EVALUATING Information Sources

Once you've located your information sources, your research is not complete. The need to evaluate applies to all information sources, including websites, books, articles, and more. Not everything you see or read is based on truth. Learn ways to verify that the sources are credible, authoritative, and relevant to your information need.

You need to be selective. It's tempting to take the first three articles you find, but they may not fully meet your needs. Some may be presented in a style that is inappropriate to your project. Some may not be recent enough for your needs. Some sources may be too broad or too narrow. This module helps you to learn ways to decide whether your sources will be truly useful for a specific project.

### Learning Outcomes

After completing this module, you will be able to:
- describe the importance of evaluating sources for quality
- evaluate sources based on several criteria, including currency, relevance, authority, accuracy, and purpose
- determine if the information need has been satisfied or if additional information is needed

### Quality of Information

Traditional library resources have usually undergone some sort of evaluative process. Books and other library materials you find have been selected and evaluated by librarians or other information specialists.

The materials indexed in library databases are included because of certain qualitative criteria established by the organization or company producing the database.

In spite of this selection process, these materials still require evaluation. You should always evaluate your sources to make sure the information is thorough, accurate and timely enough for your particular purpose.

Reliability should never be assumed with Web sites. Anyone can publish on the Web -- it is not regulated in any way. Evaluation is especially important when viewing web sites and pages available on the Open Web.

Don't assume that you can trust anything ... be wary and critical of everything you find.

### Criteria for evaluating sources

There are many criteria that should be considered when evaluating information resources. California State University at Chico uses a catchy acronym that can help you remember some of these criteria. They call it the CRAAP Test.

http://www.csuchico.edu/lins/handouts/eval_websites.pdf

The CRAAP test is "a list of questions to determine if the information you have is reliable." The following screens will go through each of these criteria:

- Currency
- Relevance
- Authority
- Accuracy
- Purpose

These criteria apply to all resources, especially to Web sites.
Currency

Currency deals with the timeliness of the information.

For some topics (e.g., history, literature), currency may not be as important to you. For information on current trends in business communication or other topics, however, you will want the most recent information. It all depends on your topic, or your information need.

Questions to ask [from Chico):

- When was the information published or posted?
- Has the information been revised or updated?
- Is the information current or out-of date for your topic?
- Are the links functional? (for Web sites)

Additional Questions:

- Is there even a date on the item?
  - For most library resources, a publication date will be printed, but for Web sites, it may be difficult to determine the date of the information.
- Look at the references cited (if there are any). How recent are these studies?

Sometimes it is important to have the most recent information available -- but not if you will sacrifice the other criteria.

Activity

You need to write a paper about treatment for diabetes. Based on the currency criterion, which book would you choose?

- When was the information published or posted?
- Has the information been revised or updated?
- Is the information current or out-of date for your topic?
Relevance

Relevance has to do with the importance of the information for your specific needs.

Questions to ask [from Chico]:

- What is the relevance of the information for my specific needs?
- How does this information address my specific requirements or concerns?
You are writing a paper on the environmental impact of oil spills, and you need three scholarly sources. You search Academic Search Complete and find 22 articles from "academic journals" with the subjects "environmental impact" and "oil spills." You're tempted to just take the first three articles. Below are the citations/abstracts for the first three. Are they relevant to your topic?

1. **Numerical analysis of a lock-release oil slick.**
   
   By: Zeng, L.; Luo, Z.L.; Chen, B.; Yang, Z.F.; Li, Z.; Lin, W.X.; Chen, G.Q., Communications in Nonlinear Science & Numerical Simulation, Aug 2010, Vol. 15 Issue 8, p2222-2230, 9p; Abstract: Abstract: Presented in this paper for the spread of a lock-release oil slick is a numerical analysis based on the renormalization group (RNG) model for turbulence closure, the volume of fluid (VOF) method for tracking the oil-water interface, and a rigid cover approximation for the open surface. In agreement with theoretical analyses and experimental observations, numerical results show that the spread of the oil slick passes through three phases: the initial inertial slumping phase in which the inertial force and the horizontal buoyancy are dominant and the front speed is constant, the transitional phase in which the viscous force begins to play an important role instead of the inertial force and the front speed declines, and the viscous self-similar phase in which the viscous force and the horizontal buoyancy are dominant and the front speed declines as. Typical flow and pressure distributions are illustrated. [Copyright &© Elsevier]; DOI: 10.1016/j.cnsns.2009.08.023; (Accessed: 2023-04-22 14:05)

