

Tackling Wicked Problems



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An OER for Students at PSU

Cathie LeBlanc

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About This Book

This book is an Open Educational Resource (OER) designed specifically for you, a Plymouth State University student enrolled in the “Tackling a Wicked Problem” course. The book contains material written specifically for it as well as material from other openly licensed material including the OER written by the Fall 2017 First Year Seminar Fellows at Plymouth State University. That earlier OER was designed specifically for Plymouth State University’s First Year Seminar and can be found here:

<https://psufys.pressbooks.com>

“Tackling a Wicked Problem” is the first course you will take in which you will engage in PSU’s Integrated Cluster model of education. This project-based course is required of all students entering the University with fewer than 24 credits and is designed to be an introduction to the kind of work students will engage in during their time at PSU. The course provides opportunities for you to understand and begin to develop the Habits of Mind that PSU faculty, staff, and alumni feel are most important to your success both during and after college.

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I

Tackling Wicked Problems

The chapter called "[What is Tackling a Wicked Problem?](#)" discusses the course and what it is all about. The chapter called "[What is a Wicked Problem?](#)" describes the characteristic of wicked problems, which are the kinds of problems that this course focuses on.

What is a Wicked Problem?

A wicked problem is a problem, usually social or cultural, that is challenging or impossible to solve either because not enough is understood about the problem, the number of stakeholders involved, the number of varying opinions, the economic burden, or the impact of these problems with other problems. For example, poverty is closely related to education, health, and nutrition.

Horst Rittel has cited ten characteristics of these hard-to-solve social and cultural issues:

1. Wicked problems are hard to define and neatly categorize. Poverty is different in Concord, New Hampshire than in urban China. Therefore, “poverty” is not the same everywhere.
2. Because wicked problems are hard to define and melt into each other, they are also hard to declare “solved.” It’s too difficult to measure success.
3. There are no “solutions” to wicked problems, only “good” or “bad” measures. Since it’s hard to define an end goal to a wicked problem, it’s more productive to focus on trying to improve a situation, rather than attempt to solve it.
4. There are no standard approaches to wicked problems. The problem of each situation is unique and requires its own approach that is often developed on the fly. Every wicked problem is unique.
5. Explanations for wicked problems vary because no single observer can claim to have fully analyzed and understood the full scope of the problem.
6. Wicked problems are the results of other wicked problems. Addressing one problem may result in improving the situation for other wicked problems. For example, improving education will have positive implications on health, nutrition and family planning. On the other hand, addressing one problem may result in other problems getting worse. For example, building low-income housing to address homelessness issues may result in high unemployment rates in concentrated areas.
7. There is no definitive scientific test for the solution of a wicked problem because they are human caused and not natural phenomena.
8. Attempts at solutions are often small-scale because too much new understanding during the process often reveals new information that changes the approach.
9. Every wicked problem is unique so attempts to solve one wicked problem are difficult to adapt to other wicked problems.
10. Designers attempting to address a wicked problem must be fully responsible for their actions.

Not every hard-to-solve problem is a wicked problem, though most social problems are wicked. Wicked problems can’t be “fixed”. Approaches should be focused on how to best mitigate their immediate impact. Finally, wicked problems require an interdisciplinary approach with an understanding that no quick result will be forthcoming. Addressing wicked problems is time-consuming and iterative, requiring long-term dedication.

The above information came from: https://www.wickedproblems.com/1_wicked_problems.php

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What is "Tackling a Wicked Problem"?

During your first year at Plymouth State University, you and all first year students who transfer in fewer than 24 credits take "Tackling a Wicked Problem" (TWP), the course in which you are currently enrolled. This is a single semester course that introduces you to Plymouth State University's educational model focused on collaboratively creating projects that reach beyond the walls of the classroom in some way. In other words, TWP represents the first Integrated Cluster experience that you will have on campus. What does that mean?

Integrated Cluster experiences involve people with different skill sets and perspectives coming together to work collaboratively on a project that reaches beyond the walls of the classroom to try to make a difference in the world. Each section of TWP is focused on a wicked problem, a societal issue that is difficult or impossible to solve. Human trafficking, homelessness, food insecurity, ocean plastics, and climate change are a few examples of the kinds of problems these sections focus on. TWP is a cornerstone course through which you begin to build the repertoire of intellectual skills needed for success in university-level work as well as for success after graduation. These intellectual skills are called Habits of Mind and we will discuss them more fully later in the book.

The project that you and your classmates work on is called The Habits of Mind project and is designed to provide you with the opportunity to practice the Habits of Mind. Your project will not "solve" the wicked problem so that the problem goes away entirely. Instead, you will work collaboratively with other students in your class on one aspect of the problem to try to make a difference in the world. At the end of the semester, you and your group will share what you learned from working on your project in a poster symposium to which members of the PSU community and the larger Plymouth community will be invited. More information about the posters will be shared later in the semester. In addition, you will write an individual paper explaining how your work on the various project activities has helped you to develop the Habits of Mind.

II

Habits of Mind

This section of the book focuses on the learning outcomes of the Plymouth State University General Education program. We call these learning outcomes “Habits of Mind.” The chapter called “[What are the Habits of Mind?](#)” explains what a Habit of Mind is and describes the four Habits of Mind that your experiences in the PSU General Education program will help you develop. The chapter called “[The Habits of Mind Signposts](#)” describes the elements (called Signposts) that make up each Habit of Mind as well as the various levels of achievement on each Signpost.

What are the Habits of Mind?

Plymouth State University requires you to take classes in General Education so that you can develop some Habits of Mind that are critical to your success in college and beyond. The General Education program provides you with opportunities to practice four particular Habits of Mind. A **habit of mind** is a usual way of thinking, a way of engaging with the everyday world. The Habits of Mind that we focus on at PSU are: **purposeful communication, problem-solving, integrated perspective, and self-regulated learning**. “Tackling a Wicked Problem” has been designed as the first course in which you will practice each of these.

Purposeful communication is a habit of mind characterized by the construction of meaning through interactions with texts and people and the creation of new messages. “Text” refers broadly to any communicative message, including, but not limited to, messages that are spoken or written, read or listened to, non-verbal, and/or delivered through any form of media (digital, social, artistic, print, etc.). Construction of meaning and creation of messages are influenced by individuals’ prior experiences as well as cultural and historical contexts. Creation of messages involves the development and purposeful expression of ideas and is designed to increase knowledge, foster understanding, and/or promote change in others’ attitudes, values, beliefs, or behaviors. To be effective, messages must engage the perspectives of others and foster dialog among individuals and the community.

Problem Solving is a habit of mind that involves an iterative process of identifying, explaining, and exploring problems, describing challenges, envisioning possible solutions and their implications, and making decisions about how to proceed based on all of these considerations. Problem solving encompasses a broad array of activities and approaches. Problems range widely in scale and scope—small to large, local to global, well-defined to ambiguous, simulated to real-world—and problem solving may be undertaken individually or in collaboration with others. In all cases, engaging in problem solving requires the ability to think creatively, adapt and extend one’s thinking, acknowledge different contexts and incorporate different perspectives, embrace flexibility, consider potential implications, determine courses of action, persist and adapt despite failure, and reflecting on the results. While the types of problems encountered and the strategies used to grapple with problems vary across disciplines, the problem solving habit of mind is relevant to all disciplines.

Integrated Perspective is a habit of mind characterized by the recognition that individual beliefs, ideas, and values are influenced by personal experience as well as multiple contextual factors—cultural, historical, political, etc. All human beings are interconnected through their participation in natural and social systems. An integrated perspective recognizes that individual decisions impact the self, the community, and the environment. Students will acknowledge the limitations of singular points of view and recognize the benefits of engaging with and learning from others in order to integrate multiple perspectives for effective communication, problem-solving, and collaboration.

Self-Regulated Learning is a habit of mind that encompasses the desire to learn, the ability to set personal goals for learning, and the capacity to engage in a self-monitored learning process. Self-regulated learners typically demonstrate strong commitment to the process of learning and take responsibility for their own learning. They take intellectual risks, persist in the face of challenges, and learn from their mistakes. They are able to organize and reorganize information, interpret information

in new ways, and generate their own ideas. Self-regulated learners demonstrate meta-cognitive awareness (an understanding of the factors that influence their own learning) and cultivate the skills and confidence they need in order to be effective learners.

Developing these Habits of Mind is a lifelong pursuit. When we start developing them, we are at the “Basecamp” level of achievement which is the level of achievement your instructors at PSU expect you to have when you finish your first year here. By the time you graduate, we expect that you will have achieved the “Summit” although we also feel that no one ever completely masters any of them. Everyone, no matter how old, educated, or skilled in these Habits of Mind has something they can improve upon.

The following infographic shows the components (or “signposts”) that make up each Habit of Mind in the Plymouth State University General Education program. You can read more about each of the signposts in the next chapter of this book.

Habits of Mind

Purposeful Communication

Signposts

- Awareness of Context
- Comprehension
- Purposeful Expression
- Effective Application of Strategies for Communication

Problem Solving

Signposts

- Problem Framing
- Challenge Identification
- Plan Development
- Decision-making and Revision
- Evaluation of Progress

Integrated Perspective

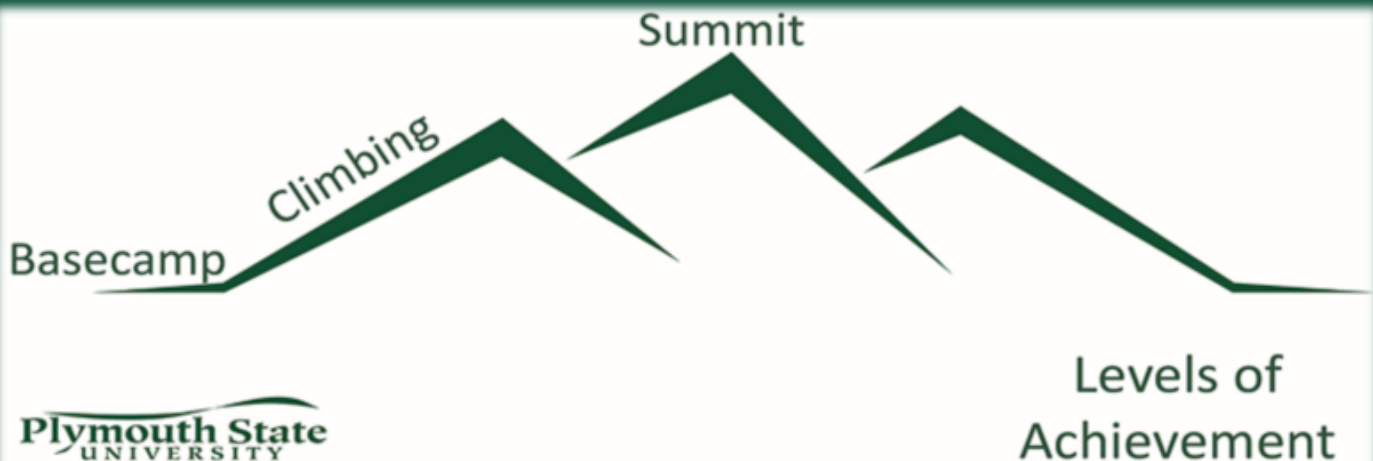
Signposts

- Self-Awareness
- Perspective Seeking
- Interconnectedness
- Collaboration

Self-Regulated Learning

Signposts

- Responsibility for Own Learning
- Engagement in the Learning Process
- Metacognitive Awareness



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Habits of Mind Signposts

As you are practicing the Habits of Mind, you will want to get a sense of your level of achievement so you can think about what you need to do to continue to improve. The following tables indicate what we, the faculty at PSU, expect you to attain by the end of your first year at PSU (Base Camp).

