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The Research Process in Technical Communication



LEARNING OBJECTIVES FOR THIS CHAPTER

- ▶ Apply critical thinking to your research
- ▶ Understand the difference between primary and secondary research
- ▶ Locate the online and hard-copy secondary sources you need
- ▶ Consult primary sources via inquiries, informational interviews and surveys, observations, and experiments

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ll technical communication requires some degree of research, even if that research merely entails checking a fact or consulting a colleague before writing a memo, letter, or email. This chapter explains how to conduct more complex research for such technical documents as long reports and proposals. As you read, consider how research in technical communication often differs from research conducted in an academic setting.

Research is a vital part of technical communication

THINKING CRITICALLY ABOUT RESEARCH

Most major decisions in the workplace are based on careful research, often with the findings recorded in a written report, in a long memo, on a Web site, or in some combination of documents. The types of research you will perform as a technical communicator depend largely on your workplace assignment.

Not all findings will be of equal value. For instance, if you really want to know how well the latest invention in robotic surgery works, you need to check with sources other than the inventor (from whom you could expect an overly optimistic or insufficiently critical assessment). Likewise, if you only consult books published before 2000 and don't consult any online sources, you are not likely to get a current and balanced view. Further, if you interpret your findings inaccurately—say, by ignoring a study that contradicts your viewpoint or claim—your research will be invalid.

Why critical thinking is essential in research

Whether you work with your own findings or the findings of other researchers, you need to decide if the information is reliable. Then you need to decide what your information means. *Critical thinking* means that you test the quality of your information and the accuracy of your interpretations. Instead of accepting information at face value, you examine, evaluate, verify, analyze, and weigh alternatives during every stage of your research. You use critical thinking to examine your evidence and your reasoning to discover new connections and new possibilities and to test the soundness of your conclusions. The following Strategies provide specific guidelines.



STRATEGIES for Thinking Critically about Research

- **Ask the right questions.** To get the right answers, start by asking the right questions. Instead of researching an overly general topic that will lead to an enormous variety of information, such as “genetically modified foods,” ask a specific, narrowed question, such as “What are the positive and negative effects of genetically modified foods on human health?”



STRATEGIES *continued*

- ▶ **Explore a balance of views.** Consider your research topic from a variety of angles. Don't just consult one expert because experts may disagree. Instead find out what multiple experts say and examine the points on which the experts agree and disagree.
- ▶ **Explore your topic in sufficient depth.** Different sources of information represent different levels of detail and dependability. At the surface layer is information from the popular press (newspapers, commercial Web sites, TV shows). This surface information may be useful and valid, but you should also go further and explore deeper levels, such as trade and business publications and Web sites or specialized literature (journals and Web sites from professional associations and government sources).
- ▶ **Evaluate your sources.** The information you find may be incomplete or misleading. While you can't always verify that a source is trustworthy, you can weed out unreliable sources by looking for common ground among sources, by determining if any of them are driven by an agenda, and by checking the source's credentials.
- ▶ **Interpret your findings objectively.** Examine what you've uncovered from multiple angles. Do your findings support only one viewpoint, or are there several ways to interpret them? If your research yields indefinite findings, don't try to force a definite conclusion. A wrong conclusion is worse than an indefinite one.

PRIMARY VERSUS SECONDARY SOURCES

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* means getting information secondhand by reading what other researchers have compiled in books and articles in print or online. Most information found online 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.

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 on 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 successfully your

How primary and secondary research differ

Why you should combine primary and secondary research

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 product users and interview some of them individually (primary research).

EXPLORING SECONDARY SOURCES

Types of secondary sources

Secondary sources include 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.

Pros and cons of using hard-copy versus online secondary sources

Although online searches are becoming the norm, thorough research may require careful examination of hard-copy sources as well. The advantages and drawbacks of each search medium, listed in Table 2.1, provide good reason for exploring both.

TABLE 2.1
Hard-copy
versus online
sources: benefits
and drawbacks

	Benefits	Drawbacks
<i>Hard-copy sources</i>	• Available on library shelves, where you might also find related material • Easy to determine author, publication date, and page number • Easier to preserve and keep secure	• Time-consuming and inefficient to search • Offer only text and images • Content may not be up to date
<i>Online sources</i>	• More current, efficient, and accessible • Searches can be narrowed or broadened • Can offer material that has no hard-copy equivalent	• Older content that has not been scanned may not be available. • Some Web sites may be unreliable • Researcher might get confused by too many choices

Online Secondary Sources

Locate online secondary sources by using subject directories and search engines

Information in virtually any format—journals, newspapers, and magazines; government documents and research reports; corporate Web sites; library databases—can be accessed online. To find various online sources, 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. Popular general subject directories include *Yahoo! Directory*, *About.com* and *Internet Public Library (ipl2)*. Specialized directories focus on a single topic such as software, health, or employment. See *Beaucoup!*, a “directory of directories” for listings of specialized directories organized by category.
- **Search engines.** Search engines, such as *Google*, *Yahoo!*, and *Bing* scan for Web sites containing key words. 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.