   Subjects: OIL spills; NUMERICAL analysis; ENVIRONMENTAL impact analysis; ENVIRONMENTAL hydraulics; GRAVITY; TURBULENCE; RENORMALIZATION group

   Database: Academic Search Complete

2. **A Model to Predict Rate of Dissolution of Toxic Compounds into Seawater from an Oil Spill.**
Authority

Authority is a very important criterion. You want to know the source of the information -- who is responsible for writing or producing it and is this person/group qualified. Look for various clues about the individual's credentials (academic degrees, professional experience, etc.) or about their affiliations with organizations that might indicate either expertise or bias.

Questions to ask [from Chico]:

- Who is the author/publisher/source/sponsor?
Are the author's credentials or organizational affiliations given?

What are the author's credentials or organizational affiliations?

What are the author's qualifications to write on the topic?

Is there contact information, such as a publisher or e-mail address?

Does the URL reveal anything about the author or source? examples: .com .edu .gov .org .net

.edu -- educational sites

Generally, an educational site can be trusted. Colleges and universities will have certain criteria established before a page gets published. But not always!

.gov -- U.S. government agency

Again, information on a .gov site should be valid. But not always!

.com -- commercial site

Anyone can get a .com domain. If it's a company site, the purpose may be to sell something.

Pay attention to the domain extension in order to evaluate the information found there.

Additional Questions:

- Does the item even list an author or responsible party? If so, does it give information about the author?
  - For Web sites, it is often difficult to find an author or a party responsible for the information.

- For Web sites, does an institution support the site?
  - is it a university, research institute, or government agency?
  - is it a reputable institution?
  - is there any bias inherent to this institution's mission?
  - if an Internet site, note the address (whose server is it on? the institution's? or free network server?)

- Does the research cite any sources? If so, is the full citation given for any studies cited?
  - Are these sources reputable?

Activity

You will be doing an experiment on wave particle duality for your physics class and you need to gather some background information.
You go to Google to find Web sites. Review the following site based on the authority criteria.

- Who is the author/publisher/source/sponsor?
- Are the author's credentials or organizational affiliations given?
- What are the author's credentials or organizational affiliations?
- What are the author's qualifications to write on the topic?
- Is there contact information, such as a publisher or e-mail address?
Welcome to Dave's Physics Shack!

A website dedicated to educating the curious about all kinds of neat things (as defined by Dave) in physics.

Here in Dave's Physics Shack, you can learn about a number of different topics in physics. Select from any of these websites:

- The Page of Entropy
- Dave's Relativity Page
- The Page of Uncertainty
- Dave's Microcosmos
- The Atom

Or for something not quite as educational, see the quanti bit page.

Dave's Physics Shack is also host to a page on general relativity by Nymbus.

Dave's Physics Shack is presented with the assistance of Morningside College.

http://webs.morningside.edu/slaven/Physics/uncertainty/uncertainty2.html
Wave-particle duality: light

Light as a wave

The story of quantum physics probably best begins with light. In the early days of physics (say, before the nineteenth century) about the only things people knew about light was that it was bright, it was fast, and it came in a variety of colors. Very little was known about the nature of light, and one of the great debates about light was over the question of whether light was made of a bunch of "light particles," or whether light was a wave. Around 1800, a man named Thomas Young apparently settled the question by performing an experiment in which he shone light through very narrow slits and observed the result. Here's the idea behind it.

Suppose you have a whole bunch of ping-pong balls. You stand back about fifteen feet from a doorway, and one by one you dip the balls in paint and throw them through the door, at a wall about 5 feet past the door. Well, you'll get a bunch of colored dots on the wall, scattered throughout an area the same shape as the door you're throwing them through. This is how particles (such as ping-pong balls) behave.