For example, by the end of your first year, we expect that you will recognize that every communication message is created and receive within a cultural and historical context. This is the Base Camp level of achievement for “Awareness of Context” in the Purposeful Communication Habit of Mind. As you develop your communication skills, we expect that you will begin to draw on knowledge about cultural and historical context, both when you create messages and when you construct the meaning of messages that you receive from others. This is the Climbing level of achievement for “Awareness of Context” in Purposeful Communication. By the time you graduate from PSU, we expect that you will seek additional knowledge so that you can better understand cultural and historical contexts, both when you create messages and when you construct the meaning of messages that you receive from others. This is the Summit level of achievement in “Awareness of Context.” In other words, as you become a better communicator, you begin to understand that the context of a message matters and, eventually, you recognize that you may not completely understand the context of a message so you seek more information to improve your understanding of both the context and the message. This is a challenging task and no one ever masters it. We can all improve on our ability.

These Habits of Mind represent what we want you to practice and develop through taking classes in the General Education program at PSU. Understanding these can help you to be more purposeful in your work in your classes.

Purposeful Communication

Signposts	Base Camp	Do You Have Evidence of This?	What’s Your Evidence?
Awareness of Context	Recognizes that every message is created and received within a cultural and historical context		
Comprehension	Shows understanding of the basic meaning of the text by paraphrasing or summarizing the information the text communicates		
Purposeful Expression	Paraphrases, summarizes, and/or quotes from information sources to create a message with a specific purpose		

Effective Application of Strategies for Communication Recognizes that others may bring different perspectives and experiences to the creation of messages and the construction of meaning from messages

Problem Solving

Signposts	Base Camp	Do You Have Evidence of This?	What's Your Evidence?
Problem Framing	When presented with a problem, describes key components of the problem		
Challenge Identification	Recognizes general challenges to solving the problem		
Plan Development	Relies on one or two strategies to identify possible solution(s) to the problem		
Decision-Making and Revision	Identifies a preferred approach to solving the problem and sticks with the plan		
Evaluation of Progress	Evaluates progress in terms of whether desired outcomes have been achieved		

Integrated Perspective

Signposts	Base Camp	Do You Have Evidence of This?	What's Your Evidence?
Self-Awareness	Recognizes that one's ideas, beliefs, and values are influenced by personal experience as well as multiple contextual factors		
Perspective Seeking	When presented with various perspectives, recognizes their validity while maintaining a preference for one's own perspective		
Interconnectedness	Identifies some connections between an individual's personal decision-making and the larger natural and social world		
Collaboration	Articulates one's own perspective and listens to other perspectives when collaborating with others		

Self-Regulated Learning

Signposts	Base Camp	Do You Have Evidence of This?	What's Your Evidence?
Responsibility for Own Learning	Strives to meet learning goals and evaluation criteria embedded in assignments and courses		
Engagement in the Learning Process	Recognizes that acquiring new knowledge and skills requires commitment to the learning process		
Metacognitive Awareness	Identifies own strengths and weaknesses as a learner and selects general strategies to aid learning		

III

Working on Your Wicked Problem

The chapter called "[How Can Design Thinking Help Us?](#)" focuses on using design thinking to imagine, design, implement, and evaluate a project that will have an impact on your wicked problem. The chapter called "[Research on Humans](#)" explains the Institutional Review Board (IRB) process you must go through if your project work is going to involve doing any sort of research on human beings. The chapter called "[Working With and For Outside Organizations](#)" describes the rules regarding collecting money or other goods for (or in conjunction with) organizations outside of PSU.

How Can "Design Thinking" Help Us?

Trying to decide what to do about your wicked problem can feel overwhelming. Design thinking is a methodology for working on complex problems which can be helpful in our work in "Tackling a Wicked Problem." Design thinking has a "[bias toward action](#)." This means it is focused on doing things rather than studying things or discussing things. There are five stages in the design thinking process that we move around in non-linearly. We may revisit some of the stages multiple times in our work as we learn more and more about the problem we are trying to solve. The early stages of design thinking emphasize gaining a deep understanding of the problem, and developing [empathy](#) with the people affected by that problem to understand their perspectives and needs. In this way, this process is sometimes referred to as human-centered design. The later stages of design thinking focus on action. Design thinking is a process that allows teams or individuals to [try out numerous solutions](#) to a problem (to "experiment rapidly" or "[prototype](#)") to meet the needs of the client or group. Related to this idea is the importance of [failing often](#), but failing quickly and cheaply so that you can find a solution that works. David Kelley explains in his [TED Talk on creative confidence](#) that "a series of small successes turns fear into familiarity."

The first stage of design thinking is about empathy. We need to know the people involved in the problem, especially the "end-users," those most affected by the problem. These people are called "stake holders" because they have a stake in any solutions we might come up with related to our problem. We need to know about their needs and the contexts in which they live. We need to put ourselves, as much as possible, in their shoes to think about what would be helpful. We can read stories about the lives of stake holders. We can invite stake holders into conversation with us. We might even design solutions in partnership with various stake holders. The idea is that we are not going to design solutions without understanding as much as we can about the perspectives of the stake holders.

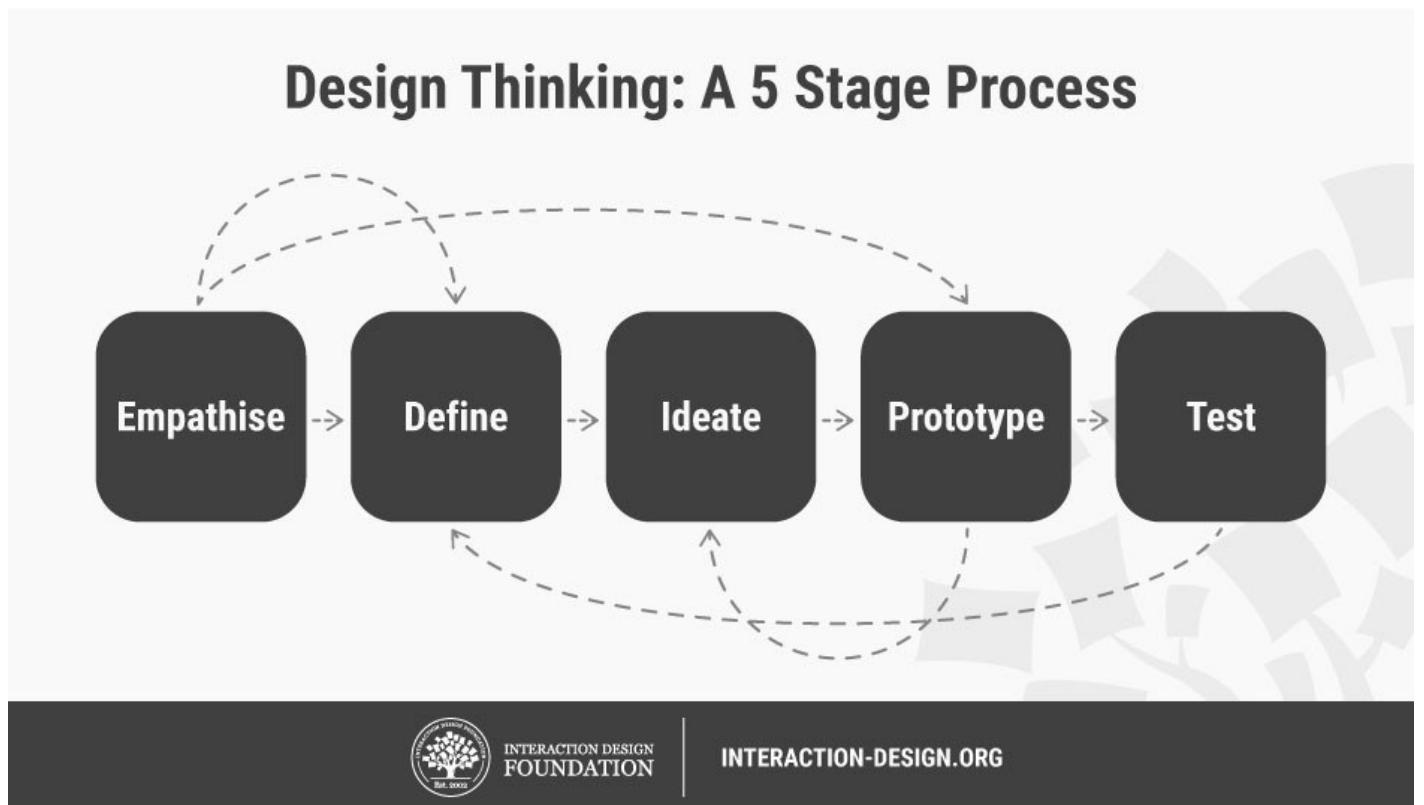
The second stage of design thinking involves defining the problem as one whose solution will satisfy a human-centered need. Notice that this definition of the problem has moved from the larger, complex problem that we are trying to work on to a smaller, more focused problem that expresses the needs of a particular group of people. We are not going to be able to "solve" the wicked problem for all of the reasons explained earlier in this OER. We are trying to make a difference in the problem and so that involves restating the wicked problem into something we can actually do something about. For example, if we are working on the wicked problem of fake news, we might decide that we would like college students at PSU to be armed with the tools that they need to recognize fake news when they see it. This won't solve the larger problem of fake news. It will continue to be created. Some people will continue to believe it. But we might be able to make a difference so that a particular population no longer believes it.

The third stage of design thinking is about ideation, where the designers (in this case, you, the students in "Tackling a Wicked Problem") generate many ideas about how to satisfy the need identified in the definition stage. You brainstorm about projects you might engage in that will make a difference in the world related to the wicked problem. In the example of fake news, you might work on the Digital Polarization Initiative, which is a web site that debunks fake news claims, by adding your own research about claims and advertising its availability to students on campus. You might create an OER about recognizing fake news and advocate for its use in all Composition classes at PSU. You might host a

movie night on campus to show and discuss the documentary “Nothing But Lies: Fighting Fake News.” You might come up with many, many more ideas about what you could do to help PSU students recognize fake news. Again, none of these ideas will solve the problem of fake news but each has an impact on the problem for PSU students.

The fourth stage is to build small-scale prototypes where particular aspects of the solution to the problem are chosen for implementation. This is an experimental stage where the goal is to identify the best solution to the needs with the constraints identified in the other stages. In this stage, you would implement one or more of the ideas that you had in the ideation stage. So might research a couple of fake news claims and publish your research on the Digital Polarization web site. You might write a chapter of the fake news OER and share it with your Composition instructor. And so on. The idea is that you implement some part of your project and share it with people.

