TECHNICAL WRITING

UNIT 2

Research, Ethics and Foundational Writing Skills

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Overview

- Major decisions in the workplace are based on careful research, with the findings recorded in a written report.
- Some parts of the research process follow a recognizable sequence (Figure 2.1).
- But research is not merely a numbered set of procedures.
- The procedural stages depend on the many decisions that accompany any legitimate inquiry (Figure 2.2).
- These decisions require you to think critically about each step of the process and about the information you gather for your research.

The Procedural Stages of the Research Process

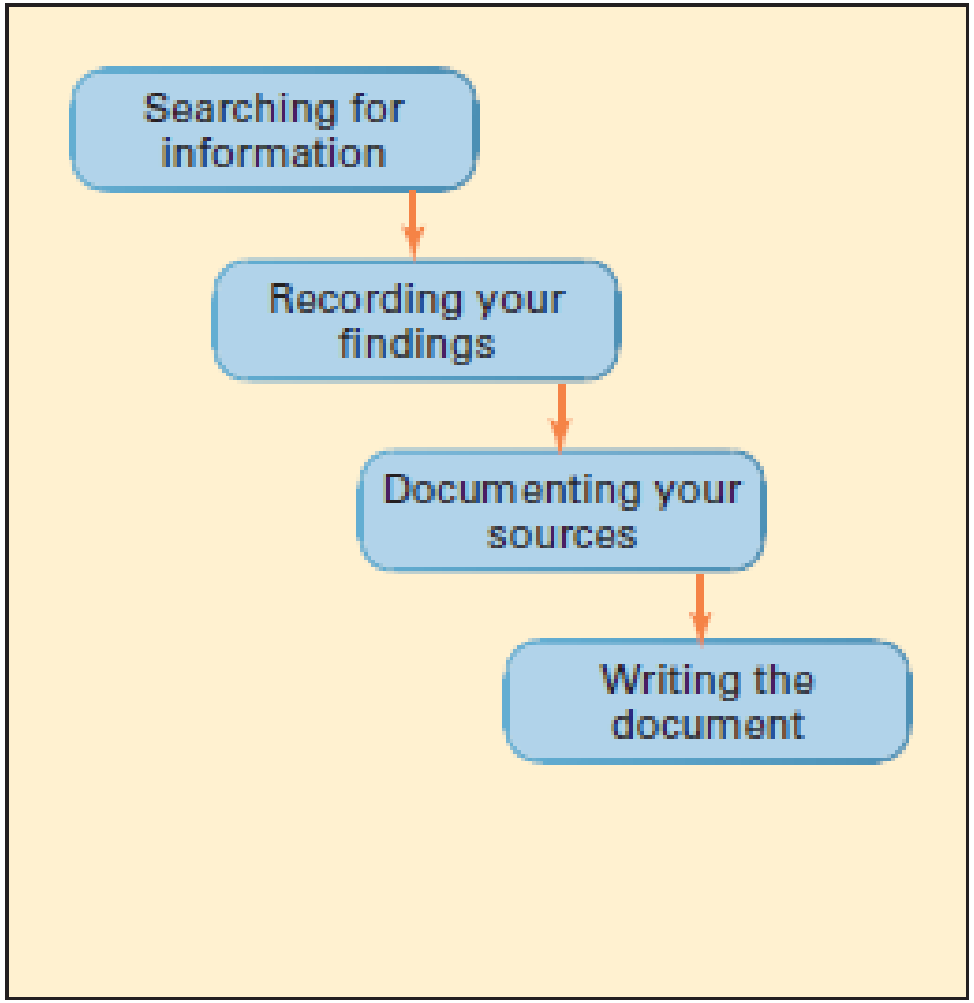


Figure 2.1

Stages of Critical Thinking in the Research Process

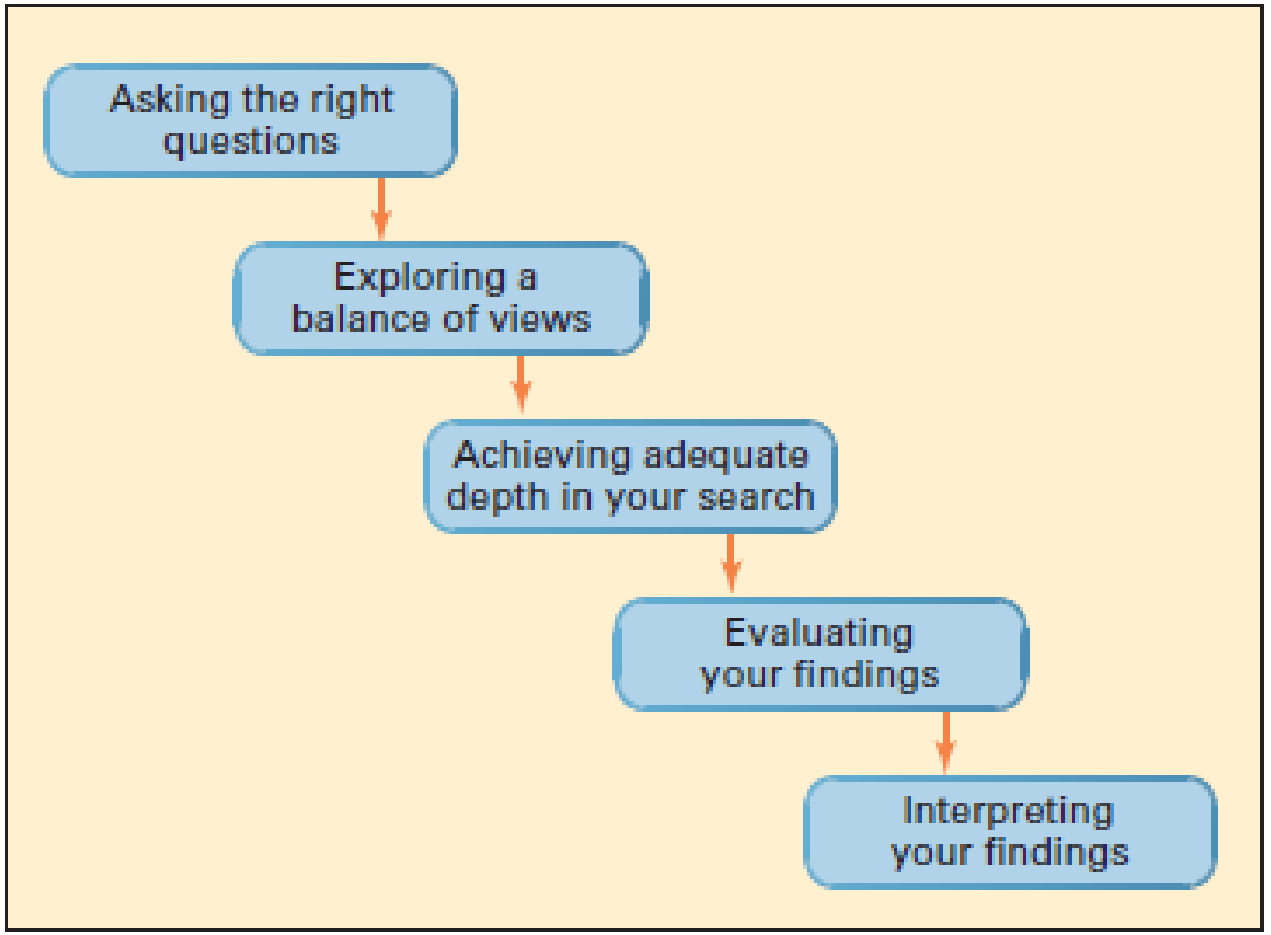


Figure 2.2

Asking The Right Questions

- Define and refine a research question to guide your work
- The answers you uncover will only be as good as the questions you ask.

CASE STUDY: Suppose, for instance, you face the following scenario:

- You are the public health manager for a small, new England town in which hightension power lines run within one hundred feet of the elementary school. Parents are concerned about danger from electromagnetic radiation (EMR) emitted by these power lines in energy waves known as electromagnetic fields (EMFs). Town officials ask you to research the issue and prepare a report to be distributed at the next town meeting in six weeks.
- First, you need to identify your exact question or questions. Initially, the major question might be: *Do the power lines pose any real danger to our children?* After phone calls around town and discussions at the coffee shop, you discover that townspeople actually have three main questions about electromagnetic fields: *What are they? Do they endanger our children? If so, then what can be done?*
- To answer these questions, you need to consider a range of subordinate questions, like those in the Figure 2.3 tree chart. Any *one* of those questions could serve as subject of a worthwhile research report on such a complex topic. As research progresses, this chart will grow. For instance, after some preliminary reading, you learn that electromagnetic fields radiate not only from power lines but from *all* electrical equipment, and even from the Earth itself. So you face this additional question: *Do power lines present the greatest hazard as a source of EMFs?*

CASE STUDY: Suppose, for instance, you face the following scenario:

- You now wonder whether the greater hazard comes from power lines or from other sources of EMF exposure. Critical thinking, in short, has helped you to define and refine the essential questions.
- Let's say you've chosen this question: *Do electromagnetic fields from various sources endanger our children?* now you can consider sources to consult (journals, interviews, reports, Internet sites, database searches, and so on). Figure 2.4 illustrates likely sources for information on the EMF topic.

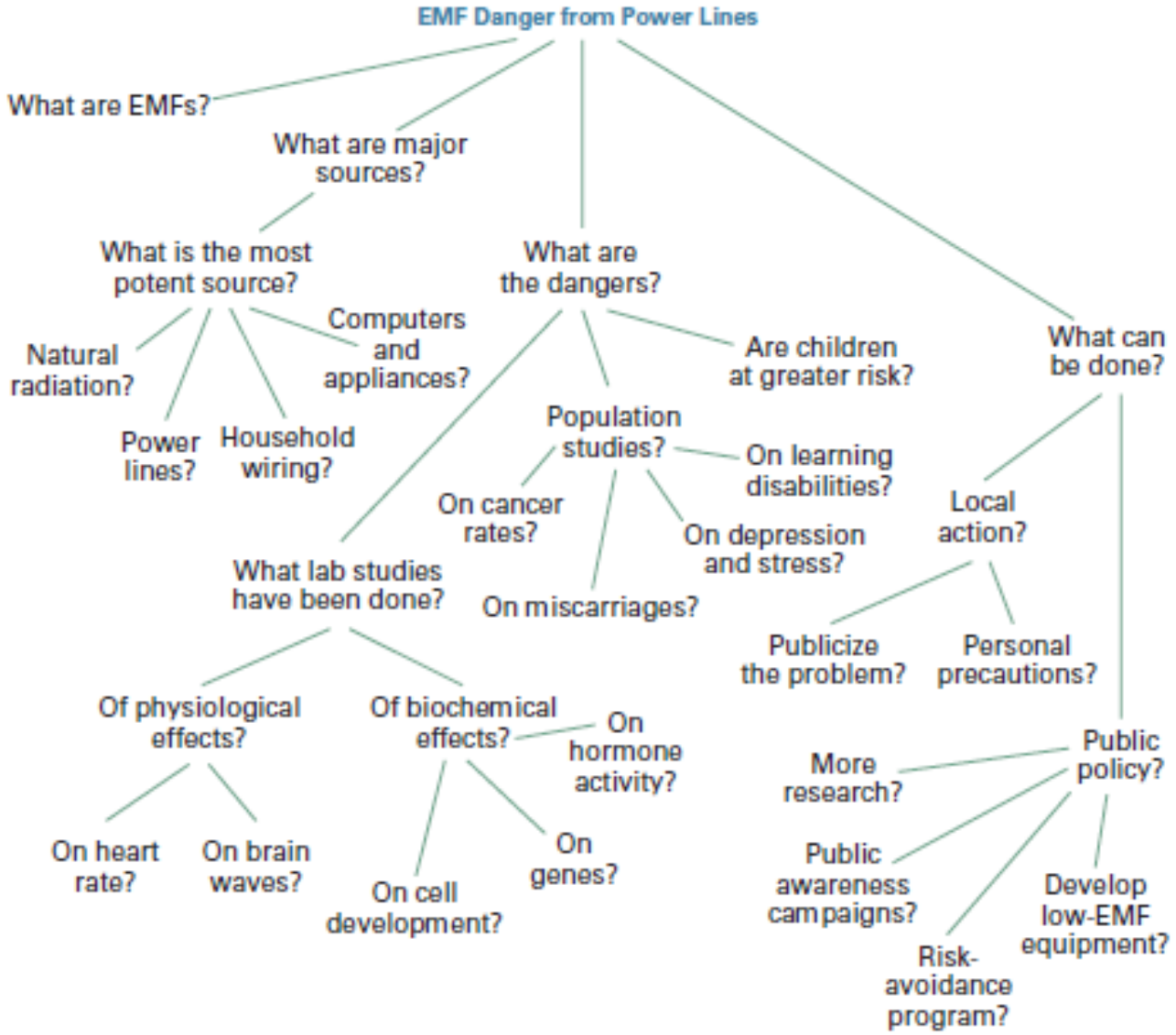


Figure 2.3: How the Right Questions Help Define a Research Problem

You cannot begin to solve a problem until you have defined it clearly.

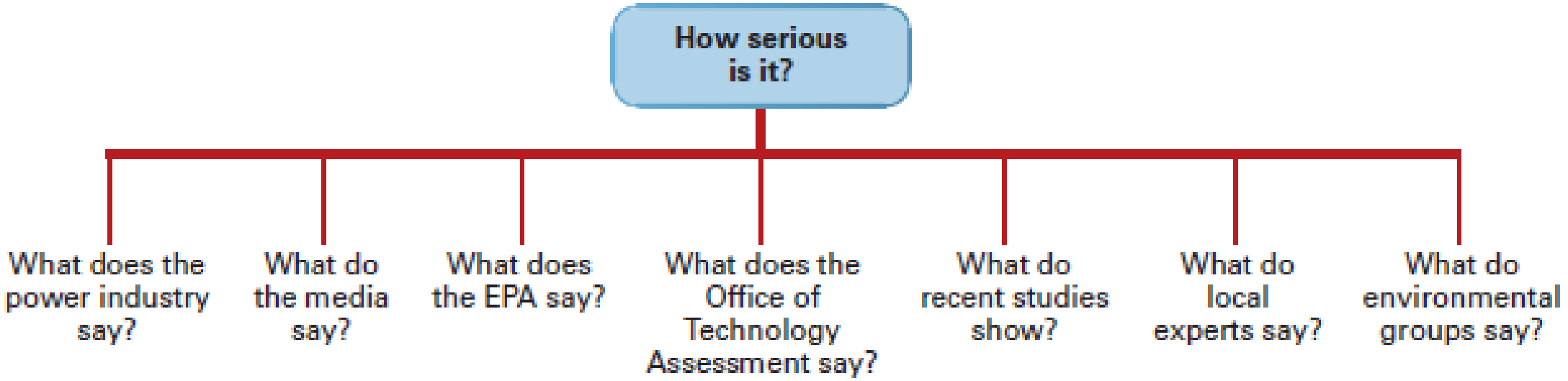


Figure 2.4: Range of Essential Viewpoints

No single source is likely to offer "the final word." Ethical researchers rely on evidence that represents a fair balance of views.

Exploring A Balance Of Views

Approach your research topic from a variety of angles

- Instead of settling for the most comforting or convenient answer, pursue the best answer.
- Even “expert” testimony may not be enough, because experts can disagree or be mistaken.
- To answer fairly and accurately, consider a balance of perspectives from up-to-date and reputable sources:
  - What do informed sources have to say about this topic?
  - On which points do sources agree?
  - On which points do sources disagree?