On the other hand, waves don't behave this way. Think of water waves. When a wave encounters an obstacle, it goes around it and closes in behind it. When a wave passes through an opening, it spreads out when it reaches the other side. And under the right conditions, a wave passing through an opening can form interesting patterns on the other side, which can be deduced mathematically.

So here's what Young did. He took light, and shone it through a very narrow slit, and then shone that light through two very narrow slits, very close together. He then observed the result of this on a screen. Now if light is made up of particles, then the particles should pass straight through the slits and produce two light stripes on the screen, approximately the same size as the slits. (Just like the ping-pong balls in the picture above.) On the other hand, if light is a wave, then the two waves emerging from the two slits will interfere with each other and produce a pattern of many stripes, not just two. (Trust me on this, or I'll be forced to go through the math...)

The result? Young found the interference pattern with many stripes, indicating that light is a wave.

Later in the nineteenth century, James Clerk Maxwell (see Dave's Relativity Page) determined that light is an electromagnetic wave: a wave of oscillating electric and magnetic fields. When Heinrich Hertz experimentally confirmed Maxwell's result, the struggle to understand light was finished. Case closed.

Light as particles
Accuracy

Accuracy deals with the "reliability, truthfulness, and correctness of the informational content."

Questions to ask [from Chico]:

- Where does the information come from?
- Is the information supported by evidence?
- Has the information been reviewed or refereed?
- Can you verify any of the information in another source or from personal knowledge?
- Does the language or tone seem unbiased and free of emotion?
- Are there spelling, grammar, or other typographical errors?

Activity

Review this Web site based on the Accuracy criteria.

- Where does the information come from?
- Is the information supported by evidence?
- Has the information been reviewed or refereed?
- Can you verify any of the information in another source or from personal knowledge?
- Does the language or tone seem unbiased and free of emotion?
- Are there spelling, grammar, or other typographical errors?

Reflection

Wave-Particle Duality

Wave-Particle Duality is perhaps the most notable concept of the quantum world, and...
wave-particle duality is perhaps the most notable concept of the quantum world, and by extension, the philosophical basis of modern thought. It is the defining characteristic of elementary physical entities, such as electrons, protons, neutrons, atoms, and molecules, which exist on the one hand in states which evolve like waves when they are not observed, and evolve like particles when observed. The key is the observation. In its wave-like state the physical entity is typically extended in space, but then contracts abruptly to localized events or point-like particles when an observation is made.

The emphasis on the abruptly is to emphasize that there is no evolvement from one state to another, but an instantaneous manifestation of a wave that also has particle properties. As waves extending through space — similar to electromagnetic and mechanical waves, but known as quantum waves -- these waves do not collide or interact with each other as particles, but superimpose upon each other, adding constructively or destructively, and creating interference patterns. These interference patterns are eliminating when the path is known! This is a phenomena known as Quantum Knowing.

Wave-Particle Duality was first encountered in Young's Diffraction Experiment. Thomas Young (1773–1829) discovered in a series of experiments the wave-particle duality of light. He was also one of the first successful workers at deciphering Egyptian hieroglyphic inscriptions. [Whether the latter had any influence on the former is very speculative, but in a connected universe, anything is possible.]

Young's experiment, conducted in 1801, utilized two or more slits upon which a beam was directed. If the beam was of macroscopic particles such as RRs, then when each RR passed through one or

References:


Purpose

Purpose as a criterion deals with "the reason the information exists."

Questions to ask [from Chico]:

- What is the purpose of the information? to inform? teach? sell? entertain? persuade?
- Do the authors/sponsors make their intentions or purpose clear?
- Is the information fact? opinion? propaganda?
- Does the point of view appear objective and impartial?
- Are there political, ideological, cultural, religious, institutional, or personal biases?
When looking at web sites, keep in mind that there are hoax sites on the web, designed with the intention of tricking you.

**Additional Criteria**

Once you have gathered and evaluated all of your information sources, ask yourself if the information you found satisfies your research or information need.

Think about your information need and your topic question.