The fifth stage involves testing the prototypes and often involves the development of more insights into the problem that can then be iteratively incorporated into redefining the problem or into new ideation and prototyping stages. This is where you get feedback about your prototype. You might share your Digital Polarization research with Student Senate and ask them for feedback. You might ask your Composition instructor whether she would use your fake news OER in her future classes and why or why not. The feedback that you receive will help you determine your next steps. Perhaps you misunderstood the needs of your stake holders and so you should revisit the empathy building stage. Or maybe you defined a problem that doesn't actually need to be solved so you revisit the problem definition stage. Or you may need to ideate more possible solutions. Or maybe you need a different or revised prototype of your solution idea. The point is that design thinking is a non-linear process where each stage may lead to paths forward or backward to any other stage in the process.



6

Research on Humans

Under federal law, institutions like Plymouth State University must create a group called the Institutional Review Board (IRB) to review and approve (or not) research that involves humans in order to ensure that no one is harmed by the research activities. Some of the projects that you might want to undertake in *Tackling a Wicked Problem* may need to be reviewed by the IRB. This chapter explains the circumstances for which you will need IRB approval for your project as well as the process for applying for IRB approval should you need to do so.

Do I need IRB approval for my class project?

Generally speaking, if the data are staying in the classroom (assignment being done for grading only) and data/results won't be shared outside the classroom, IRB approval is not needed. If data may be used for an honors thesis, or presented at the Showcase of Student Research and Engagement (for example), then the project will need IRB approval as dissemination at those public events as research data is considered to be contributing to generalizable knowledge.

Individuals who wish to gather data from human subjects as part of evaluations, assessments, service, reporting, classroom assignments, educational inquiry, or practice AND intend to use the data as research data for the purpose of publishing or sharing with a research community or the public at large, must obtain IRB approval PRIOR to conducting the activity.

The PSU IRB recognizes that human subjects may be harmed by unethical or careless activities resulting from evaluations, assessments, service, reporting, classroom assignments, educational inquiry, or practice. As a board that values the protection of human subjects and the conduct of ethical behavior, the board strongly disapproves of such unethical behavior. However, the IRB recognizes the limits of its mandate and authority. The actions of individuals conducting classroom activities are also governed by the ethical standards of their discipline (e.g., American Psychological Association or American Anthropological Association).

IRB approval is required for activities that 1) involve human subjects and 2) meet the definition of "research." According to the federal guidelines, "research" is a **systematic investigation**, including research development, testing, and evaluation, designed to develop or contribute to **generalizable knowledge**.

A **systematic investigation** follows a predetermined plan for looking at a particular issue, testing a hypothesis or research question, or developing a new theory that may include:

- Collection of quantitative or qualitative data
- Collection of data using surveys, testing or evaluation procedures, interviews, or focus groups
- Collection of data using experimental designs such as clinical trials
- Observation of individual or group behavior

A contribution to **generalizable knowledge** means that the purpose or intent of the project is to test or to develop scientific theories or hypotheses, or to draw conclusions that are intended to be applicable and/or shared beyond the populations or situations being studied. This may include one or more of the

following:

- Presentation of the data at meetings, conferences, seminars, poster presentations, etc. – including the poster symposium at the end of the semester
- The knowledge contributes to an already established body of knowledge
- Other investigators, scholars, and practitioners may benefit from this knowledge
- Publications including journals, papers, dissertations, and master's theses

If the project does not meet the definition of research (i.e. is not a systematic investigation or does not contribute to generalizable knowledge), as described above, then the project does not require IRB review and an IRB application is not required.

Examples of studies that ARE considered research with human subjects:

1. Studies that utilize test subjects for new devices, products, drugs, or materials.
2. Studies that collect data through intervention or interaction with individuals, if the information is about the individuals (including their opinions/views/thoughts). Examples of this type of research include behavioral interventions, surveys, studies that involve deception, research involving risky behaviors or attitudes, focus groups, and open-ended interviews with minors that contribute to generalizable knowledge.
3. Studies using private information that can be readily identified with individuals, even if the information was not collected specifically for the study in question.
4. Studies that use human bodily materials such as cells, blood, urine, tissues, organs, hair, or nail clippings, even if the researcher did not collect these materials for the study. However, such research may not be considered human subjects research if the materials/data are coded and the investigator does not have access to the coding systems. Guidance on research involving coded private information or biological specimens is available here; <https://www.hhs.gov/ohrp/regulations-and-policy/guidance/research-involving-coded-private-information/index.html>.
5. Studies that produce generalizable knowledge about categories or classes of subjects from identifiable private information.
6. Studies that use human beings to evaluate environmental alterations, for example, weatherization options or habitat modifications to their living or working space or test chamber.

Examples of studies that are NOT considered research with human subjects:

1. Data collection for internal departmental or other University administrative purposes. Examples: teaching evaluations, customer service surveys.
2. Information-gathering interviews where questions focus on things, products, or policies rather than people or their thoughts regarding themselves. Example: a survey of employers that asks whether the employers offer certain employee benefits programs, without asking for the opinions or thoughts of the individuals who respond to the survey.
3. Activities involving human subjects within the context of research methods courses generally do not require IRB review, unless the results will be used for research purposes (e.g., presented at PSU undergraduate or graduate research conferences or used in a thesis or dissertation).
4. Program evaluation/quality improvement/quality assurance projects are generally not considered research if these activities are designed specifically to assess or improve performance within a department, hospital or classroom setting. The intention of the project is not to generate conclusions that can be applied universally, outside of the immediate environment where the

project occurs. To determine whether a proposed quality improvement activity also qualifies as research (thus requiring IRB review), consult the Office of Human Research Protections (OHRP) guidance on quality improvement activities here:

<https://www.hhs.gov/ohrp/regulations-and-policy/guidance/faq/quality-improvement-activities/>

How do I apply for IRB approval?

If you believe your project needs IRB approval, below are the steps to follow next:

1. Complete the mandatory CITI Research training which can be found here: <https://campus.plymouth.edu/research-administration/training-2/compliance-training-citi/>.
2. Email psu-irb@plymouth.edu to ensure that your project needs IRB approval. Your subject line should be: Tackling a Wicked Problem. Provide a brief summary of your project including the participants you will be working with and the basic methodology.
3. If the IRB determines that your project needs IRB approval, complete the IRB application checklist, IRB application, and informed consent documents which can all be found here: <https://campus.plymouth.edu/institutional-review-board/how-to-apply/>
4. Submit your documents and CITI Training certificate to psu-irb@plymouth.edu.

Once you submit your application to the IRB, you will get a response in 1 to 4 weeks. You should include this time in your project planning.

Working with and for Outside Organizations

When you are working on projects, you are a representative of Plymouth State University. Because of that, there are rules that you will have to follow. Most of the rules arise when you are working with an outside organization on activities related to fundraising and donations, whether you are partnering with that organization or not and whether that organization is for-profit or not. If you plan to raise money or collect goods of any kind in your project, you must follow the rules explained in the following USNH and PSU policies. The process described will take **between 2 weeks and a month**. Be sure to include this time in your project planning.

Charitable fundraising activities for the benefit of outside parties are generally not allowable, except by registered student organizations or official athletic teams. USNH Policy 08-006 explains this policy in detail:

<https://www.usnh.edu/usnh-financial-services-policies-and-procedures/08-006-contributions-charitable-and-political>

The University understands, however, there may be times when this is a worthwhile activity for students to engage in. Approval of such activity is determined on a case-to-case basis and takes into account the value of the learning outcomes, as well as institutional risk and institutional resource investment. Plymouth State University's policy can be found here:

<https://campus.plymouth.edu/financial-services/wp-content/uploads/sites/14/2019/08/Fundraising-for-External-Entities-Policy-and-Guidelines-8-19-19-Final.pdf>

If you are interested in working on a project that involves any sort of fundraising or donation collection for an outside organization, you (or your instructor) must first contact the Coordinator of General Education, Cathie LeBlanc (cleblanc@plymouth.edu). Again, be aware that getting approval to engage in these activities will take **between 2 weeks and a month** and you should include that time in your project planning.

IV

Information Literacy

The chapter called "[Introduction to Information Literacy](#)" defines information literacy and describes its importance in our work on wicked problems. That chapter is followed by [eight chapters](#) related to the Seven Pillars model of information literacy. The next chapter is called "[SIFT: Four Moves](#)" which describes activities to engage in when trying to assess claims that you find on the World Wide Web. The final chapter is called "[Evaluating News Sources](#)" and provides strategies for determining whether news sources are trustworthy or not.

Introduction to Information Literacy

According to [Association of Colleges and Research Libraries](#), “**Information literacy** is the set of integrated abilities encompassing the reflective discovery of information, the understanding of how information is produced and valued, and the use of information in creating new knowledge and participating ethically in communities of learning.”

Information literacy is a skill that improves with practice. Throughout your life, you will find yourself in situations where you need information—information about the reliability of a car you’re thinking about buying, information about a company you’re thinking of working for, information about the positions of a presidential candidate you’re thinking about voting for. Your information needs will be many and varied. As you work on your projects for “Tackling a Wicked Problem,” you will find that you sometimes need more information before proceeding with your work. You will ask yourself where you might find the information that will be most useful to you, to help you make the best decisions possible. As you discover new information from new sources, you will ask yourself questions about the validity and reliability of that information and about how and why the information was produced. As you create your own new information that you share with others, you will need to properly and ethically summarize the ideas you found and cite those ideas so that you are not presenting them as your own. And over time, with practice, you will get better and better at these tasks.

In this section, we present two models for thinking about information literacy. The first is called The Seven Pillars model and is focused primarily on research projects. The second is called the SIFT model and is focused on evaluating the reliability of information found on the World Wide Web.

9

The Seven Pillars

It is unlikely that you know everything you need to know about your wicked problem. To fill in the gaps in your knowledge, you should do some investigation using a variety of tools. The [Seven Pillars Model of Information Literacy](#) provides a good framework for how to fill in the gaps in your knowledge about your wicked problem. The Seven Pillars are:

1. **Identify:** Understanding your information need.
2. **Scope:** Knowing what is available.
3. **Plan:** Developing research strategies.
4. **Gather:** Finding what you need.
5. **Evaluate:** Assessing your research process and findings.
6. **Manage:** Organizing information effectively and ethically.
7. **Present:** Sharing what you have learned.

The following chapters about each of these pillars of information literacy are adapted from [The Information Literacy User's Guide](#). While the pillars are normally presented in a certain order, it is important to remember that they are not intended to be a step-by-step guide to be followed in a strict order. In most projects, you will find that you move back and forth between the different pillars as you discover more information and come up with more questions about your wicked problem.

10

Seven Pillars: Identify

No one person knows everything there is to know about your wicked problem. There is simply too much information about these complex problems and much of the information addresses the problem from different perspectives or disciplines. All of us lack knowledge in countless areas, but this isn't a bad thing. Once we step back and acknowledge that we don't know something, it opens up the possibility that we can find out all sorts of interesting things, and that's when the searching begins.

One of the first things you need to do when beginning any information-based project is to identify your personal need for information. This may seem obvious, but it is something many of us take for granted. We may mistakenly assume that we already know enough to proceed. Such an assumption can lead us to waste valuable time working with incomplete or outdated information.

When you realize that you have an information need it may be because you thought you knew more than you actually do, or it may be that there is simply new information you were not aware of. One of the most important things you can do when starting to research a topic is to scan the existing information landscape to find out what is already out there. We'll get into more specific strategies for accessing different types of information later in the book, particularly in the Gather chapter, but for now it pays to think more broadly about the information environment in which you are operating.