Try To Consider All The Angles

Exploring A Balance Of Views

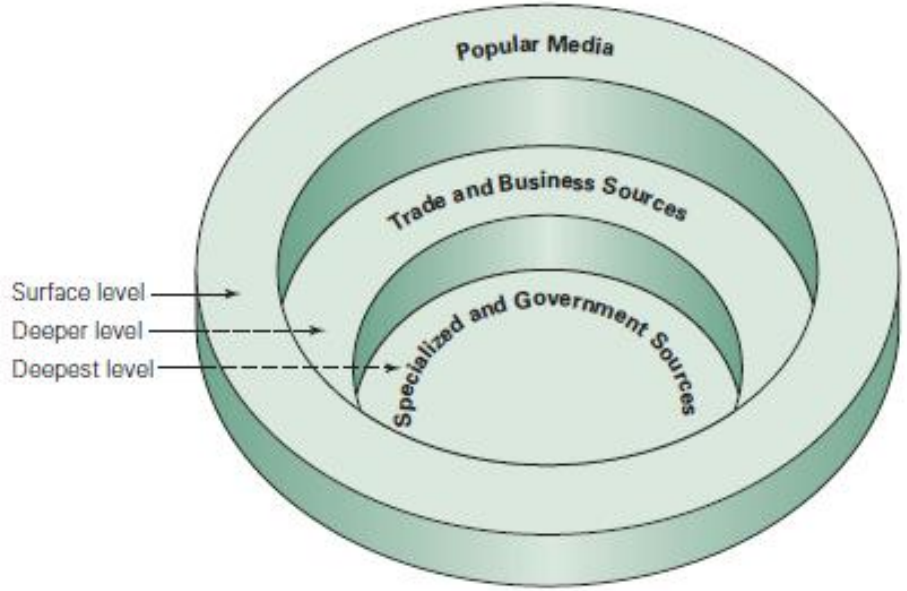
Note:

- Recognize the difference between “balance” (sampling a full range of opinions) and “accuracy” (getting at the facts).
- Government or power industry spokespersons, for example, might present a more positive view (or “spin”) of the EMF issue than the facts warrant.
- Not every source is equal, nor should we report points of view as though they were equal.

Achieving Adequate Depth In Your Search

Explore your research topic in sufficient depth

- Balanced research examines a broad range of evidence; thorough research, however, examines that evidence in sufficient depth.
- Different sources of information about any topic occupy different levels of detail and dependability as shown below:



Achieving Adequate Depth In Your Search

1. The surface level offers items from the popular media (print and online newspapers and magazines, radio, TV, Web sites, Twitter feeds, Facebook pages, blogs). Designed for general consumption, this layer of information often merely skims the surface of an issue.

2. At the next level are trade, business, and technical publications (Frozen Food World, Publisher's Weekly, and so on). Often available in both print and digital formats, these publications are designed for readers who range from moderately informed to highly specialized. This layer of information focuses more on practice than on theory, on issues affecting the field, and on public relations. While the information is usually accurate, the general viewpoints tend to reflect a field's particular biases.

Achieving Adequate Depth In Your Search

3. At a deeper level is the specialized literature (journals from professional associations—academic, medical, legal, engineering). Designed for practicing professionals, this layer of information focuses on theory as well as on practice, on descriptions of the latest studies (written by the researchers themselves and scrutinized by peers for accuracy and objectivity), on debates among scholars and researchers, and on reviews, critiques, and refutations of prior studies and publications.

- Also at this deepest level are government sources and corporate documents available through the Freedom of Information Act.
- Designed for anyone willing to investigate its complex resources, this information layer offers hard facts and detailed discussion, and (in many instances) relatively impartial views.
- **Note:** Web pages, of course, offer links to increasingly specific levels of detail. But the actual "depth" and quality of a Web site's information depend on the sponsorship and reliability of that site.

Evaluating And Interpreting Your Findings

Evaluate and interpret your sources

- Not all findings have equal value. Some information might be distorted, incomplete or misleading.
- Information might be tainted by source bias, in which a source understates or overstates certain facts, depending on whose interests that source represents (say, power company, government agency, parent group, or a reporter seeking headlines).

Evaluating And Interpreting Your Findings

To evaluate a particular finding, ask these questions:

- Is this information accurate, reliable, and relatively unbiased?
- Do the facts verify the claim?
- How much of the information is useful?
- Is this the whole or the real story?
- Do I need more information?

Questions for evaluating a particular finding

Instead of merely emphasizing findings that support their own biases or assumptions, ethical researchers seek out and report the most accurate answer.

Evaluating And Interpreting Your Findings

Once you have decided which of your findings seem legitimate, you need to decide what they all mean by asking these questions:

- What are my conclusions and do they address my original research question?
- Do any findings conflict?
- Are other interpretations possible?
- Should I reconsider the evidence?
- What, if anything, should be done?

Questions for interpreting your findings

Note: Never force a simplistic conclusion on a complex issue. Sometimes the best you can offer is an indefinite conclusion: "Although controversy continues over the extent of EMF hazards, we all can take simple precautions to reduce our exposure." A wrong conclusion is far worse than no definite conclusion at all.

Primary Versus Secondary Sources

Differentiate between primary and secondary research

- Primary research means getting information directly from the source by conducting interviews and surveys and by observing people, events, or processes in action.
- Secondary research is information obtained second hand by reading what other researchers have compiled in books and articles in print or online.
- Most information found on the Internet would be considered a secondary source.
- Some Web-based information is more accurate than others; for instance, a Web page created by a high school student might be interesting but not overly reliable, whereas a Web site that is the equivalent of a traditional secondary source (encyclopedia, research index, newspaper, journal) would be more reliable for your research.

Primary Versus Secondary Sources

- Whenever possible, combine primary and secondary research.
- Typically, you would start by using secondary sources, because they are readily available and can help you get a full background understanding of your topic.
- However, don’t neglect to add your own findings to existing ones by doing primary research.
- Working with primary sources can help you expand upon what other people have already learned and add considerable credibility to your work.
- For instance, assume that your boss asks you to write a report about how well your company’s new product is being received in the marketplace: You might consult sales reports and published print and online reviews of the product (secondary research), but you might also survey people who use the product and interview some of them individually (primary research).

Exploring Secondary Sources

Conduct secondary research using online and traditional sources

- Secondary sources include some Web sites; online news outlets and magazines; blogs and wikis; books in the library; journal, magazine, and newspaper articles; government publications; and other public records.
- Research assignments begin more effectively when you first uncover and sort through what is already known about your topic before adding to that knowledge yourself.

Exploring Secondary Sources

Online Secondary Sources

To find various sites on the Web, use two basic tools: subject directories and search engines.

- Subject directories:
  - Subject directories are indexes compiled by editors who sift through Web sites and sort the most useful links.
  - The most popular Webbased subject directory is About.com. Specialized directories focus on a single topic such as software, health, or employment.

Exploring Secondary Sources

Online Secondary Sources

- Search engines:
  - Search engines, such as Google, Yahoo!, and Bing, scan for Web sites and online documents that best match your query, based on keywords, site popularity, and a number of other factors.
  - Even though search engines yield a lot more information than subject directories, much of it can be irrelevant.
  - Some search engines, however, are more selective than others, and some focus on specialized topics.

Locating Secondary Sources Using Google

- Most people today, from students to professionals, begin their research of secondary sources by doing a Google search.
- Google, the most popular of the search engines, searches Web pages, government documents, online news sites, and other sources.
- Google also has a large collection of books and journal articles that it makes available through agreements with publishers or by digitizing works that either are in the public domain or are out of copyright.
- It's fine to start with a Google search just to brainstorm ideas and develop approaches to get started.
- But you quickly will need to narrow down your findings and do some deeper digging.
- For instance, a search on "electromagnetic radiation" will yield thousands or even millions of results. You should stick with sites from reliable sources such as universities or government research labs.

Locating Secondary Sources Using Wikipedia

- The first two Web links in many Google searches are to Wikipedia, the popular online encyclopedia.
- Wikipedia's content is provided and edited by countless people worldwide. Although these pages can provide a good starting point, the content may not be completely accurate.
- Use a Wikipedia entry to get an overview of the topic, and to help you locate other sources.
- The Wikipedia page on electromagnetic radiation contains footnotes to other sources.
- You can track down these sources at the library or over the Internet.
- Think of Wikipedia as a place to get your research started, but not as your final destination.

Other Web-Based Secondary Sources

- Google, Wikipedia, and other online tools can help you get started with your research.
- But the more you research online, the more you'll need to pay careful attention to what you are finding.
- Following are the main categories of online information sources.

Other Web-Based Secondary Sources

General Commercial, Organizational, and Academic web Sites.

- Search engines pull up a wide variety of hits, most of which will be commercial (.com), organizational (.org), and academic (.edu) Web sites.
- If a commercial site looks relevant to your search, by all means take a look at it, as long as you think critically about the information presented.
- Does the company's effort to sell you something affect the content? Be careful also of organizational Web sites, which are likely to be well-researched, but may have a particular social or political agenda.
- Academic Web sites tend to be credible. However, some academics may also have biases, so never stop thinking critically about what you find online.

Other Web-Based Secondary Sources

Government Web Sites:

- Search engines will also locate government Websites, but your best access route is through the United States government's Web portal.
- Most government organizations (local, state, and federal) offer online access to research and reports.
- Examples include the Food and Drug Administration's site, for information on food recalls, clinical drug trials, and countless related items; and the Federal Bureau of Investigation's site, for information about fugitives, crime statistics, and much more.
- State and local sites provide information on auto licenses, state tax laws, and local property issues.
- From some of these sites you can link to specific government-sponsored research projects.

Note: Be sure to check the dates of reports or data you locate on a government Web site, and find out how often the site is updated.

Other Web-Based Secondary Sources

Blogs:

- *Blogs* are Web sites on which the blog's author posts ideas, and other readers reply.
- The postings and attached discussions are displayed in reverse chronological order.
- Links that the owner has selected also supply ways to connect to other blogs on similar topics.
- Blogs are great for finding current information about a specific topic from individuals, companies, and nonprofit organizations.
- Evaluate the information on individual blogs carefully and decide which ones are most relevant and reliable.

Other Web-Based Secondary Sources

Blogs:

- Blogs nearly always represent the particular views of the blog author (whether an individual, company, organization, or academic institution) and of those who reply to the postings.
- Check any information you find on a blog against a professionally edited or peer-reviewed source.

Other Web-Based Secondary Sources

Wikis:

- *Wikis* are community encyclopedias that allow anyone to add to or edit the content of a listing.
- The most popular wiki is *Wikipedia*. The theory of a wiki is that if the information from one posting is wrong, someone else will correct it, and over time the site will reach a high level of accuracy and reliability.
- Many wikis have no oversight. Aside from a few people who determine whether to delete articles based on requests from readers, the content on a wiki is not checked by editors for accuracy.
- Always check the information against other peer reviewed or traditional sources.
- Remember that most of what is posted on a wiki has not been evaluated objectively.

Other Web-Based Secondary Sources

Facebook, Twitter, and Online groups

- For almost every organization (company, government, nonprofit) and every topic imaginable, you will be able to find a Facebook page and a Twitter feed.
- Both Facebook and Twitter can provide you with ideas as well as sources of information to explore more deeply.
- For instance, your local electric utility company's Twitter feed might contain a link to a new study about EMFs, and that study could turn out to be very useful for your research. Or, their Facebook page might announce a local citizen advisory committee that's being formed; you might want to attend that meeting to learn more.

Other Web-Based Secondary Sources

Facebook, Twitter, and Online groups

- As with all secondary sources, especially online, keep in mind that the material being presented comes with the biases of its particular organization.
- In addition, the Internet is home to numerous online forums, some of which are affiliated with specific organizations and others that are run by individuals.
- These forums might be on *Yahoo! Groups* or *Google Groups*, or they might be set up as part of a Web site.

Other Web-Based Secondary Sources

Facebook, Twitter, and Online groups

- For instance, most medical or health-related sites, especially those related to specific diseases or conditions, have forums where patients and family members can post questions and ideas.
- If membership is open to all, you can join one of these groups and see if any of the information seems useful.
- Keep in mind that material from these groups may be insightful but biased.
- Visit a variety of groups to get a broad perspective on the issue. Groups with a moderator tend to have less “noise,” while unmoderated groups could be less reliable.

Other Web-Based Secondary Sources

Digital libraries

- These online libraries are entirely searchable via the Internet, and their holdings are almost completely in digital format (either digital content itself, like online news sites, or print books and articles that have been digitized).
- Popular digital libraries include the Internet Public Library, the Haithi Trust Digital Library, and the Internet Archive. Some of these sites also include ways to ask a question (usually via an online form) of an actual librarian.
- Keep in mind that due to copyright restrictions, these sites may not include current books or other documents and materials still under copyright.

Other Web-Based Secondary Sources

Digital libraries

- Supplement any digital library research with research at an actual library; either at your school or in your community.
- These libraries offer a wide range of search tools, too, some of which you can use from your home computer.
- But school and public libraries also offer you access to materials not found online.
- You can also speak in person to a librarian if you need assistance.

Other Web-Based Secondary Sources

Periodical databases

- As noted above, almost all school and public libraries have Web sites that allow you to search for topics and materials.
- Libraries also subscribe to periodical databases, which are electronic collections of articles from newspapers, magazines, journals, and other publications.
- You can search by title, author, keyword, and so on.
- Some of the most popular general periodical databases include *InfoTrac, NewsBank, ProQuest* and *EBSCOHost.*
- Your library may also subscribe to specialized databases in a variety of subject areas.

Other Web-Based Secondary Sources

Periodical databases

- Before initiating a periodical database search, meet with your reference librarian for a tour of the various databases and instructions for searching effectively.
- Also be aware that some databases may not be accessible from school or home—you may need to visit your library in person.

Guidelines For Researching On The Internet

- **Expect limited results from any one search engine or subject directory.**
  - No single search engine can index more than a fraction of the material available on the Internet.
  - No subject directory will list the same Internet sites as another.
- **When using a search engine, select keywords or search phrases that are varied and technical rather than general.**
  - Some search terms generate more useful hits than others.
  - In addition to "electromagnetic radiation," for example, try "electromagnetic fields," "power lines and health," or "electrical fields."
  - Specialized terms (say, "vertigo" versus "dizziness") offer the best access to reliable sites. However, if you are not able to locate much by using a specialized term, widen your search somewhat.

Guidelines For Researching On The Internet

- **When using Wikipedia or other online encyclopedias, check out the footnotes and other citations.**
  - These references can direct you to other sources, such as government documents, books in the library, or published journal articles.
- **Consider the domain type (where the site originates).**
  - Standard domain types in the United States include .com (commercial organization), .edu (educational institution), .gov or .mil (government or military organization), .net (general usage), and .org (nonprofit organization).

Guidelines For Researching On The Internet

- **Identify the site's purpose and sponsor**
  - Is the intent merely to relay information, to sell something, or to promote an ideology or agenda?
  - The domain type might alert you to bias or a hidden agenda.
  - A .com site might provide accurate information but also some type of sales pitch.
  - An .org site might reflect a political or ideological bias.
  - Looking for a site's sponsor can also help you evaluate its postings. For example, a Web site about the dangers of bioengineered foods that is sponsored by an advocacy organization may be biased.

Guidelines For Researching On The Internet

- **Look beyond the style of a site**
  - Sometimes the most reliable material resides in less attractive, text-only sites.
  - The fact that a Web site may look professional doesn't always mean that its content is reliable.
- **Assess the currency of the site's materials**
  - When was the material created, posted, and updated?
  - Many sites have not been updated in months or years.