- Have you answered it sufficiently?
- Does the information you provide enough evidence to support your thesis?
- Are there gaps in the information you retrieved?
- Do you need to revise your search strategy or your terminology to gather more support for your thesis or topic question?
- Do you need to change your topic altogether?

**Evaluating Web Sites**

Much of what you will find on the Web is good quality information. Because there is so much out there, however, the quality sites may not always float to the top of your results list.

If you find a Web site and can't attest to its currency, relevance, authority, accuracy or purpose, you probably shouldn't use it as a source of information. There are many Web sites where this will be the case.

The criteria discussed above will help you identify the quality sites that will enhance your research.

In the SEARCHING module, we talked about why Wikipedia may be a very useful source, but not one that you will want to cite in your papers. Remember the disclaimer:

**WIKIPEDIA MAKES NO GUARANTEE OF VALIDITY**

...Please be advised that nothing found here has necessarily been reviewed by people with the expertise required to provide you with complete, accurate or reliable information.

...The content of any given article may recently have been changed, vandalized or altered by someone whose opinion does not correspond with the state of knowledge in the relevant fields.


Not all sites will be as up front with disclaimers.

In fact, many sites exist as hoaxes to try to fool users. They may look legitimate at first glance, but the deeper you dig, the more questionable they become.

**Activity: Evaluating Web Sites**

Go to http://www.dhmo.org and apply the CRAAP test.

<table>
<thead>
<tr>
<th>1) CURRENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is there a date of when the information was published, posted, revised or updated?</td>
</tr>
</tbody>
</table>
Are the links functional?

- Yes
- No

2) RELEVANCE

Is the information at an appropriate level (i.e. not too elementary or advanced for your needs)?

- Yes
- No

Is there supporting evidence? Is there a list of references used?

- Yes
- No

3) AUTHORITY

Is an author name given?

- Yes
- No

Is the author affiliated with any organizations?

- Yes
- No

4) ACCURACY

Can you verify any of the information in another source or from personal knowledge?

- Yes
- No
What is the purpose of the information on this Web site?

- To inform?
- To sell?

Is the information:

- Fact?
- Opinion?
- Propaganda?

Would you use the information from this site for a research paper?

- Yes
- No

Tips for finding quality web sites

1) Look at the domain extension.

- .edu -- educational sites
  Generally, an educational site can be trusted. Colleges and universities will have certain criteria established before a page gets published. But not always!
- .gov -- U.S. government agency
  Again, information on a .gov site should be valid. But not always!
- .com -- commercial site
  Anyone can get a .com domain. If it's a company site, the purpose may be to sell something.

Pay attention to the domain extension in order to evaluate the information found there.

2) Using advanced features of search engines, you can limit your search in various ways:

- to pages with specific domains
- to how recent the pages are
- to pages with various usage rights
- to pages where your keywords are in the title, or other parts of the page
- to pages that are considered "safe"
3) Use scholarly search engines instead of Open Web sites.

Among the search engines available for finding scholarly information are:

- Infomine
- Complete Planet
- Scout Report Archives
- GoogleScholar

Summary

This module stresses the importance of evaluating every information source you find.

- Traditional library resources (books, articles) have usually undergone some sort of evaluative process; however, these resources still require your evaluation.

- Evaluation is especially important when viewing Web sites and pages available on the Open Web.

- The CRAAP test is a list of questions about the Currency, Relevance, Authority, Accuracy, and Purpose of information sources "to determine if the information you have is reliable."

- You need to apply additional criteria to determine if the information you found satisfies your research or information need.

- To find quality Web sites:
  1. Look at the domain extension (e.g., .edu, .gov, .com)
  2. Use advanced features of search engines.
  3. Use scholarly search engines.

- Don't assume that you can trust anything ... be wary and critical of everything you find!

Feedback: Please take a few moments to complete a brief survey with your feedback on the module.

Suggested Reading/Sources Consulted

California State University at Chico. Evaluating Information – Applying the CRAAP Test.
http://www.csuchico.edu/lins/handouts/eval_websites.pdf

University of California, Berkeley. Evaluating Web Pages: Techniques to Apply & Questions to Ask.
http://www.lib.berkeley.edu/TeachingLib/Guides/Internet/Evaluate.html

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