For instance, any topic you need information about is constantly evolving as new information is added to what is known about the topic. Trained experts, informed amateurs, and opinionated laypeople are publishing in traditional and emerging formats; there is always something new to find out. The scale of information available varies according to topic, but in general it's safe to say that there is more information accessible now than ever before.

Due to the extensive amount of information available, part of becoming more information literate is developing habits of mind and of practice that enable you to continually seek new information and to adapt your understanding of topics according to what you find. Because of the widely varying quality of new information, evaluation is also a key element of information literacy, and will be addressed in the Evaluate chapter of this book.

Finally, while you are busy searching for information on your current understanding of your wicked problem, be sure to keep your mind open for new avenues or angles of research that you haven't yet considered. Often the information you found for your initial need will turn out to be the pathway to a rich vein of information that can serve as raw material for many subsequent projects.

All of us lack knowledge in countless areas, but this isn't a bad thing. Once we step back and acknowledge that we don't know something, it opens up the possibility that we can find out all sorts of interesting things, and that's when the searching begins.

Taking your lack of knowledge and turning it into a search topic starts with being able to state what your lack of knowledge is. Part of this is to state what you already know. It's rare that you'll start a search from absolute zero. Most of the time you've at least heard something about the topic, even if it is just a brief reference in a lecture or reading. Taking stock of what you already know can help you to

identify any erroneous assumptions you might be making based on incomplete or biased information. If you think you know something, make sure you find at least a couple of reliable sources to confirm that knowledge before taking it for granted. Use the following exercise to see if there is anything that needs to be supported with background research before proceeding.

Exercise: Taking Stock of What you Already Know

As discussed above, part of identifying your own information need is giving yourself credit for what you already know about your topic. Construct a chart using the following format to list whatever you already know about the topic.

Name your topic at the top.

In the first column, list what you know about your topic.

In the second column, briefly explain how you know this (heard it from the professor, read it in the textbook, saw it on a blog, etc.).

In the last column, rate your confidence in that knowledge. Are you 100% sure of this bit of knowledge, or did you just hear it somewhere and assume it was right?

When you've looked at everything you think you know about the topic and why, step back and look at the chart as a whole. How much do you know about the topic, and how confident are you about it? You may be surprised at how little or how much you already know, but either way you will be aware of your own background on the topic. This self-awareness is key to becoming more information literate.

This exercise gives you a simple way to gauge your starting point, and may help you identify specific gaps in your knowledge of your wicked problem that you will need to fill as you proceed with developing your project(s). It can also be useful to revisit the chart as you work on your project to see how far you've progressed, as well as to double check that you haven't forgotten an area of weakness.

What do you know?	How do you know it?	How confident are you in this knowledge?

Once you've clearly stated what you do know, it should be easier to state what you don't know. Keep in mind that you are not attempting to state *everything* you don't know. You are only stating what you don't know in terms of your current information need. This is where you define the limits of what you are searching for. These limits enable you to meet both size requirements and time deadlines for a project. If you state them clearly, they can help to keep you on track as you proceed with your work. You can learn more about this in the Scope chapter of this book.

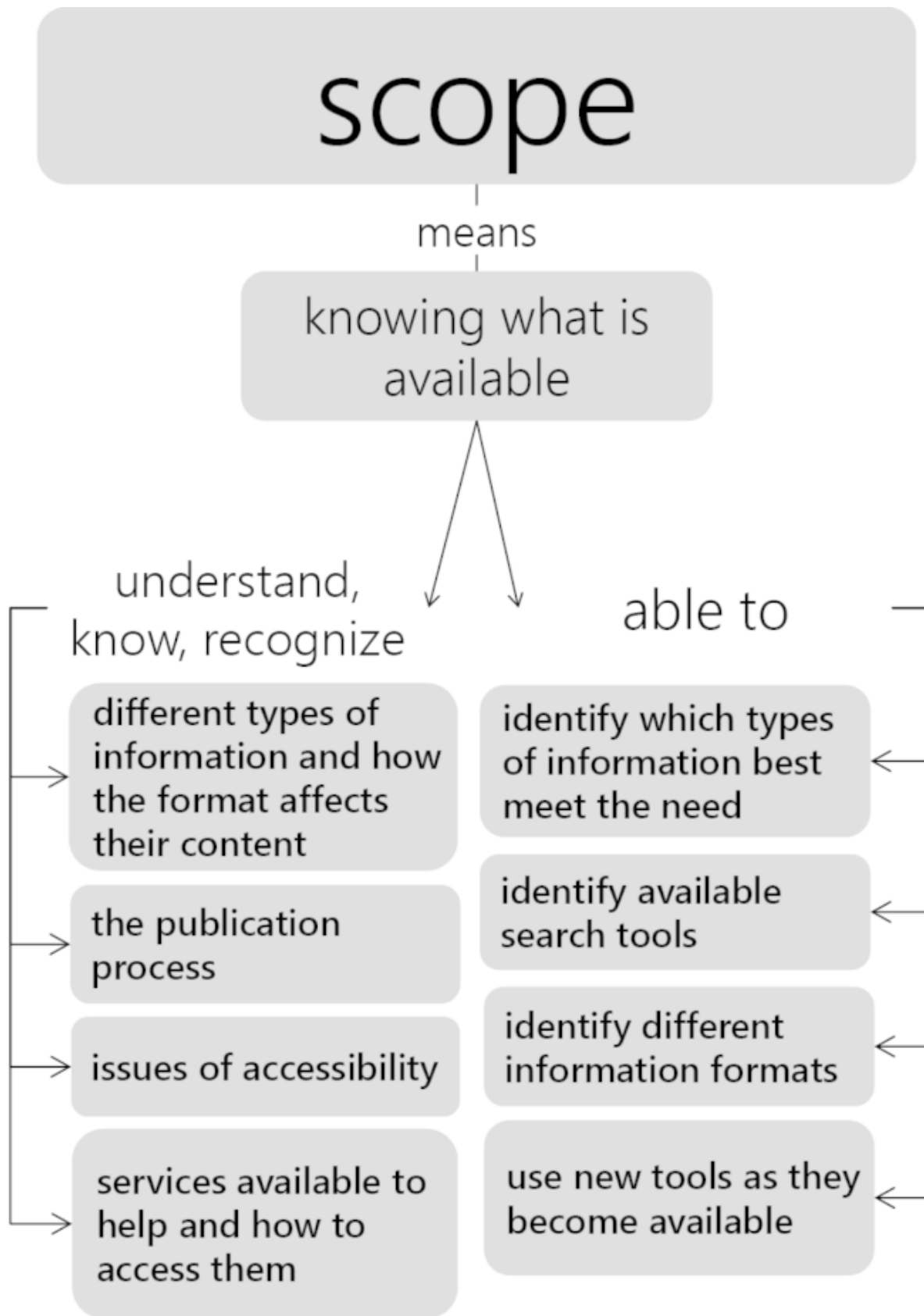
One useful way to keep your research on track is with a "KWHL" chart. This type of chart enables you to state both what you know and what you want to know, as well as providing space where you can track your planning, searching and evaluation progress. For now, just fill out the first column, but start thinking about the gaps in your knowledge and how they might inform your project development.

What do you already Know about your topic?	What do you Want to know about your topic?	How will you find information on your topic?	What have you Learned about your topic?

11

Seven Pillars: Scope

A person who is information literate in the Scope pillar is able to assess current knowledge and identify gaps. In addition to knowing that you are missing essential information, another component of information literacy is understanding that the information you seek may be available in different formats such as books, journal articles, government documents, blog postings, and news items. Each format has a unique value. The graphic below represents a common process of information dissemination. When an event happens, we usually hear about it from news sources—broadcast, web, and print. More in-depth exploration and analysis of the event often comes from government studies and scholarly journal articles. Deeper exploration, as well as an overview of much of the information available about the event, is often published in book format.



When you are looking for information, you probably start by entering some search terms into Google and hoping that you find something useful. Using Google successfully is an important information literacy skill and we will discuss how to find the most reliable information later.

A better first step might be to identify a library that contains academic resources so that you will have access to more scholarly treatments of the subject. Luckily, PSU has such a library with very helpful librarians who are experts at finding useful information about any topic.

A library catalog is a database that contains all of the items located in a library as well as all of the items to which the library has access. It allows you to search for items by title, author, subject, and keyword. A keyword is a word that is found anywhere within the record of an item in the catalog. A catalog record displays information that is pertinent to one item, which could be a book, a journal, a government document, or a video or audio recording.

If you search by subject in an academic library catalog you can take advantage of the controlled vocabulary created by the Library of Congress. Controlled vocabulary consists of terms or phrases that have been selected to describe a concept. For example, the Library of Congress has selected the phrase “Motion Picture” to represent films and movies. So, if you are looking for books about movies, you would enter the phrase “Motion Picture” into the search box. Controlled vocabulary is important because it helps pull together all of the items about one topic. In this example, you would not have to conduct individual searches for movies, then motion pictures, then film; you could just search once for motion pictures and retrieve all the items on movies and film. You can discover subject terms in item catalog records.

Many libraries provide catalog discovery interfaces that provide cues to help refine a search. This makes it easier to find items on specific topics. For example, if you enter the search terms “Hydraulic Fracturing” into a catalog with a discovery interface, the results page will include suggestions for refinements including several different aspects of the topic. You can click on any of these suggested refinements to focus your search.

Using this method, you will likely find several good resources on your wicked problem. Why might you choose books instead of another format for your starting resources? Books can provide an overview of a broad topic. Often, the author has gathered the information from multiple sources and created an easy to understand overview. You can look later for corroborating evidence in government documents and journal articles. Books might be a good information resource for this stage of your research.

Once you start to locate useful information resources, you might realize that there are further gaps in your knowledge. How do you decide which books to use? You might want the most current information, because you definitely don’t want to use outdated information. Looking at publication date will help you to choose the most recent items.

How can you get these books? They might be available at PSU’s library in which case you can borrow them as a PSU student. But if PSU doesn’t own them, you can use interlibrary loan, which will allow you to access books from other academic libraries. There is a wealth of knowledge contained in the resources of academic and public libraries throughout the United States. Single libraries can’t hope to collect all of the resources available on a topic. Fortunately, libraries are happy to share their resources and they do this through interlibrary loan. Interlibrary loan allows you to borrow books and other information resources regardless of where they are located. If you know that a book exists, ask your library to request it through their interlibrary loan program. This service is available at both academic

and most public libraries.

Another good source of information is journal articles. If you want to find journal articles, you should start your search with research databases. Research databases contain records of journal articles, documents, book chapters, and other resources. Online library catalogs differ from other research databases in that they contain only the items available through a particular library or library system. Research databases are often either broad or comprehensive collections and are not tied to the physical items available at any one library. Many databases provide the full-text of articles and can be searched by subject, author, or title. Another type of database provides just the information about articles and may provide tools for you to find the full text in another database. The databases that contain resources for a vast array of subjects are referred to as general or multidisciplinary databases. Other databases are devoted to a single subject, and are known as subject-specific databases. Databases are made up of:

- Records: A record contains descriptive information that is pertinent to one item which may be a book, a chapter, an article, a document, or other information unit.
- Fields: These are part of the record and they contain information that pertains to one aspect of an item such as the title, author, publication date, and subject.
- The subject field can sometimes be labeled subject heading or descriptor. This is the field that contains controlled vocabulary. Controlled vocabulary in a database is similar to controlled vocabulary in a Library Catalog, but each database usually has a unique controlled vocabulary unrelated to Library of Congress classifications. Many databases will make their controlled vocabulary available in a thesaurus. If the database you are searching does not have a thesaurus, use the subject field in a record to find relevant subject terms.