Guidelines For Researching On The Internet

- **Assess the author's credentials and assertions.**
  - Check the author's reputation, expertise, and institutional affiliation (university, company, environmental group).
  - Do not confuse the author (the person who wrote the material) with the Webmaster (the person who created and maintains the site).
  - Follow links to other sites that mention the author.
  - Where, on the spectrum of expert opinion and accepted theory, does this author fall? Is each assertion supported by solid evidence?
  - Verify any extreme claim through other sources, such as a professor or expert in the field.
  - Consider whether your own biases might predispose you to accept certain ideas.

Guidelines For Researching On The Internet

- **Use bookmarks and hotlists for quick access to favorite Web sites.**
  - It is always frustrating when you can't find a helpful Web site that you accessed earlier but didn't bookmark.
- **Save or print what you need before it changes or disappears.**
  - Web sites often change their content or "go dead."
  - Always record the Web address and your access date.
  - You can also use a screen capture tool (Apple Grab or other) to take a snapshot of the Web site.

Guidelines For Researching On The Internet

- **Download only what you need; use it ethically; obtain permission; and credit your sources.**
  - Unless they are crucial to your research, omit graphics, sound, and video files.
  - Do not use material created by others in a way that harms the material's creator.
  - For any type of commercial use of material from the Web, obtain written permission from the material's owner and credit the source exactly as directed by its owner.

Traditional Secondary Sources

- As noted earlier, traditional secondary research tools are still of great value.
- Most hard-copy secondary sources are carefully reviewed and edited before they are published.
- Every day, more and more hard-copy material is being digitized.
- Yet only a fraction of print sources are available on the Internet.
- It is still important to use hard-copy sources for research.
- Locate hard-copy sources by using your library's online public access catalog or other search tool (each library is different, and many are attempting to make their search tools function similar to Internet searching).
- This catalog can be accessed through the Internet or at workstations in the library.

Traditional Secondary Sources

- You can search a library's holdings by subject, author, title, or keyword. Visit the library's Web site, or ask a librarian for help.
- Following are the principal categories of hard-copy sources found at libraries, as well as one type of source material (gray literature) that you will need to track down on your own.

Traditional Secondary Sources

- **Books and Periodicals**
  - The larger or more specialized the library you visit, the more likely you are to find books by specialist publishers and periodicals that delve into more specific subject areas.
  - When consulting books and periodicals, always check the copyright date and supplement the source with additional information from more recent sources, if necessary.

Traditional Secondary Sources

- **Reference works**

  Reference works are general information sources that provide background and can lead to more specific information.

- **Bibliographies**
  - Bibliographies are lists of books and/or articles categorized by subject.
  - To locate bibliographies in your field, begin by consulting the *Bibliographic Index Plus,* a list (by subject) of major bibliographies, which indexes over 500,000 bibliographies worldwide.
  - You can also consult such general bibliographies as *Books in Print* or the *Readers' Guide to Periodical Literature.* Or, examine subject area bibliographies, such as *Bibliography of World War II History,* or highly focused bibliographies, such as *Chemical Engineering.*

Traditional Secondary Sources

- **Indexes**
- Book and article bibliographies may also be referred to as "indexes."
- Yet there are other types of indexes that collect information not likely found in standard bibliographies.
- One example is the *Index to Scientific and Technical Proceedings,* which indexes conference proceedings in the sciences and engineering.
- While limited versions of some of these indexes may be available for free on
- the Internet, most are only available via a library subscription. Other indexes
- that may be useful for your research include the following:

Traditional Secondary Sources

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- Other indexes that may be useful for your research include the following:

• *Newspaper indexes*. Most major newspapers, such as the *New York Times,* have an index covering almost the entire span of the paper's publication.

Traditional Secondary Sources

- **Periodical indexes**
  - These indexes list articles from magazines and journals.
  - The most commonly known periodical index is the Readers' Guide to Periodical Literature.
- **Citation indexes**

  Using a citation index, you can track down the publications in which original material has been cited, quoted, or verified.

Traditional Secondary Sources

- **Technical report indexes**
  - These indexes allow you to look for government and private-sector reports.
  - One example would be the Scientific and Technical Aerospace Reports index.
- **Patent indexes**
  - Patents are issued to protect rights to new inventions, products, or processes.
  - You can search for patents by using the Index of Patents Issued from the United States Patent and Trademark Office or other similar indexes that cover both U.S. and international patents.

Traditional Secondary Sources

- **Encyclopedias**
  - Encyclopedias are alphabetically arranged collections of articles.
  - Like Wikipedia, encyclopedias are a good starting point for your research, but you should use these to guide you to other material (such as journal articles or government reports).
  - The *Encyclopedia Britannica* is the most popular of the general encyclopedias.
  - You should also examine more subject-focused encyclopedias, such as *Encyclopedia of Nutritional Supplements, Encyclopedia of Business and Finance,* or *Illustrated Encyclopedia of Aircraft.*

Traditional Secondary Sources

- **Dictionaries**
  - Dictionaries are alphabetically arranged lists of words, including definitions, pronunciations, and word origins.
  - If you can't locate a particular word in a general dictionary (e.g., a highly specialized term or jargon specific to a certain field), consult a specialized dictionary, such as *Dictionary of Engineering and Technology, Dictionary of Psychology,* or *Dictionary of Media and Communication Studies*.
- **Handbooks**
  - Handbooks offer condensed facts (formulas, tables, advice, examples) about particular fields.
  - Examples include the *Civil Engineering Handbook* and *The McGraw-Hill Computer Handbook.*

Traditional Secondary Sources

- **Almanacs**
  - Almanacs are collections of factual and statistical data, usually arranged by subject area and published annually.
  - Examples include general almanacs, such as the *World Almanac and Book of Facts,* or subject-specific almanacs, such as the *Almanac for Computers* or *Baer's Agricultural Almanac.*
- **Directories**
  - Directories provide updated information about organizations, companies, people, products, services, or careers, often listing addresses and phone numbers.
  - Examples include *The Career Guide: Dun's Employment Opportunities Directory* and the *Directory of American Firms Operating in Foreign Countries.*
  - Ask your librarian about *Hoover's Company Capsules* (for basic information on thousands of companies) and *Hoover's Company Profiles* (for detailed information).

Traditional Secondary Sources

- **Abstracts**
  - Abstracts are collected summaries of books and/or articles.
  - Reading abstracts can help you decide whether to read or skip an article and can save you from having to track down a journal you may not need.
  - Abstracts usually are titled by discipline: *Biological Abstracts, Computer Abstracts,* and so on.
  - For some current research, you might consult abstracts of doctoral dissertations in *Dissertation Abstracts International.*
  - Most reference works are now available in both print and digital formats.
  - When using a reference work, check the copyright date to make sure you are accessing the most current information available.

Traditional Secondary Sources

- **Gray literature**
- Some useful printed information may be unavailable at any library. This is known as “gray literature,” or materials that are unpublished or not typically catalogued.
- Examples include pamphlets published by organizations or companies (such as medical pamphlets or company marketing materials), unpublished government documents (available under the Freedom of Information Act), dissertations by graduate students, papers presented at professional conferences, or self-published works.
- The only way to track down gray literature is to contact those who produce such literature and request anything available in your subject area.

Traditional Secondary Sources

- **Gray literature**
- For instance, you could contact a professional organization and request any papers on your topic that were delivered at their recent annual conference, or contact a government agency for statistics relevant to your topic.
- Before doing so, be knowledgeable about your topic and know specifically whom to contact.
- Don’t make vague, general requests.
- Keep in mind that gray literature, like some material found on the Web, is often not carefully scrutinized for content by editors.
- Therefore, it may be unreliable and should be backed up by information from other sources.

Exploring Primary Sources

- Perform primary research using interviews, surveys, and other techniques
- Once you have explored your research topic in depth by finding out what others have uncovered, supplement that knowledge with information you discover yourself by doing primary research.
- Primary sources include unsolicited inquiries, informational interviews, surveys, and observations or experiments.

Exploring Primary Sources

- **Unsolicited Inquiries**
- The most basic form of primary research is a simple, unsolicited inquiry.
- Letters, phone calls, or email inquiries to experts you have identified in your reading and initial research can clarify or supplement information you already have.
- Try to contact the right individual instead of a company or department.
- Also, ask specific questions that cannot be answered elsewhere.
- Be sure what you ask about is not confidential or otherwise sensitive information.
- Unsolicited inquiries, especially by phone, can be intrusive or even offensive.
- Therefore, initiate your request for an interview with a short email.

Exploring Primary Sources

- **Informational Interviews**
- An excellent primary source of information is the informational interview.
- Expert information may never be published.
- Therefore, you can uncover highly original information by spending time with your respondent and asking pertinent questions.
- In addition, an interviewee might refer you to other experts or sources of information.
- Of course, an expert's opinion can be just as mistaken or biased as anyone else's.

Exploring Primary Sources

- **Informational Interviews**
- Like patients who seek second opinions about medical conditions, researchers must seek a balanced range of expert opinions about complex problems or controversial issues.
- In researching the effects of electromagnetic fields (EMFs), for example, you would seek opinions not only from a company engineer and environmentalist, but also from presumably more objective third parties such as a professor or journalist who has studied the issue.
- Figure 7.6 provides a partial text of an interview about persuasive challenges faced by a corporation's manager.

Exploring Primary Sources

Q. *Would you please summarize your communication responsibilities?*

A. The corporate relations office oversees three departments: customer service (which handles claims, adjustments, and queries), public relations, and employee relations. I supervise production of all documents generated by this office.

Q. *Isn't that a lot of responsibility?* ← Probing and following up

A. It is, considering we're trying to keep some people happy, getting others to cooperate, and trying to get everyone to change their thinking and see things in a positive light. Just about every document we write has to be persuasive.

Q. *What exactly do you mean by "persuasive"?* ← Seeking clarification

A. The best way to explain is through examples of what we do. The customer service department responds to problems like these: Some users are unhappy with our software because it won't work for a particular application, or they find a glitch in one of our programs, or they're confused by the documentation, or someone wants the software modified to meet a specific need. In each case we have to persuade people that we've resolved the problem or are working to resolve it quickly.

The public relations department works to keep up our reputation through links outside the company. For instance, we keep in touch with this community, with consumers, the general public, government and educational agencies.

Q. *Can you be more specific? "Keeping in touch" doesn't sound much like persuasion.* ← Seeking clarification

A. Okay, right now we're developing programs with colleges and universities, in which we offer heavily discounted software, backed up by an extensive support network (regional consultants, an 800 phone hotline, a Twitter feed, and a Web site). We're hoping to persuade them that our software is superior to our well-entrenched competitor's. And locally we're offering the same kind of service and support to business clients.

Q. *What about employee relations?* ← Following up

A. Day to day we face the usual kinds of problems: trying to get 100 percent employee contributions to the United Way, or persuading employees to help out in the community, or getting them to abide by new company regulations restricting personal phone calls. Right now, we're facing a real persuasive challenge. Because of market saturation, software sales have flattened across the board. This means temporary layoffs for roughly 28 percent of our employees. Our only alternative is to persuade *all* employees to accept a 10 percent salary and benefit cut until the market improves.

Q. *How, exactly, do you persuade employees to accept a cut in pay and benefits?* ← Probing

A. Basically, we have to make them see that by taking the cut, they're really investing in the company's future—and, of course, in their own.

[The interview continues.]

Exploring Primary Sources

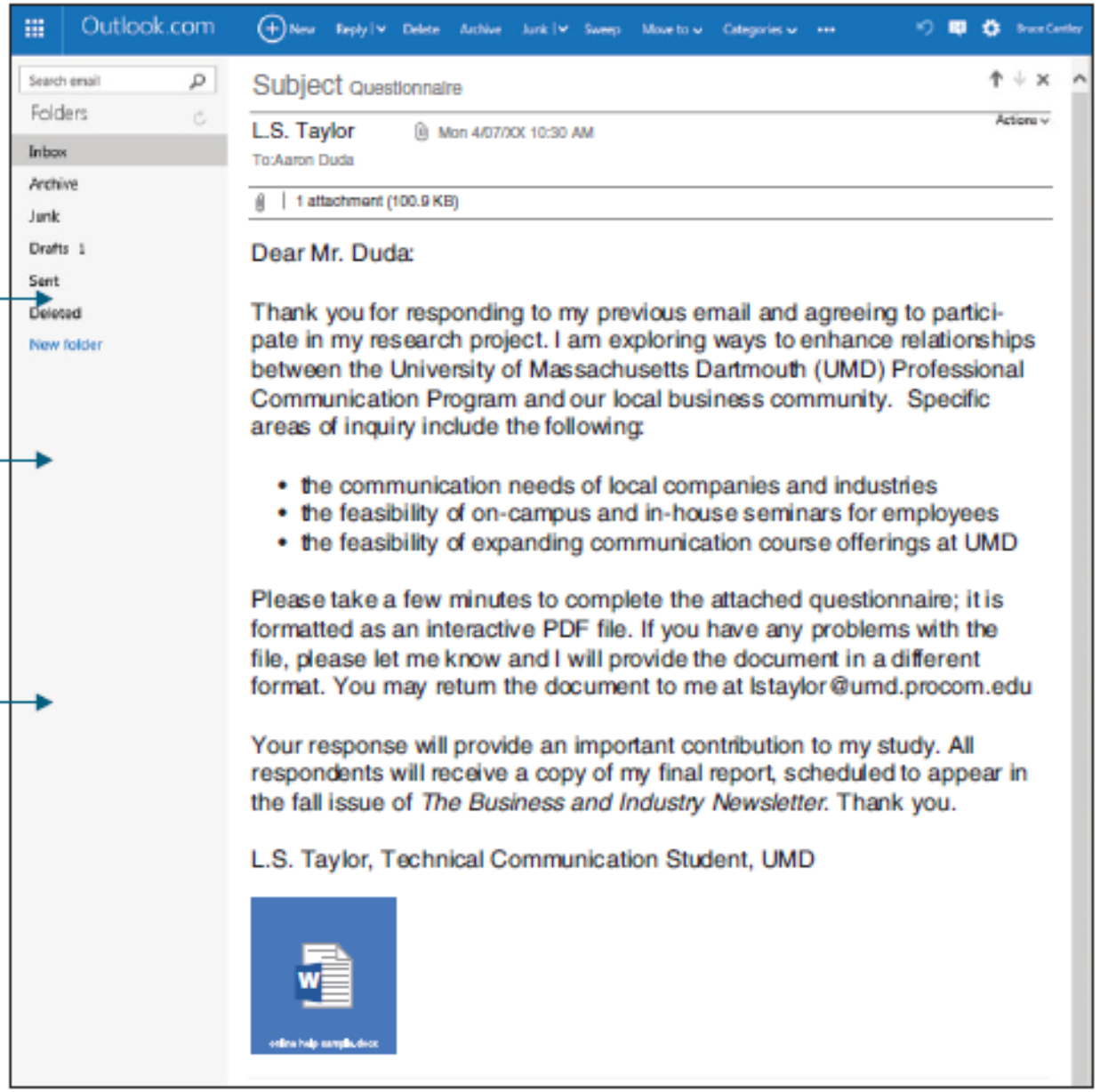
- **Surveys**
- Surveys help you form impressions of the concerns, preferences, attitudes, beliefs, or perceptions of a large, identifiable group (a *target population*) by studying representatives of that group (a *sample*).
- While interviews allow for greater clarity and depth, surveys offer an inexpensive way to get the viewpoints of a large group.
- Respondents can answer privately and anonymously—and often more candidly than in an interview.
- The tool for conducting surveys is the questionnaire.

