This source also brings in the feedback from those who are actually affected by the religious conflicts in schools. One thing I found interesting was how something as simple as a school's name can carry such deep religious meaning and create strong divisions within a community.

R. B., Oct. 2025,

McKee, E. (2018). *The origins and development of the Public Record Office of Northern Ireland, 1922–1948*. Archives and Records, 40(2), 164–178. https://doi.org/10.1080/23257962.2018.1550715

This source is a peer-reviewed research article published in 2019, focused on the origins and development of the Public Record Office of Northern Ireland, and is classified as a secondary source. This article discusses the destruction of Ireland's Public Record Office during the Irish Civil War, the subsequent separation of the Isle of Ireland into Northern Ireland and Éire, the tension between the PROI and PRONI, and the efforts put forth to create a new Public Record Office in Northern Ireland to re-establish the history that was lost in the fire. One detail I found particularly fascinating was the communication between Northern Irish scholars and Irish scholars after the civil war, and the dedication that PROI and PRONI scholars showed in sharing condolences and preserving records, even in the face of high political tensions. It proved that people's passions for history and preservation can extend beyond personal political beliefs.

This source is considered a reliable source because it was published in a scientific journal alongside a series of articles and is peer-reviewed, meaning that other scholars have verified its content to some extent. It also contains a list of all the sources used to compile this section of the journal, demonstrating that ample research has been conducted in its compilation. A researcher would likely use this source if they were specifically studying Ireland and Northern Ireland's history of record-keeping after the 1922 Four Courts Fire, as compared to a few of the other sources found that related to record-keeping in Ireland but in later time periods. Some limitations of this source include its publication date, as it discusses Northern Ireland's response to the destruction of

resources, but lacks research on the newer efforts made in 2022 to recover artifacts lost in the fire. Having a resource that explains both the history of record-keeping and more recent recovery efforts would provide a more well-rounded source to draw from, rather than having to consult multiple sources for information about the period from 1922 to 1948 and from 1948 to the present day.

Em Laubscher, Oct 13th, CC BY-NC-SA

[AI-generated citation submitted]

This citation was likely generated by AI. Interestingly, a correct version of this citation was submitted earlier in the course. However, a different version of the citation with fabricated authors was submitted for the final project. A possible cause is using an AI tool to create or edit the citation, resulting in some false information.

Michailovsky, B., Mazaudon, M., Michaud, A., Guillaume, S., François, A., & Adamou, E. (2014). Documenting and Researching Endangered Languages: The Pangloss Collection. *Language Documentation & Conservation*, *8*, 119–135. http://hdl.handle.net/10125/4621

This article is a peer-reviewed journal article that presents

the creation and development of the Pangloss Collection, a digital archive hosted by the french research group LACITO in the Centre National de la Recherche Scientifique (CNRS). The archive acts to preserve and provide open access to audio recordings, transcriptions, and annotations of endangered and under-documented languages from around the world. The authors describe how the collection combines linguistic research and language documentation, providing details about its technical structure, metadata standards, and long-term digital preservation strategies. The article also emphasizes the breadth of its geographic range in terms of languages and accessibility for both academic researchers and language-speaking communities, and comments on its diverse language range from Asia, Oceania, Europe, Africa, and the Americas.

This article is credible because it was published in a peer-reviewed academic journal and was written by linguists who are affiliated with CNRS and other prominent institutions. This reference could be of use to researchers because it ties linguistic theory to the emerging practices of modern technology, demonstrating how contemporary digital technologies can be applied to documentation and archiving. One drawback is that it focuses fairly heavily on the technological framework, rather than upon cultural revitalization components of language preservation. I was particularly intrigued by the fact that the Pangloss Collection supports speaker communities by providing access to and the opportunity to contribute to their own language archives, making documentation a shared collective experience.

Logan Dressel, October 18, 2025, CC BY-NC

Muenster, R. M., Gangi, K., & Margolin, D. (2024). Alternative Health and Conventional Medicine Discourse About Cancer on TikTok: Computer Vision Analysis of TikTok Videos. Journal of medical Internet research, 26, e60283. https://doi.org/10.2196/60283

Student chose not to publish their annotation.