Boolean Operators

One way to limit a database search is to use Boolean operators; words you can add to a search to narrow or broaden your search results. They are *and*, *or*, and *not*. You can usually find these words in the advanced search query area of a database. *And* will narrow your search. For example, if you are interested in fresh water fishing you would enter the terms “*fish and freshwater.*” Your results would then include records that only contained both of these words.

The green overlapping area in the diagram above represents the results from the “*fish and freshwater*” search.

Or will broaden your search and is usually used with synonyms. If you are interested in finding information on mammals found in the Atlantic Ocean, you could enter the terms “*whales or dolphins.*”

The circles above represent the *or* search. All of the records that contain one or another, or both of your search terms will be in your results list.

Not will eliminate a term from your results. If you were looking for information on all Atlantic Ocean fish except Bluefish, you would enter “*fish not bluefish.*”

The larger green circle represents the results that you would retrieve with this search.

Let's say you want to find information about hydraulic fracturing. You can start with the phrase "*hydraulic fracturing*" and use *and* with the phrase "*Marcellus Shale*" to focus and limit your results. Your search query is now "*hydraulic fracturing and Marcellus Shale.*" You can see this represented below. The overlapping area represents the records this search will retrieve.

More information on Boolean Operators can be found in the Plan chapter.

Database searching can seem confusing at first, but the more you use databases, the easier it gets and most of the time, the results you are able to retrieve are superior to the results that you will get from a simple internet search. Also, the librarians in Lamson Library are happy to help you find information using effective searching.

12

Seven Pillars: Plan

As you work through your own information quests, it is very important to be self-reflective. The first couple of items in this list have been considered in the Identify chapter:

- What do you really need to find?
- Do you need to learn more about the general subject before you can identify the focus of your search?
- How thoroughly did you develop your search strategy?
- Did you spend enough time finding the best tools to search?
- What is going really well, so well that you'll want to remember to do it in the future?

Another term for what you are doing is metacognition, or thinking about your thinking. As you read this chapter, you may find that you already know some of the strategies presented here. Do you do them the same way? How does it work? What pieces are new to you? When might you follow this advice? Don't just let the words flow over you, rather think carefully about the explanation of the process. You may disagree with some of what you read. If you do, follow though and test both methods to see which provides better results.

After you have thought the planning process through more thoroughly, start to think about where you can look for information. Part of planning to do research is determining which search tools will be the best ones to use. This applies whether you are doing scholarly research or trying to answer a question in your everyday life, such as what would be the best place to go on vacation. "Search tools" might be a bit misleading, since a person might be the source of the information you need. Or it might be a web search engine, a specialized database, an association—the possibilities are endless. Often people automatically search Google first, regardless of what they are looking for. Choosing the wrong search tool may just waste your time and provide only mediocre information, whereas other sources might provide really spot-on information and quickly, too. In some cases, a carefully constructed search on Google, particularly using the advanced search option, will provide the necessary information, but other times it won't. This is true of all sources: make an informed choice about which ones to use for a specific need.

So, how do you identify search tools? Let's begin with a first-rate method. For academic research, talking with a librarian or your professor is a great start. They will direct you to those specialized tools that will provide access to what you need. If you ask a librarian for help, she or he may also show you some tips about searching in the resources. This chapter will cover some of the generic strategies that will work in many search tools, but a librarian can show you very specific ways to focus your search and retrieve the most useful items.

If neither your professor nor a librarian is available when you need help, check your school's library website to see what guidance is provided. There will often be subject-related guides or lists of the best resources to assist researchers. There may be a directory of the databases the library subscribes to and the subjects they cover. Take advantage of the expertise of librarians by using such guides. Novice researchers usually don't think of looking for this type of help, and, as a consequence, often waste time.

When you are looking for non-academic material, consider who cares about this type of information. Who works with it? Who produces it or help guides for it? Some sources are really obvious, and you are already using them—for example, if you need information about the weather in London three days from now, you might check Weather.com for London’s forecast. You don’t go to a library (in person or online), and you don’t do a research database search. For other information you need, think the same way. Are you looking for anecdotal information on old railroads? Find out if there is an organization of railroad buffs. You can search on the web for this kind of information, or, if you know about and have access to it, you could check the Encyclopedia of Associations. This source provides entries for all U.S. membership organizations, which can quickly lead you to a potentially wonderful source of information. Librarians can point you to tools like these.

As you consider the information presented in this chapter, keep the scope of the information you are looking for in mind. In the previous chapter we examined the topic of scope in detail. The breadth and depth of the information you require will have an impact as you plan.

Consider Asking an Expert

Have you thought about using people, not just inanimate sources, as a way to obtain information? This might be particularly appropriate if you are working on an emerging topic or a topic with local connections. There are a variety of reasons that talking with someone will add to your research.

For personal interactions, there are other specific things you can do to obtain better results. Do some background work on the topic before contacting the person you hope to interview. The more familiarity you have with your topic and its terminology, the easier it will be to ask focused questions. Focused questions are important if you want to get into the meat of what you need. Asking general questions because you think the specifics might be too detailed rarely leads to the best information. Acknowledge the time and effort someone is taking to answer your questions, but also realize that people who are passionate about subjects enjoy sharing what they know. Take the opportunity to ask experts about sources they would recommend.

Determining Search Concepts and Keywords

Once you’ve selected some good resources for your wicked problem, and possibly talked with an expert, it is time to move on to identify words you will use to search for information on your wicked problem in various databases and search engines. This is sometimes referred to as building a search query. When deciding what terms to use in a search, break down your wicked problem into its main concepts. Don’t enter an entire sentence, or a full question. Different databases and search engines process such queries in different ways, but many look for the entire phrase you enter as a complete unit, rather than the component words. While some will focus on just the important words, the results are often still unsatisfactory. The best thing to do is to use the key concepts involved with your wicked problem. In addition, think of synonyms or related terms for each concept. If you do this, you will have more flexibility when searching in case your first search term doesn’t produce any or enough results. This may sound strange, since if you are looking for information using a Web search engine, you almost always get too many results. Databases, however, contain fewer items, and having alternative search terms may lead you to useful sources. Even in a search engine like Google, having terms you can combine thoughtfully will yield better results.

Boolean Operators

Once you have the concepts you want to search, you need to think about how you will enter them into the search box. Often, but not always, Boolean operators will help you. You may be familiar with Boolean operators. They provide a way to link terms. Boolean operators are also discussed in the Scope chapter. The information in the two chapters complements each other and reading about this important topic again provides a review for the topics that overlap.

We will start by capturing the ideas of the women creating the art. We will use *women painters and women artists* as the first step in our sample search. You could do two separate searches by typing one or the other of the terms into the search box of whatever tool you are using:

women painters

women artists

You would end up with two separate result lists and have the added headache of trying to identify unique items from the lists. You could also search on the phrase

women painters and women artists

But once you understand Boolean operators, that last strategy won't make as much sense as it seems to.

There are three Boolean operators: *and*, *or*, and *not*.

And is used to get the intersection of all the terms you wish to include in your search. With this example

women painters and women artists

you are asking that the items you retrieve have both of those terms. If an item only has one term, it won't show up in the results. This is not what the searcher had in mind—she is interested in both artists and painters, because she doesn't know which term might be used. She doesn't intend that both terms have to be used. Let's go on to the next Boolean operator, which will help us out with this problem.

Or is used when you want at least one of the terms to show up in the search results. If both do, that's fine, but it isn't a condition of the search. So *or* makes a lot more sense for this search:

women painters or women artists

Now, if you want to get fancy with this search, you could use both *and* as well as *or*:

women and (painters or artists)

The parentheses mean that these two concepts, painters and artists, should be searched as a unit, and the search results should include all items that use one word or the other. The results will then be limited to those items that contain the word *women*. If you decide to use parentheses for appropriate searches, make sure that the items contained within them are related in some way. With *or*, as in our example, it means either of the terms will work. With *and*, it means that both terms will appear in the document.

Type both of these searches in [Google Scholar](#) and compare the results (please note, you must capitalize OR when using it as a Boolean operator in Google products). Were they the same? If not, can you determine what happened? Which result list looked better?

Here is another example of a search string, using both parentheses and two Boolean operators:

entrepreneurship and (adolescents or teens)

In this search, you are looking for entrepreneurial initiatives connected with people in their teens. Because there are so many ways to categorize this age group, it makes sense to indicate that either of these terms should appear in the results, along with entrepreneurship.

However, this search string isn't perfect. Can you pick out two problems with the search terms?

The third Boolean operator, *not*, can be problematic. *Not* is used to exclude items from your search. If you have decided, based on the scope of the results you are getting, to focus only on a specific aspect of a topic, use *not*, but be aware that items are being lost in this search. For example, if you entered

entrepreneurship and (adolescents or teens) not adults

you might lose some good results. Why? If you would like to see graphical representations of the effects of Boolean operators, take a look at the Scope chapter in this book.

[Here is a good overview of Boolean operator use.](#)

13

Seven Pillars: Gather

Traditionally, information has been organized in different formats, usually as a result of the time it took to gather and publish the information. For example, the purpose of news reporting is to inform the public about the basic facts of an event. This information needs to be disseminated quickly, so it is published daily in print, online, on broadcast television, and radio media. More in-depth treatment of information takes longer to research, write, and publish and traditionally was published in scholarly journals and books.

Today, information is still published in traditional formats as well as in newly evolving formats on the Internet. These new information formats are loosely defined as Web 2.0 formats and can include electronic journals, books, news websites, blogs, Twitter, Facebook, and location postings. The coexistence of all of these information formats is messy and chaotic. The process for finding relevant information is not always clear.

One way to make some sense out of the current information universe is to thoroughly understand traditional information formats. We can then understand the concepts inherent in the information formats found online. There are some direct correlations such as books and journal articles, but there are also some newer formats like tweets that didn't exist until recently.

Let's look at the news industry. Many traditional newspapers are shutting down and those that remain are retrenching. While there are many reasons for this, one of the major trends has been the rise of the Internet. In the United States, [more than 50 per cent of the population reads the news online](#).

Indeed, online news sites provide a different and, some might argue, a more relevant experience for the reader. They offer video and sound, up-to-the-minute updates on breaking news, and the ability to interact with the content by posting comments. Another important feature of online news is that search engines can deliver content from the site in response to a query. In other words, readers don't have to visit a site such as the *New York Times* in order to read its content.

This has both positive and negative consequences. The positive consequence is that readers can quickly and conveniently obtain information from a variety of sources on a topic or event. The negative consequence is that it is more difficult to evaluate the credibility of the sources. The Evaluate chapter in this book provides some good strategies for evaluating information sources.