A Cover Email for a Questionnaire

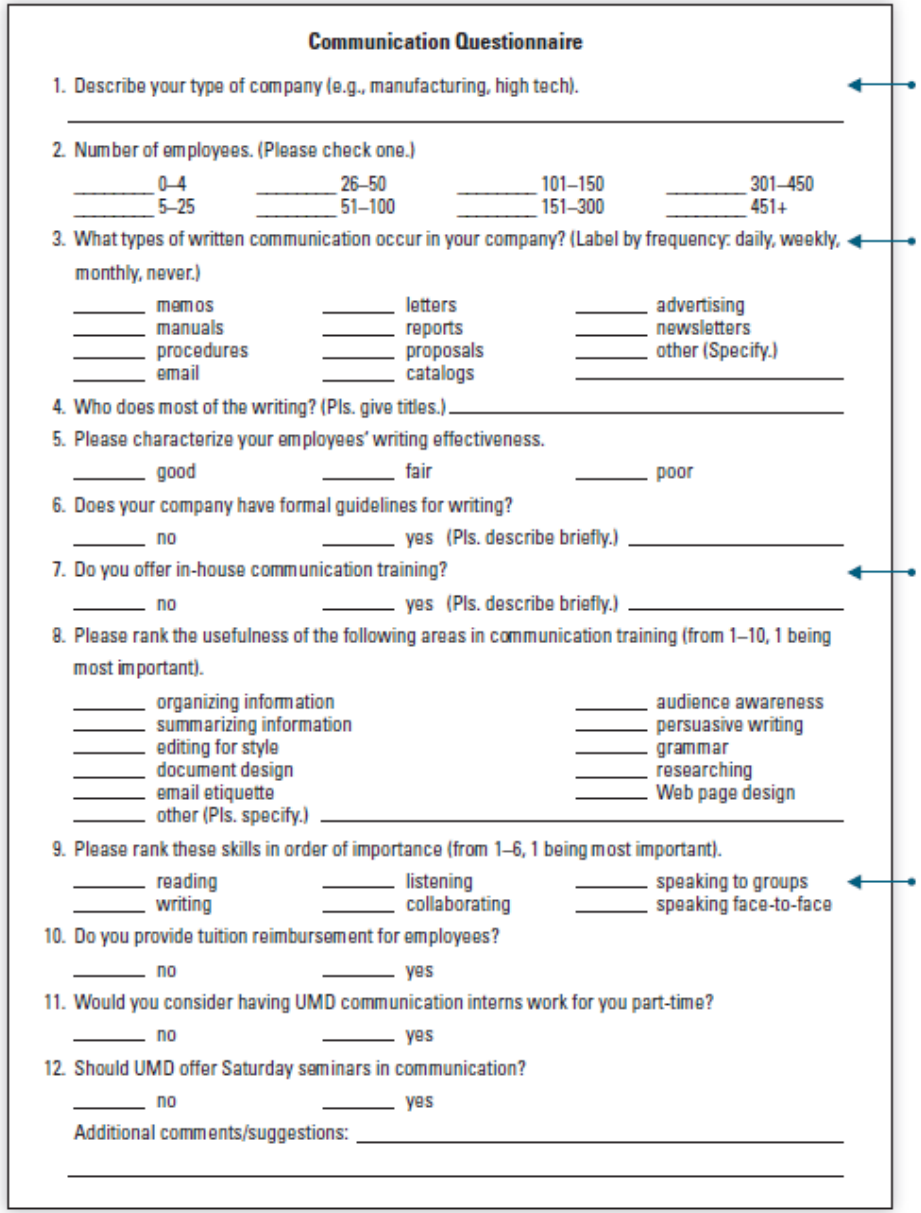
Keep the introductory sentence short

Use bullets or a numbered list for ease of reading

Be polite and professional in tone



A Questionnaire



Communication Questionnaire

1. Describe your type of company (e.g., manufacturing, high tech).

_____

2. Number of employees. (Please check one.)

_____ 0–4 _____ 26–50 _____ 101–150 _____ 301–450
_____ 5–25 _____ 51–100 _____ 151–300 _____ 451+

3. What types of written communication occur in your company? (Label by frequency: daily, weekly, monthly, never.)

_____ memos _____ letters _____ advertising
_____ manuals _____ reports _____ newsletters
_____ procedures _____ proposals _____ other (Specify.)
_____ email _____ catalogs _____

4. Who does most of the writing? (Pls. give titles.) _____

5. Please characterize your employees' writing effectiveness.

_____ good _____ fair _____ poor

6. Does your company have formal guidelines for writing?

_____ no _____ yes (Pls. describe briefly.) _____

7. Do you offer in-house communication training?

_____ no _____ yes (Pls. describe briefly.) _____

8. Please rank the usefulness of the following areas in communication training (from 1–10, 1 being most important).

_____ organizing information _____ audience awareness
_____ summarizing information _____ persuasive writing
_____ editing for style _____ grammar
_____ document design _____ researching
_____ email etiquette _____ Web page design
_____ other (Pls. specify.) _____

9. Please rank these skills in order of importance (from 1–6, 1 being most important).

_____ reading _____ listening _____ speaking to groups
_____ writing _____ collaborating _____ speaking face-to-face

10. Do you provide tuition reimbursement for employees?

_____ no _____ yes

11. Would you consider having UMD communication interns work for you part-time?

_____ no _____ yes

12. Should UMD offer Saturday seminars in communication?

_____ no _____ yes

Additional comments/suggestions: _____

_____

- Open-ended question (allows people to respond as they choose)
- Closed-ended question (provides a limited choice of responses)
- Questions and sentences are short and to the point
- Page layout is clean and easy to read

Evaluate the Sources

- **Evaluate your sources based on currency, reliability, and other factors**
  - Not all sources are equally dependable.
  - A source might offer information that is out-of-date, inaccurate, incomplete, mistaken, or biased.

1. **Determine the currency of the source.**

- Even newly published books contain information that can be more than a year old, and journal articles typically undergo a lengthy process of peer review before they are published.

Note: *The most recent information is not always the most reliable—especially in scientific research, a process of ongoing inquiry where new research findings may enhance, modify, or invalidate previous studies.*

Evaluate the Sources

2. Assess the reputation of the source.

- Check the publication's copyright page.
- Is the work published by a university, professional society, museum, or respected news organization?
- Is the publication *refereed* (all submissions reviewed by experts before acceptance)?
- Does the bibliography or list of references indicate how thoroughly the author has researched the issue (Barnes)?
- Many periodicals also provide brief biographies or descriptions of authors' earlier publications and achievements.

Evaluate the Sources

3. **Consider the possible motives of those who have funded the study.**

- Much of today's research is paid for by private companies or special-interest groups that have their own agendas.
- Medical research may be financed by drug or tobacco companies; nutritional research by food manufacturers; environmental research by oil or chemical companies.
- Instead of a neutral and balanced inquiry, this kind of "strategic research" is designed to support one special interest or another.
- Research financed by opposing groups can produce opposing results.
- Try to determine exactly what those who have funded a particular study stand to gain or lose from the results.

Evaluate the Sources

Note:

- Keep in mind that any research ultimately stands on its own merits.
- Thus, funding by a special interest should not automatically discredit an otherwise valid and reliable study.
- Also, financing from a private company often sets the stage for beneficial research that might otherwise be unaffordable, as when research funded by Quaker Oats led to other studies proving that oats can lower cholesterol.

Evaluate the Sources

4. Cross-check the source against other, similar sources.

- Most studies have some type of flaw or limitation.
- Instead of relying on a single source or study, you should seek a consensus among various respected sources.

Evaluate Online Information

- For online sources special scrutiny is needed.
- The Internet is home to many peer-reviewed, edited publications.
- More and more documents that were once only available in print (books, journal articles, government studies, newspaper articles) are now available in both print and online.
- But online, where anyone can become a publisher, you will also find information that is not subject to the scrutiny of an editorial board.
- For instance, many Web sites, blogs, and Facebook pages may contain valuable ideas, but the material might only reflect the perspective of the one person or group that created and maintains the page.

Evaluate the Evidence

- *Evidence* is any finding used to support or refute a particular claim.
- Although evidence can serve the truth, it can also distort, misinform, and deceive.
- **Determine the sufficiency of the evidence.**
  - Evidence is sufficient when nothing more is needed to reach an accurate judgment or conclusion.
  - Say you are researching the stress-reducing benefits of low-impact aerobics among employees at a fireworks factory.
  - You would need to interview or survey a broad sample: people who have practiced aerobics for a long time; people of both genders, different ages, different occupations, different lifestyles before they began aerobics; and so on.
  - But responses even from hundreds of practitioners might be insufficient unless those responses were supported by laboratory measurements of metabolic and heart rates, blood pressure, and so on.

Evaluate the Evidence

- **Differentiate hard from soft evidence.**
  - "Hard evidence" consists of facts, expert opinions, or statistics that can be verified.
  - "Soft evidence" consists of uninformed opinions or speculations, data that were obtained or analyzed unscientifically, and findings that have not been replicated or reviewed by experts.
- **Decide whether the presentation of evidence is balanced and reasonable.**
  - Evidence may be overstated, such as when overzealous researchers exaggerate their achievements without revealing the limitations of their study.
  - Or vital facts may be omitted, as when acetaminophen pain relievers are promoted as "safe," even though acetaminophen is the leading cause of U.S. drug fatalities.

Evaluate the Evidence

- ***C*onsider how the facts are being framed.**
  - A *frame of reference* is a set of ideas, beliefs, or views that influences our interpretation or acceptance of other ideas.
  - In medical terms, for example, is a "90 percent survival rate" more acceptable than a "10 percent mortality rate"?
  - Framing sways our perception.
  - For instance, what we now call a financial "recession" used to be a "depression"—a term that was coined as a euphemism for "panic".
  - Whether the language is euphemistic ("teachable moment" versus "mistake"), or demeaning to opponents ("bureaucrats," "tree huggers"), deceptive framing—all too common in political "spin" strategies—obscures the real issues.

Interpret Your Findings

- Interpreting means trying to reach the truth of the matter: an overall judgment about what the findings mean and what conclusion or action they suggest.
- Unfortunately, research does not always yield answers that are clear or conclusive.
- Instead of settling for the most *convenient* answer, we must pursue the most *reasonable* answer by critically examining a full range of possible meanings.

Interpret Your Findings

- **Identify your level of certainty**

Research can yield three distinct and very different levels of certainty:

1. The ultimate truth—the *conclusive answer:*

- Truth is *what is so* about something, as distinguished from what people wish, believe, or assert to be so.
- In the words of Harvard philosopher Israel Scheffler, truth is the view "which is fated to be ultimately agreed to by all who investigate."
- The word *ultimately* is important.
- Investigation may produce a wrong answer for years, even for centuries.

Interpret Your Findings

- For example, in the second century A.D., Ptolemy's view of the universe placed the earth at its center—and though untrue, this judgment was based on the best information available at that time.
- And Ptolemy's view survived for 13 centuries, even after new information had discredited this belief.
- When Galileo proposed a more truthful view in the fifteenth century, he was labeled a heretic.

- One way to spare yourself further confusion about truth is to reserve the word *truth* for the final answer to an issue.
- Get in the habit of using the words *belief, theory,* and *present understanding* more often.
- Conclusive answers are the research outcome we seek, but often we have to settle for answers that are less than certain.

Interpret Your Findings

2. The *probable answer:* the answer that stands the best chance of being true or accurate, given the most we can know at this particular time.

- Probable answers are subject to revision in light of new information.
- This is especially the case with *emergent science,* such as gene therapy or food irradiation.

3. The *inconclusive answer:* the realization that the truth of the matter is more elusive, ambiguous, or complex than we expected.

- We need to decide what level of certainty our findings warrant.
- For example, we are *certain* about the perils of smoking and sunburn, *reasonably certain* about the health benefits of fruits and vegetables, but *less certain* about the perils of genetically modified food or the benefits of vitamin supplements.

Examine The Underlying Assumptions

Assumptions are notions we take for granted, ideas we often accept without proof.

- The research process rests on assumptions such as these:

  that a sample group accurately represents a larger target group, that survey respondents remember facts accurately, that mice and humans share many biological similarities.

- For a study to be valid, the underlying assumptions have to be accurate.
- Consider this example: You are an education consultant evaluating the accuracy of IQ testing as a predictor of academic performance.
- Reviewing the evidence, you perceive an association between low IQ scores and low achievers.

Examine The Underlying Assumptions

- You then verify your statistics by examining a cross section of reliable sources.
- Can you justifiably conclude that IQ tests do predict performance accurately?
- This conclusion might be invalid unless you verify the following assumptions:

1. That no one—parents, teachers, or children—had seen individual test scores, which could produce biased expectations.

2. That, regardless of score, each child had completed an identical curriculum, instead of being "tracked" on the basis of his or her score.

Avoid Distorted Or Unethical Reasoning

- Recognize common errors in reasoning and statistical analysis
- Finding the truth, especially in a complex issue or problem, often is a process of elimination, of ruling out or avoiding errors in reasoning.
- As we interpret, we make *inferences:* We derive conclusions about what we don't know by reasoning from what we do know.
- For example, we might infer that a drug that boosts immunity in laboratory mice will boost immunity in humans, or that a rise in campus crime statistics is caused by the fact that young people have become more violent.

Avoid Distorted Or Unethical Reasoning

- Whether a particular inference is on target or dead wrong depends largely on our answers to one or more of these questions:
  - To what extent can these findings be generalized?
  - Is *Y* really caused by *X*?
  - To what extent can the numbers be trusted, and what do they mean?
- Three major reasoning errors that can distort our interpretations are faulty generalization, faulty causal reasoning, and faulty statistical analysis.

Faulty Generalization

- Consider, for example, the numerous times we hear about a crisis of some sort—a natural disaster, a missing airplane, a terrible accident—and all we know initially is based upon limited news reports, random Twitter posts, and cell phone videos that go viral.
- Based only on this information, people will often make general claims and jump to conclusions that later prove to be false, once more evidence is uncovered.
- We engage in faulty generalization when we jump from a limited observation to a sweeping conclusion.
- Even “proven” facts can invite mistaken conclusions, as in the following examples:

Faulty Generalization

1. “Some studies have shown that gingko [an herb] improves mental functioning in people with dementia [mental deterioration caused by maladies such as Alzheimer’s Disease]”.
2. “[I]n some cases, a two-year degree or technical certificate can offer students a better return on investment than a four-year degree”.
3. “Adult female brains are significantly smaller than male brains—about 8% smaller, on average”.

Factual Observations

1. Gingko is food for the brain!
2. Four-year degrees: a waste of money.
3. Women are the less intelligent gender.

Invalid Conclusions

Faulty Generalization

- When we accept findings uncritically and jump to conclusions about their meaning (as in points 1 and 2, above) we commit the error of *hasty generalization*.
- When we overestimate the extent to which the findings reveal some larger truth (as in point 3, above) we commit the error of *overstated generalization*.

Faulty Causal Reasoning

- Causal reasoning tries to explain why something happened or what will happen, often in very complex situations.
- Sometimes a *definite cause is apparent* ("The engine's overheating is caused by a faulty radiator cap").
- We reason about definite causes when we explain why the combustion in a car engine causes the wheels to move, or why the moon's orbit makes the tides rise and fall.
- However, causal reasoning often explores *causes that are not so obvious, but only possible or probable*.
- In these cases, much analysis is needed to isolate a specific cause.