Nintendo Life. (2024, Jan 2). *The Power of Video Game Music* [Video]. YouTube.https://youtu.be/2_UHEClhYi8

The second source is a YouTube video. The main points of the video are that music in video games is used to tell the player of various important events when music is presented and how music must accommodate the game's world to convey that information. The reason this is a reliable source is because of both the creators of the video and the presenters' examples. The creators are Nintendo Life, a news website source of Nintendo-related content that was founded in 2005. Over the years, they have produced 75,000 articles, as mentioned on their about page. In addition, the video was made last year, making the information relevant.

The examples in the video tie to why researchers should

consider this a good source, as it provides visual examples of how music is providing information to the player while also working with the game's world to achieve it. However, there are limitations as it is non-scholarly; thus, there is no peer-reviewed material, and it recites facts. But despite that, the information recited is improved through the use of visual representation of those facts. A personal example I can think of relating to the video is the song "Blood Feuds, Ancient and Modern" from the game Red Dead Redemption 2. Set in the wild west of 1899, the song plays during a mission of the same name where an outlaw group must rescue a kidnapped member. The music that plays over the mission tells the players of the stakes involved and emotions that the group is feeling that culminates to a shootout with the kidnappers.

Alejandro Espinoza, Oct. 2025, CC BY-NC-SA

Pennycook, G., & Rand, D. G. (2019). *Fighting misinformation on social media using crowdsourced judgments of news source quality*. Proceedings of the National Academy of Sciences, 116(7), 2521–2526. https://doi.org/10.1073/pnas.1806781116

This article is a scholarly source that is peer-reviewed and published in the Proceedings of the National Academy of Sciences. The authors conducted two large-scale experiments testing whether crowdsourced ratings of news sources could be used to separate trustworthy outlets from fake ones. Participants rated news sources for familiarity and

trustworthiness, and their ratings closely matched professional fact-checker scores. The results showed that most people could identify credible outlets, and the authors suggest that social media platforms could use this kind of data to reduce misinformation.

I view this as a reliable source because it's published in a respected journal and uses large groups of participants for testing. A researcher would use it because it doesn't just describe the problem of misinformation it offers a possible solution. One limitation is that people gave better ratings when they already knew the source, which could make it harder to judge smaller or new outlets. I found it interesting that, even with political differences, participants still agreed on which outlets were credible, showing that people can recognize trustworthy news across different viewpoints.

Anonymous, October 2025, CC BY-NC

Pilati, F., & Venturini, T. (2025). The use of artificial intelligence in counter-disinformation: A worldwide (web) mapping. *Frontiers in Political Science*, *7*, 1517726. https://www.frontiersin.org/journals/political-science/articles/10.3389/fpos.2025.1517726/full

This journal article by Pilati and Venturini (2025) tells the reader how AI is being used all over the world to fight disinformation by a model in which it maps online networks of organizations or programs that use AI for this purpose.

The author shows the reader how different regions approach the problem and how they use AI to stop false spread of information.

In the journal article they tell us that European regions focus on preventing misinformation before it starts to spread which they call this upstream strategy. In the us they detect false information after it appears, and they identify this as downstream strategy. The journal article points out the issues of being bias, censorship and the lack of representation from nations in the global south.

This source is reliable because it has been peer reviewed and published in Frontier in Political Science which is a well-known academic journal. This source uses real data and research methods to tell us how AI is added in real lifetime to show the spread of misinformation. Researchers can use this journal article if they are studying how different regions of the world use AI or how they try to stop the spread of misinformation. An interesting detail I found was the difference between upstream and downstream strategies which tells me different regions use different ways to combat AI misinformation. The study mentions how they might miss smaller or offline projects as a downside, but it does give us the readers an overview of how the world deals with AI misinformation.