Citations

As you start to read and digest all of the information you have gathered, you will notice that many articles and books contain references to other articles and books. Even Wikipedia entries contain references. These consist of citations to resources that authors have quoted or paraphrased in their work or have used to research for their publications. Some of these citations can provide great information. But you might not know if the citation is to a book or an article or something else.

Citations can be confusing. There are many different citation styles and not many hard and fast rules about when to use a particular style. Your professor may indicate which citation style you should use. If

not, the general rule of thumb is that the Social Sciences and Education disciplines use APA (American Psychological Association) citation style, while the Humanities and Arts disciplines use MLA (Modern Language Association) or the Chicago style. You can find detailed information about how to format a citation in these styles by consulting the latest *Publication Manual of the American Psychological Association*, for APA citations, the most recent copy of the *MLA Handbook*, or the current *Chicago Manual of Style*. You should be able to find copies of these publications in the reference section of your library. You can also obtain guidance on formatting citations in the APA and MLA style from [the University at Albany's Citation Fox](#).

However, just knowing what citation style is used doesn't always clear up the confusion. Each different information format is cited differently. The most common formats that you will encounter are books, chapters in books, journal articles, and websites.

Take a look at the following citations. You can see that there are differences between citation styles. You can also see that each information format contains different elements. When you try to determine whether a citation is for a book, book chapter or journal, think about the elements inherent in each of these formats. For example, a journal article appears in a journal that is published in a volume and issue. If you see volume and issue numbers in the citation, you can assume that the citation is for a journal article. A book chapter is usually written by a different author from the editors of the whole book. A whole book is often the easiest citation to decipher. It contains the fewest elements.

[Gathering Components of A Citation](#) from [opensunyttextbooks](#)

This chapter has discussed citations in relation to finding resources. You will encounter citations again in the Manage chapter, which covers how to use citations to share information with others.

14

Seven Pillars: Evaluate

Information is published in a variety of formats, each with its own special considerations when it comes to evaluation. Consider the following formats.

Social Media

Social media is a quickly rising star in the landscape of information gathering. Facebook updates, tweets, wikis, and blogs have made information creators of us all and have a strong influence not just on how we communicate with each other but also on how we learn about current events or discover items of interest. Anyone can create or contribute to social media and nothing that's said is checked for accuracy before it's posted for the world to see. So do people really use social media for research? Currently, the main use for social media like tweets and Facebook posts is as primary sources that are treated as the objects under study rather than sources of information on a topic. But now that the Modern Language Association has a recommended way to cite a tweet, social media may, in fact, be gaining credibility as a resource.

News Articles

These days, social media will generally be among the first to cover a big news story, with news media writing an article or report after more information has been gathered. News articles are written by journalists who either report on an event they have witnessed firsthand, or after making contact with those more directly involved. The focus is on information that is of immediate interest to the public and these articles are written in a way that a general audience will be able to understand. These articles go through a fact-checking process, but when a story is big and the goal is to inform readers of urgent or timely information, inaccuracies may occur. In research, news articles are often best treated as primary sources, especially if they were published immediately after a current event.

Magazine Articles

While news articles and social media tend to concentrate on what happened, how it happened, who it happened to, and where it happened, magazine articles are more about understanding *why* something happened, usually with the benefit of at least a little hindsight. Writers of magazine articles also fall into the journalist category and rely heavily on investigation and interviews for research. Fact-checking in magazine articles tends to be more accurate because magazines publish less frequently than news outlets and have more time to get facts right. Depending on the focus of the magazine, articles may cover current events or just items of general interest to the intended audience. The language may be more emotional or dramatic than the factual tone of news articles, but the articles are written at a similar reading level so as to appeal to the widest audience possible. A magazine article is considered a popular source rather than a scholarly one, which gives it less weight in a research context but doesn't take away the value completely.

Scholarly Articles

Scholarly articles are written by and for experts in a field and generally describe formal research

studies or experiments conducted to provide new insight on a topic rather than reporting current events or items of general interest. You may have heard the term “peer review” in relation to scholarly articles. This means that before an article is published, it undergoes a review process in order to confirm that the information is accurate and the research it discusses is valid. This process adds a level of credibility to the article that you would not find in a magazine or news article. Scholarly articles tend to be long and feature specialized language that is not easily understood by someone who does not already have some level of expertise on the topic. Though they may not be as easy to use, they carry a lot of weight in a research context, especially if you are working in a field related to science or technology. These sources will give you information to build on in your own original research.

Books

Books have been a staple of the research process since Gutenberg invented the printing press because a topic can be covered in more depth in a book than in most other types of sources. Also, the conventional wisdom for books is that anyone can write one, but only the best ones get published. This is becoming less true as books are published in a wider variety of formats and via a wider variety of venues than in previous eras, which is something to be aware of when using a book for research purposes. For now, the editing process for formally published books is still in place and research in the humanities, which includes topics such as literature and history, continues to be published primarily in this format.

Choosing Materials

When choosing a source for your research, what criteria do you usually use? Gauging whether the source relates to your topic at all is probably one. How high up it appears on the results list when you search may be another. Beyond that, you may base your decision at least partly on how easy it is to access.

These are all important criteria, to varying degrees, but there are other criteria you may want to keep in mind when deciding if a source will be useful to your research.

Quality

Scholarly journals and books are traditionally considered to be higher quality information sources because they have gone through a more thorough editing process that ensures the quality of their content. Generally, you also pay more to access these sources or may have to rely on a library or university to pay for access for you. Information on the Internet can also be of a high quality but there is less of a quality assurance process in place for much of that information. In the current climate, the highest quality information even on the Internet often requires a subscription or other form of payment for access.

Clues to a source’s level of quality are closely related to thinking about how the source was produced, including what format it was published in and whether it is likely to have gone through a formal editing process prior to publication.

Accuracy

A source is accurate if the information it contains is correct. Sometimes it’s easy to tell when a piece of

information is simply wrong, especially if you have some prior knowledge of the subject. But if you're less familiar with the subject, inaccuracies can be harder to detect, especially when they come in subtler forms such as exaggerations or inconsistencies.

To determine whether a source is accurate, you need to look more deeply at the content of the source, including where the information in the source comes from and what evidence the author uses to support their views and conclusions. It also helps to compare your source against another source. A reader of *Our Virginia* may not have reason to believe the information the author cites from the Sons of Confederate Veterans website is inaccurate, but if they compared the book against another source, the inconsistencies might become more apparent.

Relevance

Relevance has to do with deciding whether the source actually relates to your topic and, if it does, how closely it relates. Some sources may be an exact match; for others, you may need to consider a particular angle or context before you can tell whether the source applies to your topic. When searching for relevant sources, you should keep an open mind—but not too open. Don't pick something that's not really related just because it's on the first page or two of results or because it sounds good.

You can assess the relevance of a source by comparing it against your research topic or research question. Keep in mind that the source may not need to match on all points, but it should match on enough points to be usable for your research beyond simply satisfying a requirement for an assignment.

Bias

An example of bias is when someone expresses a view that is one-sided without much consideration for information that might negate what they believe. Bias is most prevalent in sources that cover controversial issues where the author may attempt to persuade their readers to one side of the issue without giving fair consideration to the other side of things. If the research topic you are using has ever been the cause of heated debate, you will need to be especially watchful for any bias in the sources you find.

Bias can be difficult to detect, particularly when we are looking at persuasive sources that we want to agree with. If you want to believe something is true, chances are you'll side with your own internal bias without consideration for whether a source exhibits bias. When deciding whether there is bias in a source, look for dramatic language and images, poorly supported evidence against an opposing viewpoint, or a strong leaning in one direction.

Reputation

Is the author of the source you have found a professor at a university or a self-published blogger? If the author is a professor, are they respected in their field or is their work heavily challenged? What about the publication itself? Is it held in high regard or relatively unknown? Digging a little deeper to find out what you can about the reputation of both the author and the publication can go a long way toward deciding whether a source is valuable.

You can investigate the reputation of an author by looking at any biographical information that is available as part of the source. Looking to see what else the author has published and whether this information has positive reviews is also important in establishing whether the author has a good

reputation. The reputation of a publication can also be investigated through reviews, word-of-mouth by professionals in the field, or online databases that keep track of statistics related to a journal's credibility.

Credibility

Credibility has to do with the believability or trustworthiness of a source based on evidence such as information about the author, the reputation of the publication, and how well-formatted the source is. How likely would you be to use a source that was written by someone with no expertise on a topic or a source that appeared in a publication that was known for featuring low quality information? What if the source was riddled with spelling and formatting errors? Looking at sources like these should inspire more caution.

Objectively, credibility can be determined by taking into account all of the other criteria discussed for evaluating a source. Knowing that some types of sources, such as scholarly journals, are generally considered more credible than others, such as self-published websites, may also help. Subjectively, deciding whether a source is credible may come down to a gut feeling. If something about a source doesn't sit well with you, you may decide to pass it over.

The chapter about "[SIFT: Four Moves](#)" provides an excellent method for evaluating sources and claims you find online. An alternative evaluation method is the CRAAP test which was developed by librarians at California State University at Chico. It gives you a good, overall set of elements to look for when evaluating a resource.

Currency

One of the most important and interesting steps to take as you begin researching a subject is selecting the resources that will help you build your thesis and support your assertions. Certain topics require you to pay special attention to how current your resource is—because they are time sensitive, because they have evolved so much over the years, or because new research comes out on the topic so frequently. When evaluating the currency of an article, consider the following

- When was the item written, and how frequently does the publication it is in come out?
- Is there evidence of newly added or updated information in the item?
- If the information is dated, is it still suitable for your topic?
- How frequently does information change about your topic?

Relevance

Understanding what resources are most applicable to your subject and why they are applicable can help you focus and refine your thesis. Many topics are broad and searching for information on them produces a wide range of resources. Narrowing your topic and focusing on resources specific to your needs can help reduce the piles of information and help you focus in on what is truly important to read and reference. When determining relevance consider the following:

- Does the item contain information relevant to your argument or thesis?
- Read the article's introduction, thesis, and conclusion.
- Scan main headings and identify article keywords.
- For book resources, start with the index or table of contents—how wide a scope does the item

have? Will you use part or all of this resource?

- Does the information presented support or refute your ideas?
- If the information refutes your ideas, how will this change your argument?
- Does the material provide you with current information?
- What is the material's intended audience?

Authority

Understanding more about your information's source helps you determine when, how, and where to use that information. Is your author an expert on the subject? Do they have some personal stake in the argument they are making? What is the author or information producer's background? When determining the authority of your source, consider the following

- What are the author's credentials?
- What is the author's level of education, experience, and/or occupation?
- What qualifies the author to write about this topic?
- What affiliations does the author have? Could these affiliations affect their position?
- What organization or body published the information? Is it authoritative? Does it have an explicit position or bias?

Accuracy

Determining where information comes from, if evidence supports the information, and if the information has been reviewed or refereed can help you decide how and whether to use a source. When determining the accuracy of a source, consider the following:

- Is the source well-documented? Does it include footnotes, citations or a bibliography?
- Is information in the source presented as fact, opinion or propaganda? Are biases clear?
- Can you verify information from referenced information in the source?
- Is the information written clearly and free of typographical and grammatical mistakes? Does the source look to be edited before publication? A clean, well-presented paper does not always indicate accuracy, but usually at least means more eyes have been on the information.