Faulty Causal Reasoning

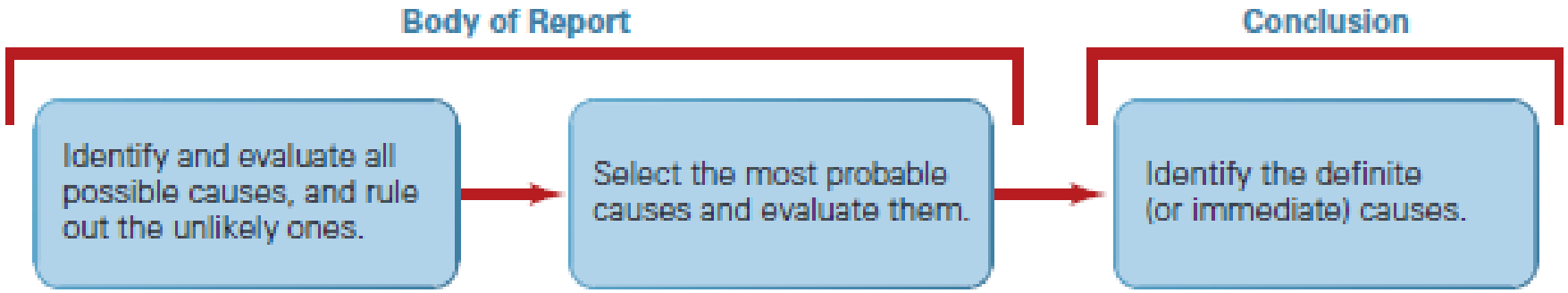
- Suppose you ask: “Why are there no children’s daycare facilities on our college campus?”
- Brainstorming yields these possible causes:
  - lack of need among students
  - lack of interest among students, faculty, and staff
  - high cost of liability insurance
  - lack of space and facilities on campus
  - lack of trained personnel
  - prohibition by state law
  - lack of government funding for such a project

Faulty Causal Reasoning

- Assume that you proceed with interviews, surveys, and research into state laws, insurance rates, and availability of personnel.
- As you rule out some items, others appear as probable causes.
- Specifically, you find a need among students, high campus interest, an abundance of qualified people for staffing, and no state laws prohibiting such a project.
- Three probable causes remain: high insurance rates, lack of funding, and lack of space.
- Further inquiry shows that high insurance rates and lack of funding *are* issues.

Faulty Causal Reasoning

- You think, however, that these obstacles could be eliminated through new sources of revenue such as charging a modest fee per child, soliciting donations, and diverting funds from other campus organizations.
- Finally, after examining available campus space and speaking with school officials, you conclude that one definite cause is lack of space and facilities.
- In reporting your findings, you would follow the sequence shown in Figure shown below:



Faulty Statistical Analysis

- The purpose of statistical analysis is to determine the meaning of a collected set of numbers.
- In primary research, our surveys and questionnaires often lead to some kind of numerical interpretation ("What percentage of respondents prefer X?" "How often does Y happen?").
- In secondary research, we rely on numbers collected by survey researchers.
- Numbers seem more precise, more objective, more scientific, and less ambiguous than words.
- They are easier to summarize, measure, compare, and analyze.
- But numbers can be totally misleading.

Faulty Statistical Analysis

- For example, radio or television phone-in surveys often produce distorted data:
- Although “90 percent of callers” might express support for a particular viewpoint, people who bother to respond tend to have the greatest anger or extreme feelings—representing only a fraction of overall attitudes.
- Mail-in or Internet surveys can produce similar distortion.
- Before relying on any set of numbers, we need to know exactly where they come from, how they were collected, and how they were analyzed.
- Faulty statistical reasoning produces conclusions that are unwarranted, inaccurate, or deceptive. Following are typical fallacies.

The Sanitized Statistic

- Numbers can be manipulated (or “cleaned up”) to obscure the facts.
- For instance, when creating a chart or graph to represent sales trends for a product, marketers might leave out numbers at the very low end of the range, or start with the years when sales began to pick up, in order to show an upward trend more favorable to investors.

The Meaningless Statistic

- Exact numbers can be used to quantify something so inexact or vaguely defined that it should only be approximated : “Boston has 3,247,561 rats.” “Zappo detergent makes laundry 10 percent brighter.”
- An exact number looks impressive, but it can hide the fact that certain subjects (child abuse, cheating in college, drug and alcohol abuse, eating habits) cannot be quantified exactly because respondents don’t always tell the truth (on account of denial or embarrassment or guessing) or they respond in ways they think the researcher expects.

The Undefined Average

- The mean, median, and mode can be confused in representing an “average” :
  1. The *mean* is the result of adding up the values of items in a set of numbers, and then dividing that total by the number of items in the set.
  2. The *median* is the result of ranking all the values from high to low, then identifying the middle value (or the 50th percentile, as in calculating SAT scores).
  3. The *mode* is the value that occurs most often in a set of numbers.
- Each of these three measurements represents some kind of average.
- But unless we know which “average” (mean, median, or mode) is being presented, we cannot possibly interpret the figures accurately.

The Distorted Percentage Figure

- Percentages are often reported without explanation of the original numbers used in the calculation:

  "Seventy-five percent of respondents prefer our brand over the competing brand"—without mention that, say, only four people were surveyed.

- Another fallacy in reporting percentages occurs when the *margin of error* is ignored.
- This is the margin within which the true figure lies, based on estimated sampling errors in a survey.

  For example, a claim that "most people surveyed prefer Brand X" might be based on the fact that 51 percent of respondents expressed this preference; but if the survey carried a 2 percent margin of error, the real figure could be as low as 49 percent or as high as 53 percent.

- In a survey with a high margin of error, the true figure may be so uncertain that no definite conclusion can be drawn.

The Bogus Ranking

- This distortion occurs when items are compared on the basis of ill-defined criteria.
- For example, the statement “Last year, the Batmobile was the number-one selling car in America” does not mention that some competing car makers actually sold *more* cars to private individuals and that the Batmobile figures were inflated by hefty sales—at huge discounts—to rental-car companies and corporate fleets.
- Unless we know how the ranked items were chosen and how they were compared (the *criteria*), a ranking can produce a seemingly scientific number based on a completely unscientific method.

Confusion Of Correlation With Causation.

- *Correlation* is a numerical measure of the strength of the relationship between two variables (say smoking and increased lung cancer risk, or education and income).
- *Causation* is the demonstrable production of a specific effect (smoking causes lung cancer).
- Correlations between smoking and lung cancer or between education and income signal a causal relationship that has been demonstrated by many studies.
- But not every correlation implies causation.
- For instance, a recently discovered correlation between moderate alcohol consumption and decreased heart disease risk offers no sufficient proof that moderate drinking *causes* less heart disease.

Confusion Of Correlation With Causation.

- In any type of causal analysis, be on the lookout for *confounding factors*, which are other possible reasons or explanations for a particular outcome.
- For instance, studies indicating that regular exercise improves health might be overlooking the confounding factor that healthy people tend to exercise more than those who are unhealthy.

The Biased Meta-analysis

- In a meta-analysis, researchers examine a whole range of studies that have been done on one topic (say, high-fat diets and cancer risk).
- The purpose of this "study of studies" is to decide the overall meaning of the collected findings.
- Because results ultimately depend on which studies have been included and which omitted, a meta-analysis can reflect the biases of the researchers who select the material.
- Also, because small studies have less chance of being published than large ones, they may get overlooked.

The Fallible Computer Model

- Computer models process complex *assumptions* to predict or estimate costs, benefits, risks, and probable outcomes.
- But answers produced by any computer model depend on the assumptions (and data) programmed in.
- Assumptions might be influenced by researcher bias or the sponsors' agenda.

  For example, a prediction of human fatalities from a nuclear reactor meltdown might rest on assumptions about the availability of safe shelter, evacuation routes, time of day, season, wind direction, and the structural integrity of the containment unit.
- But these assumptions could be manipulated to overstate or understate the risk.
- For computer-modeled estimates of accident risk (oil spill, plane crash) or of the costs and benefits of a proposed project or policy (international space station, health care reform), consumers rarely know the assumptions behind the numbers.

Misleading Terminology

- The terms used to interpret statistics sometimes hide their real meaning.
- For instance, the widely publicized figure that people treated for cancer have a "50 percent survival rate" is misleading in two ways;

(1)*Survival* to laypersons means "staying alive," but to medical experts, staying alive for only five years after diagnosis qualifies as survival;

(2)The "50 percent" survival figure covers *all* cancers, including certain skin or thyroid cancers that have extremely high *cure rates,* as well as other cancers (such as lung or ovarian) that are rarely curable and have extremely low *survival rates*.

Misleading Terminology

- Th Even the most valid and reliable statistics require that we interpret the reality behind the numbers.
- For instance, the overall cancer rate today is “higher” than it was in 1910.
- What this may mean is that people are living longer and thus are more likely to die of cancer and that cancer today rarely is misdiagnosed—or mislabeled because of stigma.
- The finding that rates for certain cancers “double” after prolonged exposure to electromagnetic waves may really mean that cancer risk actually increases from 1 in 10,000 to 2 in 10,000.

Misleading Terminology

- The numbers may be “technically accurate” and may seem highly persuasive in the interpretations they suggest.
- But the actual “truth” behind these numbers is far more elusive.
- Any interpretation of statistical data carries the possibility that other, more accurate interpretations have been overlooked or deliberately excluded.

Acknowledge The Limits Of Research

- Legitimate researchers live with uncertainty.
- They expect to be wrong far more often than right.
- Following is a brief list of things that go wrong with research and interpretation.

Obstacles To Validity And Reliability

- *Validity* and *reliability* determine the dependability of any research. *Valid research* produces correct findings.
- A survey, for example, is valid when

(1) it measures what you want it to measure,

(2) it measures accurately and precisely, and

(3) its findings can be generalized to the target population.

Acknowledge The Limits Of Research

- Valid survey questions enable each respondent to interpret each question exactly as the researcher intended; valid questions also ask for information respondents are qualified to provide.
- Survey validity depends largely on trustworthy responses.
- Even clear, precise and neutral questions can produce mistaken, inaccurate, or dishonest answers.
- People often see themselves as more informed, responsible, or competent than they really are.
- Respondents are likely to suppress information that reflects poorly on their behavior, attitudes, or will power when answering such leading questions as “How often do you take needless sick days?” “Would you lie to get ahead?” “How much time do you spend on Facebook?” They might exaggerate or invent facts or opinions that reveal a more admirable picture when answering the following types of questions: “How much do you give to charity?” “How many books do you read?” “How often do you hug your children?”

Acknowledge The Limits Of Research

- Even when respondents don't know, don't remember, or have no opinion, they often tend to guess in ways designed to win the researcher's approval.
- *Reliable research* produces findings that can be replicated.
- A survey is reliable when its results are consistent; for instance, when a respondent gives identical answers to the same survey given twice or to different versions of the same questions.
- Reliable survey questions can be interpreted identically by all respondents.
- Much of your communication will be based on the findings of other researchers, so you will need to assess the validity and reliability of their research as well as your own.

Acknowledge The Limits Of Research

Deceptive Reporting

- One problem in reviewing scientific findings is “getting the story straight.”
- Intentionally or not, the public often is given a distorted picture.
- For instance, although twice as many people in the United States are killed by medications as by auto accidents—and countless others harmed—doctors rarely report adverse drug reactions.

Skimming Your Sources and Taking Notes

- To record the information that will eventually go into your document, you need to skim your potential sources and take notes.
- Don’t try to read every potential source.
- A careful reading of a work that looks promising might prove disappointing.
- You might also get halfway through a book and realize that you must start writing immediately in order to submit your document on time.

Skimming Books and Articles

In a book, skim

- **The preface and introduction:** to understand the writer's approach and methods
- **The acknowledgments section:** to learn about help the author received from other experts in the field or about the author's use of primary research or other resources
- **The table of contents:** to understand the book's scope and organization
- **The notes at the ends of chapters or at the end of the book:** to understand the nature and extent of the author's research
- **The index:** to determine the extent of the coverage of the information you need
- **A few paragraphs from different portions of the text:** to gauge the quality and relevance of the information

Skimming Books and Articles

In an article, skim

- **The abstract:** to get an overview of the article's content
- **The introduction:** to understand the article's purpose, main ideas, and organization
- **The notes and references:** to understand the nature and extent of the author's research
- **The headings and several of the paragraphs:** to understand the article's organization and the quality and relevance of the information

Skimming Books and Articles

- Skimming will not always tell you whether a book or article is going to be useful, but it can tell you if a work is *not* going to be useful—because it doesn't cover your subject, for example, or because it is too superficial or too advanced.
- Eliminating the sources you don't need will give you more time to spend on the ones you do.
- **Note taking** is often the first step in writing a document.
- The best way to take notes is electronically.
- If you can download files from the Internet, download bibliographic references from a CD-ROM database, and take notes on a laptop, you will save a lot of time and prevent many errors.
- If you do not have access to these electronic tools, get a pack of note cards.

Skimming Books and Articles

- Most note taking involves three kinds of activities: paraphrasing, quoting, and summarizing.
- Knowing how to paraphrase, quote, and summarize is important for two reasons:
  - To a large extent, your note taking will determine the quality of your finished product. You want to record information accurately and clearly. Mistakes made at this point can be hard to catch later, and they can ruin your document.
  - You want to use your sources responsibly. You don't want to plagiarize unintentionally.

Recording Bibliographic Information

Record the bibliographic information for each source from which you take notes.

Information to record for a book

- author
- title
- publisher
- place of publication
- year of publication
- call number or URL

Recording Bibliographic Information

Information to record for an article

- author
- title of article
- title of periodical
- volume
- number
- date of publication
- pages on which article appears
- call number or URL of periodical

For electronic sources, record any additional relevant information such as identifying numbers, database name, and retrieval data.

Paraphrasing

- A paraphrase is a restatement, in your own words, of someone else's words.
- If you simply copy someone else's words—even a mere two or three in a row— you must use quotation marks.
- In taking notes, what kind of material should you paraphrase?
- Any information that you think might be useful: background data, descriptions of mechanisms or processes, test results, and so forth.
- Following shows a paraphrased passage based on the following discussion.
- The author is explaining the concept of performance-centered design.

Paraphrasing

Original Passage

- In performance-centered design, the emphasis is on providing support for the structure of the work as well as the information needed to accomplish it.
- One of the best examples is TurboTax®, which meets all the three main criteria of effective performance-centered design:
- *People can do their work with no training on how to use the system.* People trying to do their income taxes have no interest in taking any kind of training. They want to get their taxes filled out correctly and quickly, getting all the deductions they are entitled to. These packages, over the years, have moved the interface from a forms-based one, where the user had to know what forms were needed, to an interview-based one that fills out the forms automatically as you answer questions. The design of the interface assumes no particular computer expertise.

Paraphrasing

Original Passage

- *The system provides the right information at the right time to accomplish the work.* At each step in the process, the system asks only those questions that are relevant based on previous answers. The taxpayer is free to ask for more detail or may proceed through a dialog that asks more-detailed questions if the taxpayer doesn't know the answer to the higher-level question. If a taxpayer is married filing jointly, the system presents only those questions for that filing status.
- *Both tasks and systems change as the user understands the system.* When I first used TurboTax 6 years ago I found myself going to the forms themselves. Doing my taxes generally took about 2 days. Each year I found my need to go to the forms to be less and less. Last year, it took me about 2 hours to do my taxes, and I looked at the forms only when I printed out the final copy.