Subject directories are maintained by editors

Most search engines are maintained by computers not people

To research online, use the following Strategies. To locate any of the Web sites or online resources mentioned in this or other chapters, just do a Google or other search on the resource name. For instance, to locate the electronic version of a digital newspaper, search on the newspaper name.



STRATEGIES for Researching Online

- ▶ **Expect limited results from any one search engine or subject directory.** No single search engine, not even a popular one like Google, can index more than a fraction of material available on the Web. No subject directory will list the same Web 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.
- ▶ **When using a subject directory, drill down to an appropriate level of specificity.** Don’t rely on finding what you need at the top, or most general, topic level (e.g., “business” or “education”). The best subject directories will be organized into multiple levels of specificity. Keep digging until you either find what you want or discover that the subject directory doesn’t list topics relevant to your research.
- ▶ **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



STRATEGIES *continued*

usage), and .org (organization). While a .com site or a .net site may contain reliable information, you may be better off with a .gov or .mil site that provides official government information, an .edu site that is written by discipline-specific experts, or an .org site that is written by parties who specialize in a particular area.

- ▶ **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 genetically modified organisms (GMOs) by an organization called the Non-GMO Project (Figure 2.1) may contain useful information but may also be biased toward one point of view.
- ▶ **Look beyond the style of a site.** Sometimes the most reliable material resides in less attractive, text-only sites. A flashy site does not necessarily indicate reliable content.
- ▶ **Assess the currency of the site and its materials.** When was the material created, posted, and updated? Many sites have not been updated in months or years.
- ▶ **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.
- ▶ **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 previously 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.
- ▶ **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 disrespects or otherwise harms the material's creator. For any type of commercial use of material from the Web, obtain written permission from the source's owner and credit the source exactly as directed by its owner. For more information on copyright, see Chapter 18 and Appendix A.

The image is a screenshot of the Non-GMO Project website. The header features the Non-GMO Project logo (a butterfly on a leaf) and the text "NON GMO PROJECT". Below the logo is a navigation bar with links: HOME, ABOUT, GMO FACTS, FIND NON-GMO, GET INVOLVED, PRODUCT VERIFICATION, PRESS ROOM, and CONTACT US. A search bar is located in the top right corner. The main content area is titled "GMO FACTS" and "Frequently Asked Questions". It includes several sections with bold headings and paragraphs of text. On the left side of the main content area, there is a vertical sidebar with links: GMO FACTS, GMOS AND YOUR FAMILY, WHAT IS GMO?, GMO SCIENCE, THE "NON-GMO PROJECT VERIFIED" SEAL, INFORMATION ON GMO SWEET CORN, FAQ TRIFOLD FOR PRINTING, and RETURN TO HOME PAGE. Below the sidebar are four large buttons: "Find Non-GMO Choices", "Take Action Now", "Get the Facts", and "DONATE".

What are GMOs?
GMOs, or "genetically modified organisms," are plants or animals that have been genetically engineered with DNA from bacteria, viruses or other plants and animals. These experimental combinations of genes from different species cannot occur in nature or in traditional crossbreeding.

Virtually all commercial GMOs are engineered to withstand direct application of herbicide and/or to produce an insecticide. Despite biotech industry promises, none of the GMO traits currently on the market offer increased yield, drought tolerance, enhanced nutrition, or any other consumer benefit.

Meanwhile, a growing body of evidence connects GMOs with health problems, environmental damage and violation of farmers' and consumers' rights.

Are GMOs safe?
Most developed nations do not consider GMOs to be safe. In more than 60 countries around the world, including Australia, Japan, and all of the countries in the European Union, there are significant restrictions or outright bans on the production and sale of GMOs. In the U.S., the government has approved GMOs based on studies conducted by the same corporations that created them and profit from their sale. Increasingly, Americans are taking matters into their own hands and choosing to opt-out of the GMO experiment.

Are GMOs labeled?
Unfortunately, even though polls consistently show that a significant majority of Americans want to know if the food they're purchasing contains GMOs, the powerful biotech lobby has succeeded in keeping this information from the public. In the absence of mandatory labeling, the Non-GMO Project was created to give consumers the informed choice they deserve.

Where does the Non-GMO Project come in?
The Non-GMO Project is a non-profit organization with a mission of protecting the non-GMO food supply and giving consumers an informed choice. We offer North America's ONLY third party verification for products produced according to rigorous best practices for GMO avoidance (for more info, [click here](#)). Our strategy is to empower consumers to make change through the marketplace. If people stop buying GMOs, companies will stop using them and farmers will stop growing them.

Do Americans want non-GMO foods and supplements?
Polls consistently show that a significant majority of North Americans would like to be able to tell if the food they're purchasing contains GMOs (a 2012 Mellman Group poll found that 91% of American consumers wanted GMOs labeled). And, according to a recent CBS/New York Times poll, 53% of consumers said they would not buy food that has been genetically modified. The Non-GMO Project's seal for verified products will, for the first time, give the public an opportunity to make an informed choice when it comes to GMOs.