Purpose

Knowing why information was created is a key to evaluation. Understanding the reason or purpose of the information, if the information has clear intentions, or if the information is fact, opinion or propaganda will help you decide how and why to use information

- Is the author's purpose to inform, sell, persuade, or entertain?
- Does the source have an obvious bias or prejudice?
- Is the article presented from multiple points of view?
- Does the author omit important facts or data that might disprove their argument?
- Is the author's language informal, joking, emotional, or impassioned?
- Is the information clearly supported by evidence?

Seven Pillars: Manage

Now that you have gone through the processes involved to find and evaluate information, the next step is to start working with it. This is where the Manage pillar comes in: it focuses on the need to organize information professionally and ethically.

It is wonderful to have access to information. It empowers us humans, with data and knowledge that leads us throughout our busy days and helps us organize our leisure time more efficiently. GPS devices and mobile phones help us get to unfamiliar destinations. We can find places to eat, to stay, and to get entertainment. All of this information is at our fingertips due to modern technology. We all take advantage of this technology to some degree and use this information to our advantage.

But there is another type of information—not just the kind that provides directions. We seek such information when we are ill and need to look up medical advice. We also seek information when in school—very few subjects require only the use of a textbook. We need to search for information and then use it in our intellectual work, because every paper or project produced in college is a product of someone’s creativity.

So how should we handle this product of creativity (a.k.a information)? Let’s think about a simple example: apple picking in the fall. It is a popular thing to do, especially here in the Northeast where most of the authors of this textbook live. People come to the farm, get bags or baskets, gather apples, and then line up to weigh them and pay. The farmers’ hard work is being rewarded.

Now imagine a different situation. You worked hard and wrote a very good paper and your roommate just copied a couple of paragraphs and inserted them into her own paper because the topics were related. Was this fair? How were you rewarded for your hard work? Nobody is saying that your roommate should have paid you, as you would pay the farmer for apples. But she should not use your intellectual capital without attribution to you! What she did was an act of plagiarism—you will read more about it soon!

You might publish an article in your college newsletter. This article is your intellectual personal property and you hold the copyright, which means that no one has the right to reproduce all or any part of it (i.e. copy it) without your permission. If your roommate decides to use some information from your article in her paper, she should provide a citation (the information that will help the reader identify and find your article should they decide to do so). If she is using direct quotes from your article, again, she would need to put double quotes around your words and provide information about the author (you, in this instance) to avoid plagiarism. Keep reading to find useful information about avoiding plagiarism.

Copyright and plagiarism are just two aspects of intellectual property that you need to deal with. You have to respect copyright, i.e. the rights of the author and avoid plagiarism. However, there are more aspects to it. Have you heard of patents? If you are planning a career in science and technology-related fields then you also have to learn more about patents. Patents deal with creators’ rights to their invention of new machinery or processes. Plants and design can also be patented. You can find useful information at the [United States Patent and Trademarks Office \(USPTO\)](https://www.uspto.gov/). Trademarks and trade secrets are other aspects of intellectual property that you may have to deal with.

In addition to being aware of plagiarism, patents, trademarks, and trade secrets, you need to be mindful of open access issues, which relate to valuable research data and academic publications posted online for everybody to read. However, you cannot always just use the data from open access sources. You often need to ask the author for permission. Many open access publications use Creative Commons licensing. You can read more about open access in the Science Literacy chapter.

There is a lot to learn about using information legally and ethically, but this knowledge will empower you in your academic work and ultimately allow you to succeed. The following examples and tips will get you off to a good start.

What is Plagiarism?

In short, plagiarism is when you use words, thoughts, or ideas that belong to someone else without giving them credit. In the classroom (and in the world of publishing), documenting your information sources is the only way others can tell how thorough and careful you've been in researching your topic. Have you ever thought about why teachers and professors seem to spend way too much time urging everyone to be sure to cite all of their sources properly? You've heard it all before: footnote this, endnote that, put this in the bibliography, capitalize this word, where are the italics, the commas, periods, hanging indents, yada yada yada! It's enough to make you give up and just wing it. But hold on a second while you gather your thoughts. Why do your professors always spend so much time urging you to do something that seems to have little practical purpose? If you don't tell readers where your information came from, they may think (and many do) that you either made up the information or "stole" it. Failing to cite your sources is plagiarism.

Keeping Track of Your Sources

As you read each source, write down any of the authors' ideas, quotes, or thoughts you want to use and be sure to write down page numbers, if the source provides them. When you put your paper together, you will then have all the information you need to properly cite any quote, idea, or thought that came from each source.

This information is often referred to as bibliographic information or metadata. It consists of essential information that identifies the information resource used to inform a research project.

You may not use every single item that you found when you gathered your sources, but having a list of all of the sources you considered will help you keep track of everything you use for your paper.

When to Cite

Now that you have gathered all of your information resources, you need to be mindful about how you used them in your research project. There are some very firm rules about what constitutes plagiarism:

- If you copy a sentence or paragraph verbatim (exactly) from a book, article, website, blog posting, or anywhere online or in print, you must provide information on the author and the publication in which the sentence or paragraph appears. This is known as "citing a source."
- If you use some of the exact phrases in a sentence or paragraph, even if you are not copying the whole sentence or paragraph, you must cite your source.
- If you use original information that you have obtained from an interview or conversation with

someone, you must cite your source.

- If you do not use the exact sentence or phrase but paraphrase it, or use the ideas inherent in the exact sentence or phrase, you must cite your source.
- If you reprint images, maps, diagrams, charts, or tables, you must cite your source.
- If you embed video files or audio files into your work, you must cite your source.

Citation Styles

Citing sources and avoiding plagiarism should always be an author's intent, but it is easy to get confused about how to cite. Citation styles were introduced in the Gather chapter, but it is worth repeating that there are many different citation styles. The three styles that are used most often are APA (American Psychology Association), MLA (Modern Language Association), and Chicago. There are no hard and fast rules about when to use each style. Professors often have a preference for one style over another, so make sure that you check with your instructor about which style they prefer.

Creating properly formatted citations has become easier in recent years with the introduction of reference management software and citation generators. A citation generator is software that will help to correctly format your citations. Some popular citation generators are Noodlebib and Easybib, both are available for a fee. There are also free citation generators available online. You can search the web to retrieve them. These generators are handy to use but they often contain errors so it is important to check the results for accuracy. The following resources are useful tools for all writers.

- *Publication Manual of the American Psychological Association*, 6th edition for APA citations
- *MLA Handbook*
- *The Chicago Manual of Style*
- *Citation Fox*

You should be able to locate the three manuals in the reference section of your library. [Citation Fox is available online.](#)

Where to Go For Help

Even if you are a very organized person and have diligently collected bibliographic information on all of the information resources that you consulted during the research process, you may misplace essential information on a resource. You may think that since you can't find this information, you will be unable to use it. But there is another option—consult a librarian. Librarians have comprehensive knowledge about how information is organized and retrieved. They also have a wealth of information resources at their fingertips. Even if you can't retrace your steps to find the missing data, it is likely that a librarian will be able to help you find the bibliographic information you need. Librarians can also help you determine when and how to cite your work. They may even be able to help you navigate citation generators and reference managers. Librarians at your library are available to help you in person, by telephone, and via email and chat. Consult your library's website for contact information.

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Seven Pillars: Present

Individuals adept at the Present pillar can apply the knowledge they have gained. They can present the results of their project development, synthesize new and old information and data to create new knowledge, and disseminate their work in a variety of ways. In “Tackling a Wicked Problem”, you will present your project at the end of the semester in a public event. The research that you do in this course is in the service of developing a project that actually makes a difference in the world, that has some impact on the world outside of the classroom.

You will do a poster presentation in which you discuss the project activities you engaged in and what you learned from those activities. Your instructor will provide you with the details about the end of semester public event. But you may want to present your project in other ways and in other venues. Some of the more common ways of presenting information are discussed below, but the descriptions of them are not exhaustive and remember that these are not nearly all of the options. In addition, you can often combine more than one method of presentation to highlight different elements of your findings or to reach multiple audiences.

Written

Writing is the most established way to share your project. Benefits of writing include the ability to proofread, edit, and rewrite to get your presentation exactly right. Done skillfully, writing can hold your audience’s attention and effectively deliver information. Done poorly, it can confuse or bore your audience to the point that they stop reading. To avoid this second possibility, if at all possible, have someone read your writing before you give it to the final audience. Take constructive criticism to heart, so that your voice is clearly heard.

- **Traditional Paper.** One of the most common ways to present projects, especially for students, is in a short paper written as a class assignment. The way this type of paper is formatted is determined by the teacher, and is fairly straightforward. The goal is usually to demonstrate to the teacher that you have understood the topic and can draw some conclusions from what you’ve learned.
- **Thesis/Dissertation.** At higher levels of education, you may be called upon to write a thesis paper or even a dissertation. At this point, you are entering the realm of high level professional or scholarly expertise, and will be expected to produce original ideas and the necessary supporting research to contribute to your field. The type of writing in theses and dissertations varies depending on the subject area, but generally these manuscripts are longer and more detailed than a traditional class paper. They also use more discipline-specific language, and can take several years to complete.
- **Scholarly Journal Article.** Articles published in scholarly journals undergo a peer-review process (see the Evaluate chapter) to ensure that they are reliable and significant additions to the literature on a topic. If you get to a point in your research where you feel you have a contribution that others could use, investigate the possibility of submitting an article for publication, especially if your research is relevant to your intended career. It can be difficult to determine which journal to submit your article to, so don’t hesitate to ask teachers, colleagues, or even the editor of the journal if your article’s content is appropriate.

- **Blog/Tweet/Other Social Media.** A relatively new option for getting your information out to a wide audience is to use social media tools. If you have your own blog or website you can easily publish information about your project for the entire world to see (getting people to actually look at it is another issue, with many possible solutions). You can also use Facebook, Twitter or other tools to let people know what you're working on and to direct them to more detailed information that you've posted elsewhere online. While this may seem unusual, it is becoming more and more popular for researchers to share work online as it progresses, so that other interested parties can contribute and ask questions, making the final product more robust, whatever form it ends up taking.

Spoken

Presenting information verbally might seem easier than writing or terrifying, depending on your experience and personality. Ideally you will be thoroughly prepared and able to clearly explain your project, while also being able to respond effectively to unanticipated questions. It takes practice and a deep knowledge of your topic to do this—even the best speakers get flustered once in a while. Don't be afraid to say you don't know the answer and always offer to follow up on a question.

- **Class Presentation/Speech.** As with the class paper, a class presentation is one of the first experiences most students will have with verbally presenting their projects. One great benefit of this type of presentation is that you will most likely receive detailed feedback on how well it was received and perhaps even get some suggestions on how to improve your delivery. Your fellow students will also be faced with the same task and can even provide this type of feedback before the actual presentation takes place.
- **Conference Presentation or Poster Session.** As your expertise on a topic grows, you may want to reach a wider audience. You will also want to reach an audience that is interested in your topic. An excellent place to find this audience is at a professional conference in your field. Aside from the many other benefits of attending professional conferences, presenting at a conference will help you begin to make yourself known to other researchers in similar subject areas. Responding to audience questions will give you the chance to prove that you really know your material or, alternately, can point out gaps in your knowledge that may lead to new research opportunities. Poster sessions are a great way to get your feet wet, as your poster will be available for you to refer to and the atmosphere is not quite as overwhelming as standing in front of a full audience for a presentation.