Paraphrasing

Lovgren, "Achieving Performance-Centered Design"
www.reisman-consulting.com/pages/a-Perform.html

example of performance-centered design:
TurboTax® meets three main criteria:

- People can do their work with no training on how to use the system.
- The system provides the right information at the right time to accomplish the work.
- Both tasks and systems change as the user understands the system.

- This paraphrase is inappropriate because the three bulleted point are taken word for word from the original.
- The fact that the student omitted the explanations from the original is irrelevant.
- These are direct quotes, not paraphrases.

Paraphrasing

Lovgren, "Achieving Performance-Centered Design"
www.reisman-consulting.com/pages/a-Perform.html

example of performance-centered design:
TurboTax® meets three main criteria:

- You don't have to learn how to use the system.
- The system knows how to respond at the appropriate time to what the user is doing.
- As the user gets smarter about using the system, the system gets smarter, making it faster to complete the task.

- This paraphrase is appropriate because the words are different from those used in the original.
- When you turn your notes into a document, you are likely to reword your paraphrases.
- As you revise your document, check a copy of the original source document to be sure you haven't unintentionally reverted to the wording from the original source.

Paraphrasing Accurately

- **Study the original until you understand it thoroughly.**
- **Rewrite the relevant portions of the original.**

  Use complete sentences, fragments, or lists, but don't compress the material so much that you'll have trouble understanding it later.
- **Title the information so that you'll be able to identify its subject at a glance.**

  The title should include the general subject and the author's attitude or approach to it, such as "Criticism of open-sea pollution-control devices."
- **Include the author's last name, a short title of the article or book, and the page number (if any) of the original.**

  You will need this information later in citing your source.

Quoting

- Sometimes you will want to quote a source, either to preserve the author's particularly well-expressed or emphatic phrasing or to lend authority to your discussion.
- Avoid quoting passages of more than two or three sentences, or your document will look like a mere compilation.
- Your job is to integrate an author's words and ideas into your own thinking, not merely to introduce a series of quotations.
- Although you probably won't be quoting long passages in your document, recording a complete quotation in your notes will help you recall its meaning and context more accurately when you are ready to integrate it into your own work.

Quoting

- The simplest form of quotation is an author's exact statement:
- As Jones states, "Solar energy won't make much of a difference for at least a decade."
- To add an explanatory word or phrase to a quotation, use brackets:
- As Nelson states, "It [the oil glut] will disappear before we understand it."
- Use ellipses (three spaced dots) to show that you are omitting part of an author's statement:

ORIGINAL STATEMENT "The generator, which we purchased in May, has turned out to be one of our wisest investments."

ELLIPTICAL QUOTATION "The generator . . . has turned out to be one of our wisest investments."

Quoting

- According to the documentation style recommended by the Modern Language Association (MLA), if the author's original statement has ellipses, you should add brackets around the ellipses that you introduce:
- **ORIGINAL STATEMENT** "I think reuse adoption offers . . . the promise to improve business in a number of ways."
- **ELLIPTICAL QUOTATION** "I think reuse adoption offers . . . the promise to improve business [. . .] ."

Summarizing

- Summarizing is the process of rewriting a passage in your own words to make it shorter while still retaining its essential message.
- Writers summarize to help them learn a body of information or to create a draft of one or more of the summaries that will go into the document.
- Most long technical documents contain several kinds of summaries:
  - a letter of transmittal that provides an overview of the document
  - an abstract, a brief technical summary
  - an executive summary, a brief nontechnical summary directed to the manager
  - a conclusion that draws together a complicated discussion
- The guidelines and examples in this section explain how to summarize the printed information you uncover in your research.

Summarizing

- The following advice focuses on extracting the essence of a passage by summarizing it.
- **Read the passage carefully several times.**
- **Underline key ideas.**

  Look for them in the titles, headings, topic sentences, transitional paragraphs, and concluding paragraphs.
- **Combine key ideas.**

  Study what you have underlined. Paraphrase the underlined ideas. Don't worry about your grammar, punctuation, or style at this point.
- **Check your draft against the original for accuracy and emphasis.**

  Check that you have recorded statistics and names correctly and that your version of a complicated concept faithfully represents the original. Check that you got the proportions right; if the original devotes 20 percent of its space to a particular point, your draft should not devote 5 percent or 50 percent to that point.

Summarizing

- **Record the bibliographic information carefully.**

  Even though a summary might contain all your own words, you still must cite your source, because the main ideas are someone else's. If you don't have the bibliographic information in an electronic form, put it on a note card.

Documenting Your Sources

- Documentation identifies the sources of the ideas and the quotations in your document.
- Documentation consists of the citations in the text throughout your document and the reference list (or list of works cited) at the end of your document.
- Documentation serves three basic functions:
- **It helps you acknowledge your debt to your sources.**

  Complete and accurate documentation is a professional obligation, a matter of ethics. Failure to document a source, whether intentional or unintentional, is plagiarism. At most colleges and universities, plagiarism can mean automatic failure of the course and, in some instances, suspension or expulsion. In many companies, it is grounds for immediate dismissal.

Documenting Your Sources

- **It helps you establish credibility.**

  Effective documentation helps you place your document within the general context of continuing research and helps you define it as a responsible contribution to knowledge in the field. Knowing how to use existing research is one mark of a professional.

- It helps your readers find your source in case they want to read more about a particular subject.

- Three kinds of material should always be documented:

  - **Any quotation from a written source or an interview, even if it is only a few words.**

  - **A paraphrased idea, concept, or opinion gathered from your reading.** There is one exception. An idea or concept so well known that it has become general knowledge, such as Einstein's theory of relativity, needs no citation. If you are unsure about whether an item is general knowledge, document it, just to be safe.

Documenting Your Sources

- **Any graphic from a written or an electronic source**

  Cite the source for a graphic next to the graphic or in the reference list. For an online source, be sure to include a retrieval statement, URL, or DOI in the bibliographic entry. If you are publishing your work, you must also obtain permission to use any graphic protected by copyright.

APA Style

APA (American Psychological Association) style consists of two elements:

- citations in the text and a list of references at the end of the document.

APA Style for Textual Citations

1. Summarized or Paraphrased Material

- For material or ideas that you have summarized or paraphrased, include the author's name and the publication date in parentheses immediately following the borrowed information.

  This phenomenon was identified more than 50 years ago (Wilkinson, 1948).

- If your sentence already includes the source's name, do not repeat it in the parenthetical notation.

  Wilkinson (1948) identified this phenomenon more than 50 years ago.

APA Style for Textual Citations

2. Quoted Material or Specific Fact

- If the reference is to a specific fact, idea, or quotation, add the page number(s) from the source to your citation.

  This phenomenon was identified more than 50 years ago (Wilkinson, 1948, p. 36).

  Wilkinson (1948) identified this phenomenon more than 50 years ago (p. 36).

3. Source with Multiple Authors

- For a source written by two authors, cite both names. Use an ampersand (&) in the parenthetical citation itself, but use the word *and* in regular text.

  (Tyshenko & Paterson, 2012)

  Tyshenko and Paterson (2012) argued . . .

APA Style for Textual Citations

- For a source written by three, four, or five authors, include all the names the first time you cite the reference; after that, include only the last name of the first author followed by *et al.*

  First Text Citation

  Cashman, Walls, and Thomas (2013) argued . . .

  Subsequent Citations

  Cashman et al. (2013) found . . .

- For a source written by six or more authors, use only the first author's name followed by *et al.*

  (Marken et al., 2014)

  Marken et al. (2014) reported . . .

APA Style for Textual Citations

4. Source Authored by an Organization

- If the author is an organization rather than a person, use the name of the organization.

  There is currently ongoing discussion of the scope and practice of nursing informatics (American Nurses Association, 2010).

  In a recent publication, the American Nurses Association (2010) discusses the scope and practice of nursing informatics.

- If the organization name is commonly abbreviated, you may include the abbreviation in the first citation and use it in any subsequent citations.

  First Text Citation

  (International Business Machines [IBM], 2011)

  Subsequent Citations

  (IBM, 2011)

APA Style for Textual Citations

5. Source with an Unknown Author

- If the source does not identify an author, use a shortened version of the title in your parenthetical citation.

  Hawking made the discovery that under precise conditions, thermal radiation could exit black holes ("World Scientists," 2009).

- If the author is identified as anonymous—a rare occurrence—treat *Anonymous* as a real name.

  (Anonymous, 2011)

6. Multiple Authors with the Same Last Name

- Use first initials if two or more sources have authors with the same last name.

  B. Porter (2012) created a more stable platform for database transfers, while A. L.

  Porter (2012) focused primarily on latitudinal peer-to-peer outcome interference.

APA Style for Textual Citations

7. Multiple Sources in One Citation

- When you refer to two or more sources in one citation, present the sources in alphabetical order, separated by a semicolon.

  This phenomenon has been well documented (Houlding, 2011; Jessen, 2010).

8. Personal Communication

- When you cite personal interviews, phone calls, letters, memos, and emails, include the words *personal communication* and the date of the communication.

  D. E. Walls (personal communication, April 3, 2011) provided the prior history of his . . .

APA Style for Textual Citations

9. Electronic Document

- Cite the author and date for an electronic source as you would for other kinds of documents.
- If the author is unknown, give a shortened version of the title in your parenthetical citation.
- If the date is unknown, use *n.d.* (for *no date*).

  Interpersonal relationships are complicated by differing goals (Hoffman, n.d.).
- If the document is posted as a PDF file, include the page number in the citation.
- If a page number is not available but the source contains paragraph numbers, give the paragraph number.

  (Tong, 2010, para. 4)
- If no paragraph or page number is available and the source has headings, cite the appropriate heading and paragraph.

  The CDC (2007) warns that babies born to women who smoke during pregnancy are 30% more likely to be born prematurely (The Reality section, para. 3).

APA Reference List

A reference list provides the information your readers will need in order to find each source you have cited in the text. It should not include sources you read but did not use.

Following are some guidelines for an APA-style reference list.

- **Arranging entries.**

  Arrange the entries alphabetically by author's last name. If two or more works are by the same author, arrange them by date, earliest to latest. If two or more works are by the same author in the same year, list them alphabetically by title and include a lowercase letter after the date: 2010a, 2010b, and so on. Alphabetize works by an organization by the first significant word in the name of the organization.

- **Book titles.**

  Italicize titles of books. Capitalize only the first word of the book's title, the first word of the subtitle, and any proper nouns.

APA Reference List

- **Publication information.**

  For books, give the publisher's name in as brief a form as is intelligible; retain the words *Books* and *Press*. Include the name of both the city and the state (abbreviated) for publishers located in U.S. cities or the city and the country (not abbreviated) for publishers in non-U.S. cities; for publishers located in Canadian cities, also include the province.

- **Periodical titles.**

  Italicize titles of periodicals and capitalize all major words.

- **Article titles.**

  Do not italicize titles of articles or place them in quotation marks. Capitalize only the first word of the article's title and subtitle and any proper nouns.

APA Reference List

- **Electronic sources.**

  Include as much information as you can about electronic sources, such as author, date of publication, identifying numbers, and retrieval information. Include the digital object identifier (DOI) when one exists. Remember that electronic information changes frequently. If the content of an electronic source is likely to change, be sure to record the date you retrieved the information.

- **Indenting.**

  Use a hanging indent, with the first line of each entry flush with the left margin and all subsequent lines indented one-half inch:

  Sokolova, G. N. (2010). Economic stratification in Belarus and Russia: An experiment in comparative analysis. *Sociological Research, 49*(3), 25–26.

  Your instructor may prefer a paragraph indent, in which the first line of each entry is indented one-half inch:

  Sokolova, G. N. (2010). Economic stratification in Belarus and Russia: An experiment in comparative analysis. *Sociological Research, 49*(3), 25–26.

APA Reference List

- **Spacing.**

  Double-space the entire reference list. Do not add extra space between entries.

- **Page numbers.**
  - When citing a range of page numbers for an article, always give the complete numbers (for example, 121–124, *not* 121–24 or 121–4).
  - If an article continues on subsequent pages after being interrupted by other articles or advertisements, use a comma to separate the page numbers.
  - Use the abbreviation *p.* or *pp.* only with articles in newspapers, chapters in edited books, and articles from proceedings published as a book.

- **Dates.**
  - Follow the format year, month, day, with a comma after only the year: (2011, October 31).

Sample APA Reference List

REFERENCES

Nonperiodical web document with no DOI

Centers for Disease Control and Prevention. (2010, June 1). *Teens behind the wheel: Graduated driver licensing.* Retrieved from http://www.cdc.gov/MotorVehicleSafety/Teen_Drivers/GDL/Teens_Behind_Wheel.html

Journal article, paginated by volume

Cumsille, P., Darling, N., & Martinez, M. L. (2010). Shading the truth: The pattern of adolescents' decisions to avoid issues, disclose, or lie to parents. *Journal of Adolescence, 33*, 285–296.

Online article with a DOI

Iemolo, F., Cavallaro, T., & Rizzuto, N. (2010). Atypical Alzheimer's disease: A case report. *Neurological Sciences, 31*, 643–646. doi:10.1007/s10072-010-0334-1

Chapter in an edited book

Jyonouchi, H. (2010). Possible impact of innate immunity in autism. In A. Chauhan, V. Chauhan, & W. T. Brown (Eds.), *Autism: Oxidative stress, inflammation, and immune abnormalities* (pp. 245–276). Boca Raton, FL: CRC Press.

Book in an edition other than the first

Quinn, G. R. (2010). *Behavioral science* (2nd ed.). New York, NY: McGraw-Hill Medical.

Online article, paginated by issue, with no DOI

Srivastava, R. K., & More, A. T. (2010). Some aesthetic considerations for over-the-counter (OTC) pharmaceutical products. *International Journal of Biotechnology, 11*(3–4), 267–283. Retrieved from http://www.inderscience.com

IEEE Style

- IEEE style consists of two elements: citations in the text and a reference list at the end of the document.
- **IEEE Textual Citations**
- In the IEEE (originally, Institute of Electrical and Electronics Engineers) documentation system, citations in the text are bracketed numbers, keyed to a numbered list of references that appears at the end of the document.
- Entries in the list are arranged in the order in which they are cited in the text and are numbered sequentially.
- Once a reference has been listed, the same number is used in all subsequent citations of that source.

IEEE Style

- To cite references in the text, place the reference number or numbers immediately after the author's name, in square brackets, before any punctuation.
- Use *et al.* if there are three or more author names.

  A recent study by Goldfinkel [5] shows that this is not an efficient solution. Murphy [8]–[10] comes to a different conclusion.

- You can also use the bracketed citation number or numbers as a noun.

  In addition, [5] shows that this is not an efficient solution; however, [8]–[10] come to a different conclusion.

The IEEE Reference List

The following guidelines will help you prepare IEEE-style references.

- **Arranging entries.**

  Arrange the entries in the order in which they first are cited in the text, and then number them sequentially. Place the numbers in square brackets and set them flush left in a column of their own, separate from the body of the references. Place the entries in their own column, with no indents for turnovers.

- **Authors.**

  List the author's first initial (or first and middle initials, separated by spaces), followed by the last name. In the case of multiple authors, use all names; use *et al.* after the first author's name only if the other names are not given. If an entry has an editor or translator in place of an author, add the abbreviation *Ed.* (or *Eds.* for *editors*) or *Trans.* following the name.

The IEEE Reference List

- **Book titles.**

  Italicize titles of books. In English, capitalize the first word and all major words. In foreign languages, capitalize the first word of the title and subtitle, as well as any words that would be capitalized in that language.