Raimi, L., & Boroh, S. E. (2025). How social media is shaping Christian-Muslim schisms: Towards an understanding of the spread of virtual

fanaticism in Nigeria. *Informology*, 4(1), 41–56. https://informology.org/2025/v4n1/a47.pdf

This source is a peer-reviewed article that examines how social media has affected the relationship between Christians and Muslims in Nigeria. The authors argue that platforms like Facebook and Twitter make it easier for misinformation, hate speech, and propaganda to spread. One of the main points is that misinformation spreads faster and more widely on social media because of the way algorithms amplify emotional and divisive content. They explain how this kind of content often goes "viral" online and creates more division between religious groups in real life. One thing I found interesting was that the authors said young people are the most affected, since they use social media more than older generations.

I believe this source is reliable because it was published in Informology, an academic journal, and is written by researchers who use case studies and content analysis to back up their claims. A researcher would use this article over other sources because it directly connects misinformation, religion, and Nigerian society. Out of the sources I came across, this one fits my topic best because it connects misinformation directly with Muslim-Christian relations in Nigeria. A limitation, however, is that it focuses mainly on social media and does not go as deeply into misinformation from traditional sources like radio or newspapers. Still, it provides a strong foundation for understanding how online misinformation worsens Muslim-Christian relations in Nigeria and will help me highlight the impact of digital platforms in my research.

R. B., Oct. 2025, CC BY-NC

Raya, D., Juliebø-Jones, P., Pietropaolo, A., Bhojani, N., Kamal, W., & Somani, B. (2025). Unraveling online perspectives and misinformation surrounding urinary tract infections: A thematic analysis of 1,200 Instagram posts. Urology Research & Practice, 51(3), 84–88. https://research.ebsco.com/c/whjebw/search/details/jycthbthkz?limiters=LB%3ATEIgVU0gKg%3D%3D%26TEIgVU1TTCBMKg%3D%3D%26TEIgVU1TTCBNKg%3D%3D%2CFT1%3AY%2CRV%3AY&q=social+media+AND+health+misinformation+and+instagram&searchMode=all

This peer reviewed article explores how misinformation about urinary tract infections (UTIs) spreads on Instagram. The authors analyzed 1,200 posts to see how accurate they were and who were sharing them. They found that many posts came from non medical influencers or personal accounts, and that posts with emotional and visually striking content got more views than factual posts. This study suggests that Instagram can influence how people understand and manage their own health, sometimes leading to incorrect treatment.

This source is reliable because it is published in Urology Research & Practice, a respected medical journal, and uses a structured analysis method. Researchers would use it because it provides real and true examples of health misinformation on social media and shows how users respond to different types of content. One limitation is that it

only focuses on UTIs, so it may not help with other health topics. An interesting point is that posts with emotional appeals or "miracle cures" gained the most attention, showing how social media engagement often favors sensational content over accurate information.

Allayana McIntosh, October 19, 2025, CC BY-NC

[AI-generated citation submitted]

This citation was likely generated by AI. It referenced an article from a popular newspaper that did not exist. The paper has published articles on similar topics, but none with this title, which is very similar to a different article published by a well-known think tank. The cited author writes for that paper, but has not published on the stated topic.

Sweet, M. (2015). The language of music storytelling in games. In *Writing interactive music for video games: A composer's guide*. Addison-Wesley Professional. https://learning.oreilly.com/library/view/writing-interactive-music/9780133563528/.

The first source I chose was a section in a chapter from the book Writing interactive music for video games: A composer's guide, by author Michael Sweet. The chapter's

name is The language of music storytelling in games, and the section is called Exploring Music Function. In that section, it discusses how music is used to immerse the player into the game and communicate with them about events. An example, “Introduce Character,” they discussed how when players meet a new character appearing on screen, that character’s theme should be played to inform the player of whether they are a friend or foe. The reason I know this is a reliable source is that the author has experience in video game composing. On the Berklee College of Music website, it is stated that Michael Sweet is an audio composer who has worked on 100 award-winning video games, earning him awards such as the Best Audio Award at the Independent Games Festival.