Audiovisual

Visual images can have an immediate impact on how your audience reacts to and understands your presentation. Choose them wisely and use them at appropriate times! You can read more about how different visualizations of information affect the way that information is received in the Visual Literacy chapter. Below are just a few brief thoughts about how you might use visuals in your presentations.

- **Powerpoint/Prezi/Other Presentation Software.** Powerpoint has been around long enough that most everyone knows it. For many purposes a slideshow that you speak over, or even a slideshow that is posted online for individual viewing, can succinctly get your point across. Newer presentation tools such as [Prezi](#) use a similar underlying idea but enable you to create more dynamic presentations directly online. Keep in mind that in most cases, tools such as these are meant to accompany a speaker and to use them effectively takes forethought and practice.

- **Images.** Images can be powerful tools to grab attention, condense information, and tell your story. Different types of images can be useful in different contexts. In an art class you may use reproductions of famous paintings or drawings, or images you've created on your own. In a business class, graphs and charts may be more appropriate. Just make sure the images you choose actually make your presentation more effective rather than distracting attention from your main point.
- **Song.** Keeping your audience in mind, don't be afraid to present your material in an unusual manner. If you can create a song (as one example), you may make your audience curious enough to stay around for more detailed information later!
- **Video.** With the tools available now, it is possible to create a quality video product to present your information without extensive training or a lot of money. New online tools are constantly being introduced (and retired, unfortunately) which enable you to enter your content (words, images, video, etc.) and have it processed into a completed video in a short amount of time. Your library is also likely to have tools available for you to use to create video and audio projects, including not only the editing software, but often the video cameras, microphones, and hard drives you'll need to create original content. Don't hesitate to ask a librarian for both access and help using these resources. Many libraries also offer introductory courses on the software they provide to get you off to a running start.

You are an Active Agent

During the project development process, at times it can feel as if you are just collecting or repeating what others have written or done, and that your presentation is just going to repeat what is already known about the wicked problem. While this may be somewhat true, your unique experience and perspective about your project is new.

Before the advent of online tools, publishing your new information was difficult and often expensive. It was hard to reach a large audience because of the physical limitations of producing and distributing paper copies of publications. Now anyone can publish anything and make it available to the entire Internet-connected world in a matter of seconds. This means that you have a great opportunity to share your ideas and to communicate with people around the world who are interested in similar topics. It also means that you have to carefully consider what you publish because anyone, even an unintended audience, can find what you've published.

In addition to being able to share information freely, you also have access to tools to create and edit audio and video materials that were prohibitively expensive to create or adapt not too long ago. You can now share more interactive and engaging material with a wider audience than ever before. This is a great opportunity and a great responsibility— use it wisely!

Wider Connections

When you begin to share your own work, you gain insight into the processes of producing and publishing information, which will help you the next time you need to find sources for a research or other type of project. Now that you know what it took for you to produce information in a given format, you know what other creators had to do to produce their work. This can help you decide which sources will be most reliable and valuable for your own research.

Presenting your information is usually considered the final step in the project development process. You

tell the audience what you've done and what you've found out and you go home. However, as we've seen, sometimes in the process of presenting or preparing to present, you uncover new questions and need to Identify that new information need. Or you may discover that what you thought was a reliable source was not so reliable and you need to Evaluate a little more. The project development process is not linear, but a continuous cycle with various entry and exit points that change depending on your goals, topic, and methods. Ideally, for those who enjoy it, it never ends!

SIFT: Four Moves

We live in the information age. Information is everywhere. In fact, information overload is cited as a problem in which we are bombarded with so much information that we sometimes feel paralyzed and can't make decisions. The person who is information literate, however, combats information overload by understanding what their information needs are, where to get useful information, and how to evaluate the reliability and validity of that information.

There are many sources for getting information. There are blogs, books, documentaries, scholarly articles, magazines, TV shows, social media platforms, and so on. Much of the information we encounter comes to us through online sources. Mike Caulfield, in [Web Literacy for Student Fact Checkers](#), identifies [four moves](#) for evaluating these sources and the claims they make.

What people need most when confronted with a claim which may not be 100% true is *things they can do to get closer to the truth*. They need something Caulfield decided to call "moves."

Moves accomplish intermediate goals in the fact-checking process. They are associated with specific tactics. Here are the moves:

- **(S)top:** Check your emotions. If a claim causes strong emotion — anger, glee, pride, vindication — and that emotion causes you to share a "fact" with others, STOP. You must fact-check this claim. In addition, if you get lost, or hit dead ends, or find yourself going down an increasingly confusing rabbit hole during your investigation, STOP. Back up and start over knowing what you know now. You're likely to take a more informed path with different search terms and better decisions. In addition,
- **(I)investigate the source:** Read what other people say about the source (publication, author, etc.). The truth is in the network.
- **(F)ind better coverage:** Look around to see if someone else has already fact-checked the claim or provided a synthesis of research or provided coverage that gives more useful information about the claim or the context of the claim.
- **(T)race claims, quotes, and media back to the original context:** Most web content is not original. Get to the original source to understand the trustworthiness of the information.

In general, you can try these moves in any order, and at each stage if you find success your work might be done.

When you first see a claim you want to share, STOP. Why do you want to share it? How do you know the claim is true?

When you first see a claim you want to check, your first move might be to look to see if sites like Politifact, or Snopes, or even Wikipedia have researched the claim. (Find better coverage).

If you can't find better coverage on the claim, the real work begins. It starts by trying to trace the claim to the source. If the claim is about research, can you find the journal it appeared in? If the claim is about an event, can you find the news publication in which it was originally reported? (Trace claims, quotes, and media back to the original source).

Maybe you get lucky, and the source is something known to be reputable — some recognizable source such as the journal *Science*, or the newspaper *The New York Times*. Again, if so, you can stop there. If not, you're going to need to investigate the source, finding out more about this source you've ended up at. Is it trustworthy? How do you know (Investigate the source).

And if at any point you fail — if the source you find is not trustworthy, complex questions emerge, or the claim turns out to have multiple sub-claims — then you circle back, and start a new process. Rewrite the claim. Try a new search of fact-checking sites, or find an alternate source. (Stop).

We should say a bit more about strong emotion. Above all, it's these claims that you must fact-check. [This comic](#) from *The Oatmeal* explains why we feel strong emotions when we encounter certain kinds of information.

Why? Because you're already likely to check things you know are important to get right, and you're predisposed to analyze things that put you an intellectual frame of mind. But things that make you angry or overjoyed, well... our record as humans are not good with these things.

Our normal inclination is to ignore verification needs when we strongly react to content, and researchers have found that content that causes strong emotions (both positive and negative) spreads the fastest through our social networks. Savvy activists and advocates utilize this flaw of ours, getting past our filters by posting material that goes straight to our heart.

Building new habits requires that we identify “pegs” on which to hang those habits. So use your emotions as a reminder — as a trigger for your fact-checking habit. If every time content you want to share makes you feel rage, or laughter, or ridicule, or, sorry to say, a heartwarming buzz — spend 30 seconds fact-checking you'll do pretty well.

This chapter was adapted from [Web Literacy for Student Fact-Checkers](#) by Mike Caulfield.

Evaluating News Sources

Evaluating news sources is one of the more contentious issues out there. People have their favorite news sources and don't like to be told that their news source is untrustworthy.

For fact-checking, it's helpful to draw a distinction between two activities:

- News gathering, where news organizations do investigative work—calling sources, researching public documents, and checking and publishing facts (e.g. getting the facts of Bernie Sanders involvement in the passage of several bills)
- News analysis, which takes those facts and strings them into a larger narrative, such as “Senator Sanders an effective legislator behind the scenes” or “Senator Sanders largely ineffective Senator behind the scenes.”

Most newspaper articles are not lists of facts, which means that outfits like the *Wall Street Journal* and the *New York Times* do both news gathering and news analysis in stories. What has been lost in the dismissal of the *New York Times* as liberal and the *Wall Street Journal* as conservative is that these are primarily biases of the news analysis portion of what they do. To the extent the bias exists, it's in what they choose to cover, to whom they choose to talk, and what they imply in the way they arrange those facts they collect.

The news gathering piece is affected by this, but in many ways largely separate, and the reputation for fact checking is largely separate as well. *MSNBC*, for example, has a liberal slant to its news, but a smart liberal would be more likely to trust a fact in the *Wall Street Journal* than a fact uttered on *MSNBC* because the *Wall Street Journal* has a reputation for fact-checking and accuracy that *MSNBC* does not. The same holds true for someone looking at the *New York Observer* vs. the *New York Times*. Even if you like the perspective of the *Observer*, if you were asked to bet on the accuracy of two pieces—one from the *Observer* and one from the *Times*—you could make a lot of money betting on the *Times*.

Narratives are a different matter. You may like the narrative of *MSNBC* or the *Observer*—or even find it more in line with reality. You might rely on them for insight. But if you are looking to validate a *fact*, the question you want to ask is not always “What is the bias of this publication?” but rather, “What is this publication's record with concern to accuracy?”

Experts have looked extensively at what sorts of qualities in a news source tend to result in fair and accurate coverage. Sometimes, however, the number and complexity of the various qualities can be daunting. We suggest the following short list of things to consider.

- **Machinery of care:** Good news sources have significant processes and resources dedicated to promoting accuracy, and correcting error.
- **Transparency:** Good news sources clearly mark opinion columns as opinion, disclose conflicts of interest, indicate in stories where information was obtained and how it was verified, and provide links to sources.
- **Expertise:** Good news sources hire reporters with reporting or area expertise who have been

educated in the processes of ethical journalism. Where new writers with other expertise are brought in, they are educated by the organization.

- **Agenda:** The primary mission of a good news source is to inform its readers, not elect Democrats, promote tax cuts, or reform schools. You should absolutely read writers with activist missions like these, but do not treat them as “pure” news sources.

Here’s an important tip: *approach agenda last*. It’s easy to see bias in people you disagree with, and hard to see bias in people you agree with. But bias isn’t agenda. Bias is about how people see things; agenda is about what the news source is set up to *do*. A site that clearly marks opinion columns as opinion, employs dozens of fact-checkers, hires professional reporters, and takes care to be transparent about sources, methods, and conflicts of interest is less likely to be driven by political agenda than a site that does not do these things. And this holds even if the reporters themselves may have personal bias. Good process and news culture goes a long way to mitigating personal bias.

Yet, you may see some level of these things and still have doubt. If the first three indicators don’t settle the question for you, you should consider agenda. Is the source connected to political party leadership? Funded by oil companies? Have the owners made comments about what they are trying to achieve with their publication, and are those ends about specific social or political change or about creating a more informed public?

Again, we cannot stress enough: you should read things by people with political agendas. It’s an important part of your news diet. It’s also the case that sometimes the people with the most expertise work for organizations that are trying to accomplish social or political goals. But when sourcing a fact or a statistic, agenda can get in the way and you’d want to find a less agenda-driven source if possible.

This chapter was adapted from [Web Literacy for Student Fact-Checkers](#) by Mike Caulfield.