- **Publication information.**

  For books, give the city of publication, the country (if other than the United States), the publisher's name (abbreviated), and the year of publication. When two or more cities are given on a book's copyright page, include only the first. If the city is not well known, add the abbreviation for the name of the state or province (in Canada). If the publisher's name indicates the state, no state abbreviation is necessary.

- **Periodical titles.**

  Italicize and abbreviate titles of periodicals. Capitalize all major words in the title.

The IEEE Reference List

- **Article titles.**

  Place titles of print articles in quotation marks; do not use quotation marks for titles of articles found in electronic sources. Capitalize the first word of the title and subtitle. Do not capitalize the remaining words unless they are proper nouns.

- **Electronic sources.**

  Follow the special style for electronic sources in which, most notably, the sequence of information is different from that for print material (the date follows the author, and the year comes before the month). Do not place article titles in quotation marks, and use periods rather than commas to separate sections. In addition to the basic information, give the medium and provide a way to locate the source by including, for example, a URL.

The IEEE Reference List

- **Spacing.**

  Single-space the reference list, and do not add extra space between entries.

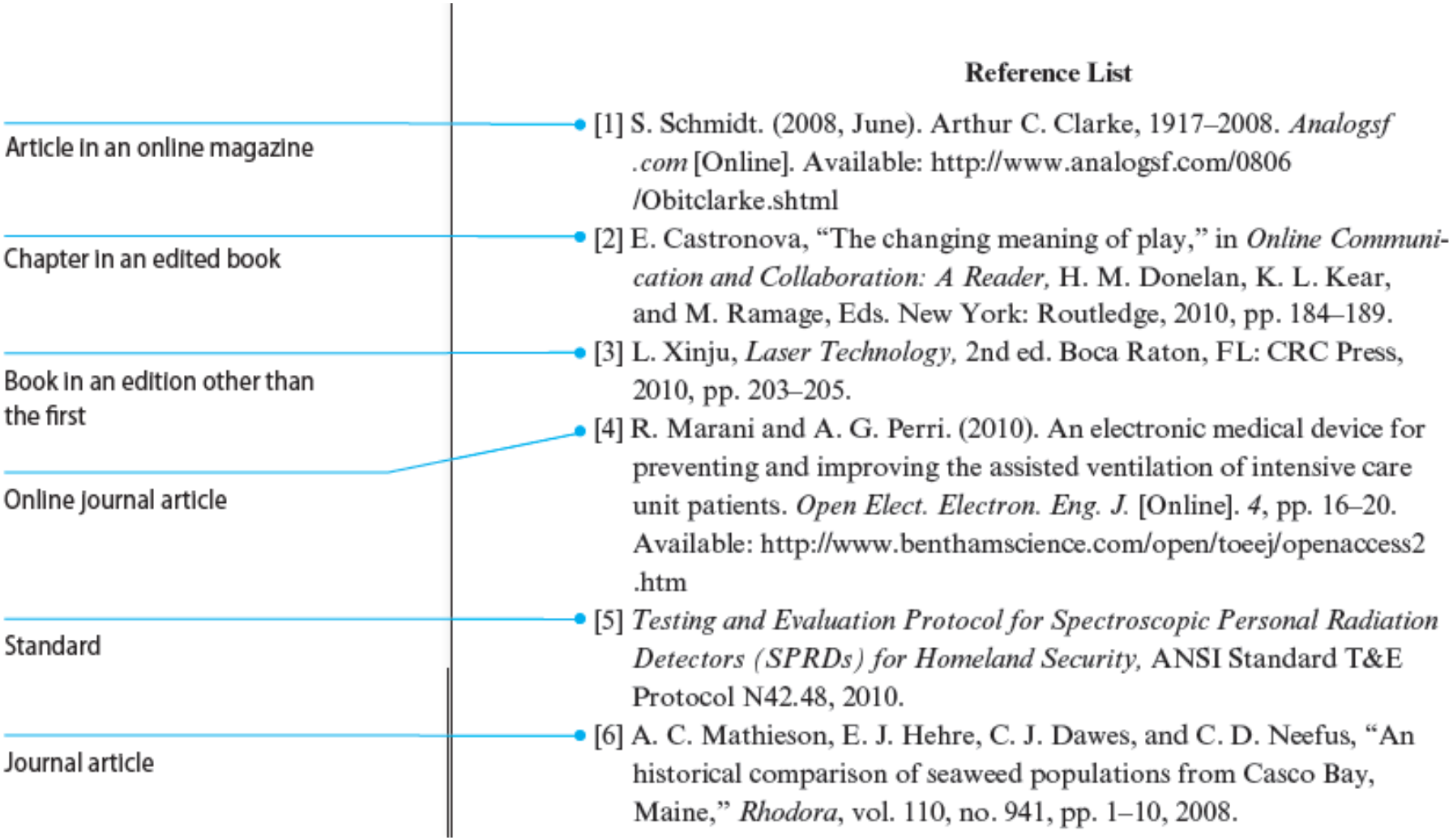
- **Page numbers.**

  To give a page or a range of pages for a specific article in a book or periodical, use the abbreviation *p*. or *pp.* Write numbers in full (152–159, *not* 152–59 or 152–9).

- **Dates.**

  For print sources, follow the format month (abbreviated), day, year (for example, Apr. 3, 2010 or Feb. 22–23, 2011). Do not abbreviate May, June, or July. For electronic sources, follow the format year, month (abbreviated), day (for example, 2011, Oct. 14).

Sample IEEE Reference List



Reference List

[1] S. Schmidt. (2008, June). Arthur C. Clarke, 1917–2008. *Analogsf .com* [Online]. Available: http://www.analogsf.com/0806 /Obitclarke.shtml

[2] E. Castronova, "The changing meaning of play," in *Online Communication and Collaboration: A Reader,* H. M. Donelan, K. L. Kear, and M. Ramage, Eds. New York: Routledge, 2010, pp. 184–189.

[3] L. Xinju, *Laser Technology,* 2nd ed. Boca Raton, FL: CRC Press, 2010, pp. 203–205.

[4] R. Marani and A. G. Perri. (2010). An electronic medical device for preventing and improving the assisted ventilation of intensive care unit patients. *Open Elect. Electron. Eng. J.* [Online]. *4*, pp. 16–20. Available: http://www.benthamscience.com/open/toeej/openaccess2 .htm

[5] *Testing and Evaluation Protocol for Spectroscopic Personal Radiation Detectors (SPRDs) for Homeland Security,* ANSI Standard T&E Protocol N42.48, 2010.

[6] A. C. Mathieson, E. J. Hehre, C. J. Dawes, and C. D. Neefus, "An historical comparison of seaweed populations from Casco Bay, Maine," *Rhodora*, vol. 110, no. 941, pp. 1–10, 2008.

MLA Style

- MLA (Modern Language Association) style consists of two elements: citations in the text and a list of works cited at the end of the document.

MLA Textual Citations

- In MLA style, the textual citation typically includes the name of the source's author and the number of the page being referred to.
- Textual citations vary depending on the type of source cited and the context of the citation.

The MLA List of Works Cited

- A list of works cited provides the information your readers will need to find each source you have cited in the text.
- It should not include sources you consulted for background reading.
- Following are some guidelines for an MLA style list of works cited.
- **Arranging entries.**

  Arrange the entries alphabetically by the author's last name. If two or more works are by the same author, arrange them alphabetically by title. Alphabetize works by an organization by the first significant word in the name of the organization.

- **Book titles.**

  Italicize titles of books and capitalize all major words. Note that in MLA style, prepositions are not capitalized.

The MLA List of Works Cited

- **Publication information.**

  Shorten the publisher's name where possible. For cities outside the United States, include the name of the province (in Canada) or country, abbreviated, unless the city is well known (such as Tokyo or London).

- **Periodical titles.**

  Italicize titles of periodicals and capitalize all major words. Omit any initial article.

- **Article titles.**

  Place titles of articles and other short works in quotation marks and capitalize all major words.

The MLA List of Works Cited

- **Electronic sources.**

  Include as much information as you can about electronic sources, such as author, date of publication, identifying numbers, and retrieval information. Also, be sure to record the date you retrieved the information, because electronic information changes frequently. If no author is known, start with the title of the website. Italicize titles of entire websites; treat titles of works within websites, such as articles and video clips, as you would for print sources. In citations for online sources, include the sponsor or publisher, as well as the date of publication or update. If this information can't be located, use *N.p.* (for *No publisher*) or *n.d.* (for *no date*). Insert the word *Web* before the date of retrieval. Include the URL only if you suspect that your reader will be unable to locate the source with a search engine. Place the URL in angle brackets at the end of the entry, after the date of retrieval.

- **Indenting.**

  Use a hanging indent, with the first line of each entry flush with the left margin and all subsequent lines indented one-half inch.

The MLA List of Works Cited

- **Spacing.**

  Double-space the entire works-cited list. Do not add extra space between entries.

- **Page numbers.**

  Do not use the abbreviation *p.* or *pp.* when giving page numbers. For a range of pages, give only the last two digits of the second number if the previous digits are identical (for example, 243–47, *not* 243–247 or 243–7). Use a plus sign (+) to indicate that an article continues on subsequent pages, interrupted by other articles or advertisements.

- **Dates.**

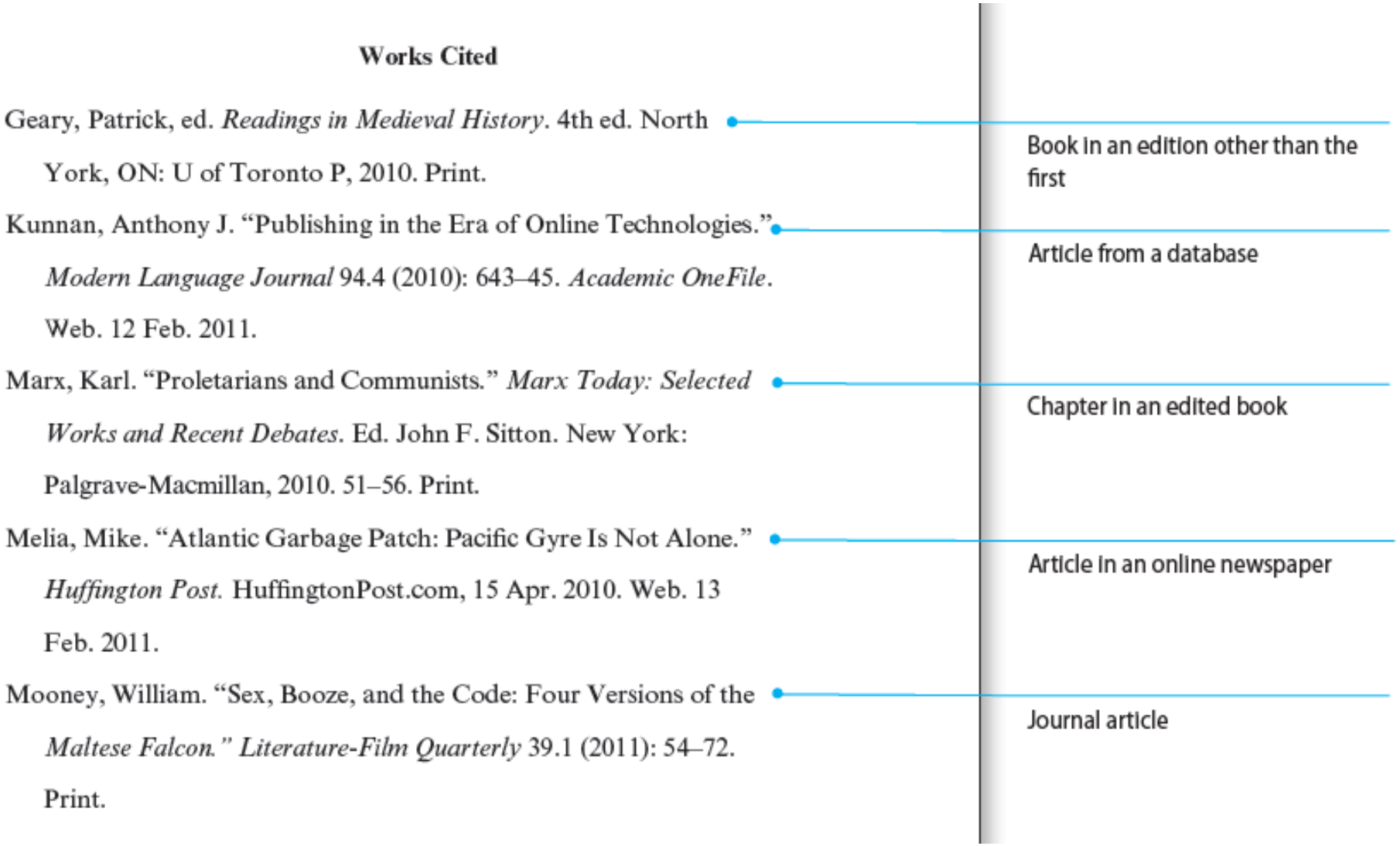
  Follow the format day month year, with no commas (for example, 20 Feb. 2009). Spell out *May*, *June*, and *July*; abbreviate all other months (except *Sept.*) using the first three letters followed by a period.

The MLA List of Works Cited

- **Medium.**

  With a few exceptions explained below, list the medium of publication, followed by a period, as the last part of any entry. Examples include *Print*, *Web*, *Radio*, *Television*, *CD*, *CD-ROM*, *Audiocassette*, *Film*, *Videocassette*, *DVD*, *Performance*, *Address*, *MS* (for *manuscript*), *TS* (for *typescript*), *E-mail*, *PDF file*, *Microsoft Word file*, *JPEG file*, *MP3 file*.

Sample MLA List of Works Cited



Works Cited

Geary, Patrick, ed. *Readings in Medieval History*. 4th ed. North York, ON: U of Toronto P, 2010. Print.

Book in an edition other than the first

Kunnan, Anthony J. "Publishing in the Era of Online Technologies." *Modern Language Journal* 94.4 (2010): 643–45. *Academic OneFile*. Web. 12 Feb. 2011.

Article from a database

Marx, Karl. "Proletarians and Communists." *Marx Today: Selected Works and Recent Debates*. Ed. John F. Sitton. New York: Palgrave-Macmillan, 2010. 51–56. Print.

Chapter in an edited book

Melia, Mike. "Atlantic Garbage Patch: Pacific Gyre Is Not Alone." *Huffington Post*. HuffingtonPost.com, 15 Apr. 2010. Web. 13 Feb. 2011.

Article in an online newspaper

Mooney, William. "Sex, Booze, and the Code: Four Versions of the *Maltese Falcon*." *Literature-Film Quarterly* 39.1 (2011): 54–72. Print.

Journal article

Ethical Considerations in Technical Writing

The Core of Ethical Technical Writing

- Ethical technical writing is about doing the right thing. It's about being **honest**, **transparent**, and **responsible** in all your communications. As engineers, you'll be writing reports, manuals, and proposals that people will rely on for safety, functionality, and accuracy. So, the information you provide must be truthful and complete.
- **Key Principles:**
  - **Honesty:** Don't exaggerate claims or misrepresent data.
  - **Accuracy:** Ensure all facts, figures, and technical details are correct.
  - **Clarity:** Write in a way that avoids misinterpretation, especially in safety instructions.
  - **Completeness:** Provide all necessary information, not just what makes your product look good.