Researchers should consider this source as it provides a composer’s view on how video game music is structured to inform the player of various events and how to make them feel engaged with the material. There are some limitations to this source, as the book was released in 2015, and the study of video game music has since improved, rendering it somewhat outdated. In addition, it was not peer-reviewed, so the book’s information was from the author himself. However, despite being considered outdated, the information still holds up to modern times. An interesting detail I learned was that when reading through it, I was able to correlate the information to video games that I have played or seen. An example was “Introduce Character,” and I remembered the theme of the villain of Odin from the game God of War: Ragnarök.

Alejandro Espinoza, Oct. 2025, CC BY-NC-SA

[AI-generated citation submitted]

This citation was likely generated by AI. It referenced a real YouTube channel, but that channel had not published a video with the provided title or on the stated topic. The link led to an entirely different video on a similar topic, but with a different title, from a different channel, and published on a different date.

Van den Berg, R. (2024). Lexicography and language documentation: Urgency, challenges, possibilities. *Lexicography*, *11*(2), 145–180. https://doi.org/10.3138/lexi.27796

This is a peer-reviewed scholarly academic journal article on the role of lexicography, the study and practice of dictionary compilation, in the documentation of endangered languages. The author, Van den Berg, calls for urgent documentation of endangered languages in an age of global language endangerment and extinction, particularly focusing on Asia. The author also discusses additional related issues in documentation, including community identity and resources, linguistic resources, linguist engagement, and balancing

description and accessibility of dictionaries. Van den Berg discusses practical tools such as dictionary development and collaboration as two necessary tools of effective language documentation.

This source is credible because it was published in a peer-reviewed academic journal and authored by a linguist specializing in lexicography. As a researcher, one might select this article because it discusses both theoretical perspectives and real-life documentation practices, providing a critical summary and usable methods. One shortcoming is that the article focuses predominantly on lexicographic approaches, and it is difficult to discern how it relates to some of the broader technological innovations and sociocultural elements of preservation. Interestingly, I learned that dictionary projects, created with community input, can function as cultural commodities, rather than purely linguistic records, while also fostering and supporting identity.

Logan Dressel, October 18, 2025, CC BY-NC

Yildiz, E. (2025). Artificial intelligence in mental health nursing: Balancing clinical efficiency and the human touch- A quest for a new synthesis. *Journal of Psychiatric and Mental Health Nursing*, 32, 946-952. https://doi.org/10.1111/jpm.13173

This is a peer-reviewed journal article. This article discusses how collaborating AI with Nursing, particularly in mental

health, can be beneficial in some respects, as well as cause ethical issues in others. When looking at AI and Nursing, some of the ways it can be beneficial to the practice: early diagnosis, intervention, and care through the analysis of large datasets, automating routine tasks, and creating personalized treatment plans, which all help with the reduction of a nurse's workload. While there are still ethical considerations to be considered when using AI. I recently looked at another peer-reviewed journal article that explored artificial intelligence and whether it is trustworthy or reliable due to the human aspect and core values of nursing, such as autonomy, dignity, integrity, and vulnerability, being replaced by AI. Both articles believe that due to the evolution of nursing and AI they can complement each other but not completely replace the core values of nursing.

I believe that this is a reliable source due to it being published in a peer-reviewed academic journal. I used the SIFT method. A researcher would use this source to get a different perspective of nursing (mental health) that one would not normally think AI could benefit the practice with, due to the relationship aspect of this part of nursing. AI is not going anywhere, and it's only becoming more and more popular. Therefore, as nursing practices change and the demands placed on nursing, something has to change, and incorporating AI into nursing without taking away the humanness can be beneficial to not just the practice but the patient as well. The more research/ evidence done on this topic, the more acceptable AI will become in nursing. A limitation of this article is that it discusses AI in the mental health area of nursing instead of all aspects of nursing/

healthcare. I found this information useful in how using AI can result in a faster diagnosis for a patient, which will allow nurses more time to focus on what they are actually treating the patient for, and not waiting on a diagnosis for weeks or months without proper care.

TDE, Oct 19, 2025, CC-BY-ND