# Introduction to Evidence-Based Practice

As an engineering student, and later, in your career as an engineer, you will frequently need to make decisions, solve problems, and design products and processes. But, how can you make well-informed, smart decisions and choose the best available solution? A good place to start is with evidence-based practice.

[show definition of evidence-based practice] Evidence-based practice refers to an approach in which professionals make decisions and solve problems using both their knowledge of their discipline and the best available scientific evidence. What do we mean by “scientific evidence”? [show definition of scientific evidence] Scientific evidence refers to knowledge that has been obtained through scientific research.

Evidence-based practice is a concept that originated in evidence-based medicine. In practicing evidence-based medicine, a physician must define a patient problem, identify relevant scientific evidence that applies to that problem, and determine what evidence is most relevant and of the highest quality to apply to solve the patient’s problem.

Similarly, we can engage in evidence-based practice in engineering. This process involves [show elements of the process on screen] defining what problem you are trying to solve, seeking scientific evidence to help determine potential solutions, and using high-quality evidence to decide how best to solve the problem.

To engage in evidence-based practice, we need to be skilled in finding, reading, and applying scientific evidence. To do this, we need to develop skills in developing a research question, choosing an appropriate resource to search for information, and conducting a thorough search for relevant evidence.

We also need to make sure that we choose sources that are high quality and relevant to the topic or research question. This means that we cannot assume that any source that we find is “good enough”, but rather, we need to evaluate every source that we encounter to determine its relevance and quality. This applies to all types of sources, from webpages to books to journal articles. Though the ways in which we evaluate a webpage might be different from the way we evaluate a journal article, we still need to consider the quality and relevance of either type of source before we use it in our work. Because the quality of information you find and use impacts the quality of your work, it is important to base decisions on accurate, trustworthy information.

Once you have found appropriate, high-quality evidence, you can use that evidence in combination with your engineering knowledge and skills to identify an appropriate solution to the problem you are trying to solve. By engaging in evidence-based practice, you can use your own knowledge and the knowledge that has been generated through research by scientists and engineers to make more informed decisions, resulting in better, more meaningful work.

# Information Sources in Engineering

When it comes to finding evidence to inform your decisions, where should you look? Let’s consider what types of information sources are typically used by engineers. To do this, we’ll examine an article [show beginning of article including title and abstract] titled “Does Workplace Matter? How Engineers Use and Access Information Resources in Academic and Non-Academic Settings”, published in the journal *Science & Technology Libraries* in 2019. This article outlines the results of a survey of 190 engineers on what types of information they use in their work and how they obtain that information. This study divides engineers into two groups:

* Engineers who work in an academic setting such as university or other academic institution
* Engineers who work in a non-academic setting such a for a government, corporation, or non-profit

Let’s start by looking at engineers who work in academic settings. The most highly ranked sources, in order from most to least important are [display list on screen, revealing one item at a time]:

1. Scholarly journals
2. Scholarly books and chapters
3. Conference proceedings
4. Textbooks and handbooks
5. Magazines and trade journals
6. Standards
7. Manuals and spec sheets
8. Government documents

For engineers who work in non-academic settings, the sources that are most important are [display list on screen, revealing one item at a time]:

1. Standards
2. Manuals and spec sheets
3. Magazines and trade journals
4. Textbooks and handbooks
5. Conference proceedings
6. Government documents
7. Scholarly books and chapters
8. Scholarly journals

Other types of sources that both groups used sometimes but viewed as less important included things like [display] newspapers and news sites, blogs, social media, and popular science books.

You may not be familiar with all the different types of sources that were mentioned in these lists, and that’s okay! You’ll learn more about them soon. But you can see from these lists that engineers use a wide variety of different types of information sources and that the sources they value most depends somewhat on what kind of workplace they are in and what information they have access to.

The type of information sources that you consult as a student will also depend on your information need. Sometimes it makes sense to consult scholarly sources like journal articles, scholarly books, and conference proceedings, but, in other cases, it makes more sense to consult technical sources such as a standard or a spec sheet. Often, it will be useful to consult multiple different types of information sources. Using a variety of information sources and source types can help you get a more complete picture of a problem or topic and ensure that you have enough information to make good, evidence-based decisions.