Ethical Considerations in Technical Writing

- **Intellectual Property (IP)** 💡
- Intellectual property refers to creations of the mind. Just like physical property, it can be owned. As a technical writer, you'll be dealing with IP all the time. **Copyright** is one of the main forms of IP.
- **Other Types of IP:**
  - **Patents:** Protect inventions. An engineer might patent a new type of circuit or a machine.
  - **Trademarks:** Protect brand names, logos, and slogans. Think of the name "Google" or the Apple logo.
  - **Trade Secrets:** Protect confidential business information. This could be a formula, a manufacturing process, or a client list.
  - Understanding these is crucial. You can't just copy a competitor's design and put it in your manual, just as you can't use another company's logo in your presentation without permission.

Ethical Considerations in Technical Writing

- **Copyright**

  Copyright gives the creator of an original work exclusive rights to it for a limited time. This includes literary, dramatic, musical, and artistic works.

- **What's protected by copyright?**

  Original Expression: The specific way you've written something.

  Code: The actual lines of code you've written.

  Illustrations and Diagrams: The drawings you create for a manual.

  Reports and Documents: The full text of a report.

- **What's NOT protected?**

  Ideas and Concepts: You can't copyright the idea of a self-driving car, only the specific code and design you create for one.

  Facts and Data: Facts like "water boils at 100°C" or scientific data can't be copyrighted.

Ethical Considerations in Technical Writing

- **Copyright Violations and Plagiarism**
- **Plagiarism**.

  It's presenting someone else's work or ideas as your own. In academic settings, it's a serious offense. In a professional context, it can lead to lawsuits and ruin your career.

- **How to avoid plagiarism:**

  Proper Citation: Always credit your sources. Whether it's an image, a fact from a research paper, or a piece of text, cite it correctly.

  Paraphrasing: Rewrite the information in your own words and style. But even then, you must still cite the source.

  Quoting: Use quotation marks for direct quotes and cite the source immediately.

  Permission: For copyrighted material, especially images and long text blocks, you may need to get explicit permission from the owner.

- Remember, the goal is not just to avoid getting caught. The goal is to be a professional who respects the work of others. As engineers and future technical writers, your reputation for integrity will be one of your most valuable assets.

Plagiarism and academic integrity

- **What is Academic Integrity?**
- Academic integrity is a commitment to five fundamental values: **honesty, trust, fairness, respect, and responsibility**. It's the cornerstone of all academic work. When you uphold academic integrity, you are committing to producing original work and accurately representing the contributions of others.
- In technical writing and engineering, academic integrity applies to everything from lab reports and research papers to design documents and technical proposals. It means:
- **Doing your own work.**
- **Accurately reporting data, even if it's not the result you hoped for.**
- **Giving credit where credit is due.**

Plagiarism and academic integrity

- **Plagiarism: A Violation of Integrity**
- Plagiarism is the act of presenting someone else's work, ideas, or words as your own without proper acknowledgment. It's a form of intellectual theft and a serious violation of academic and professional ethics.
- You might be thinking, "I know what plagiarism is, I'd never do it." But it's not always as simple as copying and pasting. Plagiarism can take many forms:
  - **Direct Plagiarism:** Copying text word-for-word without quotation marks and a citation.
  - **Paraphrasing Plagiarism:** Rewriting someone's ideas in your own words without citing the original source.
  - **Self-Plagiarism:** Reusing your own previously submitted work without permission from your instructor. Yes, this is a real thing.
  - **Mosaic Plagiarism:** Patching together phrases and sentences from different sources without proper citation.
- Even if it's accidental, a lack of citation is still plagiarism. The responsibility falls on you to know the rules and apply them.

Plagiarism and academic integrity

- **How to Avoid Plagiarism**

Avoiding plagiarism is straightforward if you follow a few key practices:

1. Always Cite Your Sources

This is the most important rule. Any time you use a piece of information that is not common knowledge, you must cite the source. This includes:

- Facts, statistics, and data.
- Ideas and opinions.
- Direct quotes.
- Images, charts, and diagrams.

Plagiarism and academic integrity

2. Master Paraphrasing

- Paraphrasing is rewriting a source's idea in your own words. It's a critical skill in technical writing. When you paraphrase, you must change both the sentence structure and the vocabulary. After you've rewritten it, you still need to cite the original source.
- **Example:**

  Original Source: "The rapid advancement of artificial intelligence has raised concerns about data privacy and job displacement."

  Plagiarized Paraphrase: "The swift development of AI has caused worries about people's data privacy and the loss of jobs." (Too similar, no citation.)

  Correct Paraphrase: "Concerns about data privacy and employment are growing as artificial intelligence technology evolves at a rapid pace (Source, Year)." (Rewritten and cited.)

Plagiarism and academic integrity

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3. Use Quotation Marks

If you use a sentence or a few words exactly as they appear in the original text, you must enclose them in quotation marks and provide a citation. Use direct quotes sparingly; paraphrasing shows you truly understand the material.

4. Manage Your Research

Keep detailed notes of where every piece of information comes from. Use a consistent citation style, like IEEE or APA, from the very beginning of your research. This will save you from scrambling to find sources at the last minute.

Plagiarism and academic integrity

Why Does This Matter for Engineers?

In engineering, plagiarism and a lack of integrity can have severe consequences:

- **Safety Risks:** Plagiarizing data or design elements can lead to failures in a product or system, potentially endangering lives.
- **Loss of Trust:** If you are caught misrepresenting your work, you will lose the trust of your colleagues, clients, and employer. This can end your career.
- **Legal Action:** Copying patented designs or copyrighted material can lead to costly lawsuits for you and your company.

Ethical Representation of Data and Results

- **The Core Principle:** Your writing must be an honest and accurate reflection of your work.
- **What does this mean?** It means never falsifying, omitting, or misrepresenting data.
  - Present **all** results, including those that are unfavorable or don't support your hypothesis.
  - Provide **context** for your data. What were the test conditions? What were the variables?
- **Example:** Imagine a stress test on a new material. You must report all data points, even the ones showing a lower-than-expected breaking point. Omitting these could lead to a catastrophic failure in a real-world application.

Ethical Representation of Data and Results

- **Misleading Visuals**
- **A picture is worth a thousand lies?** Visuals like charts and graphs can be powerful but are easy to manipulate.
- **Watch for these common tricks:**
  - **Improperly scaled axes:** A graph with a y-axis that doesn't start at zero can exaggerate minor differences.
  - **Cherry-picking data points:** Showing only the data that fits your desired outcome while hiding the rest.
- **Your responsibility:** Create visuals that are clear, honest, and accurately represent the data. Don't let a chart deceive your audience.

Ethical Representation of Data and Results

- **The Impact of Unethical Data Reporting**
- **Project Failure:** A design based on flawed data will likely fail.
- **Loss of Credibility:** Once an engineer is caught misrepresenting data, their professional reputation is ruined.
- **Legal Consequences:** Falsifying technical documents can lead to lawsuits, fines, and in some cases, criminal charges.
- **Safety Risks:** In fields like civil, mechanical, or biomedical engineering, unethical data reporting can lead to products that endanger human lives.

Ethical Representation of Data and Results

- **Confidentiality and Professional Responsibility**
- **What is Confidential Information?** This includes proprietary designs, trade secrets, client data, and any information shared under a Non-Disclosure Agreement (NDA).
- **Your Obligation:** As a professional, you have a duty to protect this information.
  - This is often a **legal requirement** spelled out in your employment contract.
  - It is also a matter of **professional ethics** to protect your client's or employer's intellectual property and privacy.

Ethical Representation of Data and Results

- **Upholding Confidentiality**
- **Think "Need-to-Know":** Share confidential information only with colleagues who absolutely need it to do their job.
- **Secure Your Work:** Lock your computer when you walk away. Don't discuss project details in public spaces like coffee shops.
- **Professional Discretion:** Be mindful of what you post online. Sharing details about your project, even in a casual context, can be a breach of confidentiality.
- **A simple rule:** If you're unsure whether something is confidential, treat it as if it is. When in doubt, ask your supervisor.

Version Control

- **What is Version Control?**

Definition: Version control is a system that records changes to a file or set of files over time so you can recall specific versions later.

- **Why it's essential:** Think of it as an "undo" button for your entire project, but with a full history. It allows you to track who made what changes, when, and why.
- **For engineers, it's crucial for:**
  - **Collaboration:** Multiple people can work on the same project simultaneously without overwriting each other's work.
  - **Tracking:** You can easily revert to an earlier, stable version if a new change breaks the code or design.
  - **Backup:** Your entire project history is stored, protecting you from data loss.

Centralized vs. Distributed Systems

- **Centralized Version Control Systems (CVCS):**
  - **How it works:** A single, central server stores all versions of the project. Developers "check out" files, make changes, and then "check in" their new versions.
  - **Pros:** Simpler to set up.
  - **Cons:** The single point of failure. If the central server is down, no one can save their changes.
  - **Examples:** CVS, SVN.
- **Distributed Version Control Systems (DVCS):**
  - **How it works:** Every developer has a full copy of the entire project history on their local machine. Changes are shared between local repositories.
  - **Pros:** No single point of failure; you can work offline.
  - **Cons:** Can have a steeper learning curve initially.
  - **Examples: Git** (the most popular), Mercurial.

Key Version Control Concepts

- **Repository (Repo):** A database that contains all the files and the complete history of a project.
- **Commit:** A snapshot of your repository at a specific point in time. It's a "save point" in your project history. Every commit has a unique ID and a message describing the changes.
- **Branching:** A parallel version of the repository. It allows developers to work on new features or bug fixes in isolation without affecting the main project.
- **Merging:** The process of combining changes from one branch into another (e.g., bringing a completed feature branch back into the main project).
- **Conflict:** This happens when two different branches change the same line of code or part of a file, and the version control system can't automatically decide which change to keep. You must resolve these manually.

Key Version Control Concepts

- **Introduction to Git**
- **What is Git?** Git is a powerful and widely-used **Distributed Version Control System**. It was created by Linus Torvalds, the creator of Linux.
- **Why Git?**
  - **Speed:** It's incredibly fast because most operations are performed locally.
  - **Flexibility:** It's great for branching and merging, which makes it perfect for collaborative projects.
  - **Community:** Huge community support and extensive documentation.
  - **Industry Standard:** Almost all tech companies use Git for version control.

Key Version Control Concepts

- **Basic Git Workflow**
- **Initialize:** Create a new Git repository (git init).
- **Add:** Tell Git which files you want to track (git add <filename>). This moves the files to the staging area.
- **Commit:** Save the changes to the repository with a descriptive message (git commit -m "Your message here").
- **Branch:** Create a new branch for a new feature (git checkout -b <branch-name>).
- **Push/Pull:**
  - **Pull** (git pull): Download and integrate changes from a remote repository.
  - **Push** (git push): Upload your local commits to a remote repository.

Key Version Control Concepts

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Best Practices for Engineers

- **Commit frequently and with purpose:** Make small, logical commits. This makes it easier to track and debug changes.
- **Write clear commit messages:** A good message explains *what* you did and *why* you did it.
- **Use branches for everything:** Don't work on the main branch. Create a new branch for every new feature or bug fix.
- **Resolve conflicts promptly:** Don't ignore merge conflicts. Address them as soon as they arise to prevent bigger headaches later.
- **Leverage remote repositories:** Use platforms like GitHub or GitLab to collaborate with your team and back up your work.

Key Version Control Concepts

- **Why You Need to Master This**
- **It's a core skill for any modern engineer.** You'll use version control in nearly every professional setting.
- **It makes you a better teammate.** It enables seamless collaboration and shows professionalism.
- **It protects your work.** It's the safety net that ensures your project history is always available, preventing disastrous data loss.

Technical Writing Collaboration

What is Technical Writing Collaboration?

- Technical writing often involves multiple people working together on a single document.
- This could include engineers, subject matter experts, editors, and other writers.
- **Collaboration** is the process of a group of people working towards a common goal.
- Effective collaboration is essential for creating accurate, consistent, and high-quality technical documents.

Types of Collaborative Tools

Collaborative tools can be broadly categorized based on their primary function. We'll explore four main types:

- **Document-Centric Tools:** These tools are built around a shared document, allowing multiple users to edit and comment in real time.
- **Communication Tools:** These are designed for real-time or asynchronous communication, enabling team members to discuss and clarify issues quickly.
- **Project Management Tools:** These help teams track tasks, manage workflows, and monitor progress.
- **Version Control Systems:** These are crucial for managing changes and revisions to documents, especially in a technical environment where code and documentation are closely linked.

Types of Collaborative Tools

1. Document-Centric Tools

These tools are the most direct way to collaborate on a document. They allow for simultaneous editing and are perfect for a single source of truth.

- **Google Docs:** A free and widely used tool. It provides real-time co-authoring, commenting, and a revision history. It's great for simple documents and quick edits.
- **Microsoft Word (with OneDrive/SharePoint):** The classic word processor with added cloud-based collaboration features. It allows for simultaneous editing, tracking changes, and commenting.
- **Confluence:** A powerful tool often used in conjunction with Jira. It’s designed for creating and sharing knowledge bases, meeting notes, and technical documentation within an organization. It's highly effective for complex projects.

Types of Collaborative Tools

Key Features:

- Real-time co-authoring
- Commenting and suggestion features
- Version history/revision tracking

Types of Collaborative Tools

2. Communication Tools

These tools facilitate communication among team members, which is vital for resolving issues, making decisions, and staying on the same page.

- **Slack/Microsoft Teams:** These are chat-based platforms that organize conversations into channels. They're great for quick questions, sharing files, and keeping communication transparent.
- **Zoom/Google Meet:** Video conferencing tools that are essential for virtual meetings, brainstorming sessions, and live discussions.
- **Email:** A more formal and asynchronous communication method. It’s useful for sharing final documents, official announcements, and detailed explanations.

Types of Collaborative Tools

Key Features:

- Instant messaging
- Video and audio calls
- File sharing

Types of Collaborative Tools

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3. Project Management Tools

These tools help a team stay organized and on schedule. They're especially useful for technical writing projects with many moving parts.

- **Trello:** A simple, visual tool that uses a **kanban board** system (boards, lists, and cards) to track tasks. It’s excellent for managing a project's workflow.
- **Jira:** A more robust and powerful tool, particularly popular in software development. It's used for tracking bugs, managing tasks, and creating sprints. Technical writers often use it to track documentation tasks alongside development work.
- **Asana:** A flexible project management tool for tracking tasks and projects. It can be used for simple to complex projects and offers various views, like lists and calendars.

Types of Collaborative Tools

Key Features:

- Task assignment and tracking
- Progress monitoring
- Workflow automation

Types of Collaborative Tools

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4. Version Control Systems (VCS)

These systems are critical for managing changes to documents, especially those that are code-heavy, such as API documentation. They allow for a structured way to track revisions.

- **Git (and platforms like GitHub/GitLab):** While primarily used for code, **Git** is also a powerful tool for technical writers. It allows for creating branches for different versions of a document, merging changes, and tracking every single revision. This is particularly useful for documentation that lives in a code repository.
- **SVN (Subversion):** An older but still used VCS. It's a centralized system where changes are checked out and committed to a central repository.

Types of Collaborative Tools

Key Features:

- Revision history
- Branching and merging
- Rollback to previous versions

Types of Collaborative Tools

Choosing the Right Tools

The best approach is often to use a **combination of tools**. For example, you might use:

- **Confluence** for the main documentation.
- **Slack** for daily communication and quick questions.
- **Jira** to track tasks and progress.
- **Git** for version control if the documentation is part of a software project.

Understanding these tools and their functions will make you a more effective and collaborative technical writer.