How common are GMOs?
In the U.S., GMOs are in as much as 80% of conventional processed food. [Click here for a current list of GMO risk crops.](#)

Why does the Non-GMO Project verify products that have a low risk of containing GMOs?
Some ingredients that seem low-risk may have less-visible high-risk ingredients. Take, for example, dried fruit. Raisins and similar fruit are sometimes packed with a small quantity of oil to keep them moist. This oil, when used, is sometimes high-GMO-risk. As such, it is critical that we do take the time to look carefully at ingredient spec sheets during the verification process, to ensure that risks like this are effectively mitigated, even in apparently low-risk products.

Contamination incidents have occurred with seemingly "low-risk" products (rice, startling corn, flax). Non-GMO Project Verification supports manufacturers in being able to quickly and proactively respond to unexpected contamination issues.

FIGURE 2.1 A Web site that advocates a particular viewpoint

Source: Courtesy of the Non-GMO Project.

Following are the principal categories of information sources on the online.

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 the content within a commercial site looks directly relevant to your search, by all means use it, as long as you think critically about the information presented. Does the fact that the company is likely trying to sell you something affect the content? Be careful also of organizational Web sites, which are likely to be well researched but which may have a particular social or political agenda. Are the opinions expressed by the organization designed to sway you to their agenda? Academic Web sites tend to be credible. However, some academics may also have biases, so never stop thinking critically about what you find on the Web.

Government Web Sites. Search engines will also pull up government Web sites, but your best way to access them is by going through the U.S. government's Web portal. Most government organizations (local, state, and federal) have a Web site and online access to research and reports. Examples include the Food and Drug Administration's Web site, which offers information on food recalls, clinical drug trials, and countless related items; and the Federal Bureau of Investigation's Web site, which provides information about the most wanted fugitives in the United States, tips on how to avoid being the victim of a crime, and much more. State and local sites provide information on auto licenses, state tax laws, and local property and land issues. From some of these sites you can link to specific government-sponsored research projects.

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.

Online News Outlets and Magazines. Most major news organizations offer online versions of their broadcast and print publications. Examples include online versions of newspapers such as *The New York Times* and *The Wall Street Journal*, CNN, and National Public Radio. Major magazines, such as *Time*, *Newsweek*, *Forbes*, and other more specialized magazines also offer Web versions. Some news is available online only, as in the online magazines *Slate* and *Salon*. To locate these publications, do a Google or other search on the publication name.

Make sure you understand how the publication obtains and reviews information. Is it a major news site, such as CNN, or is it a smaller site run by a special-interest group? Each can be useful, but you must evaluate the source. Also keep in mind that many online magazines have a particular political bias. Is the magazine conservative or liberal in its point of view?

Blogs. *Blogs* are Web sites on which the blog's author posts ideas. Readers are able to post comments and replies. Postings and replies are displayed in reverse

chronological order, with the newest topic first. Older posts can usually be viewed via an index or link. Links that the owner has hand chosen also supply ways to connect to other blogs on the same or similar topics. Blogs are great for finding current information from individuals, companies, and nonprofit organizations that are knowledgeable about particular topics. You will find more blogs than you can use, so you need to evaluate the information on individual blogs carefully and decide which ones are most relevant and reliable.

Keep in mind that 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 blog postings. Check any information you find on a blog against a professionally edited or peer-reviewed source.

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.

Always keep in mind that many wikis have no oversight. Aside from a few people who determine whether to delete articles based on requests from users, the content on a wiki is not checked by editors for accuracy. Always check information you find on a wiki against several other peer-reviewed or traditional sources. Remember that most of what is posted on a wiki has not been evaluated objectively. See Chapter 19 for more on blogs and wikis.

Online Forums and Electronic Mailing Lists. For almost any topic imaginable, you will find a Web forum, or discussion group. Major technology companies like Apple and Microsoft offer discussion forums to help customers solve technical problems. One way to locate relevant forums is to search through one of the major online forum providers. For instance, if you are researching a health-related issue such as stress among college students, you might want to visit *Google Groups* or *Yahoo! Groups* and join a group related directly to that issue. As with blogs, you will find more online forums than you could ever possibly use, so choose them with care.

Electronic mailing lists, or e-lists, are essentially the same as online forums. Most online forums offer two options: either subscribing to and visiting the forum via the Web or subscribing to and receiving messages and responses from participants directly into your email inbox. Messages may be sent to the entire group, or you may reply to participants individually.

Material you find on online forums or receive via e-lists may be insightful but may not represent an adequate range of responses. Visit a variety of forums or subscribe to multiple e-lists to get a broad perspective on the issue. Information posted on online forums or sent out to e-list subscribers may or may not be moderated (approved by a reviewer prior to being posted). Unmoderated material is usually less reliable.

E-Libraries. Entirely searchable online, e-libraries are excellent research tools. Aside from the online sites sponsored by most public libraries, the most notable e-library is the Internet Public Library, an online-only, noncommercial, and academically reliable virtual library founded by the University of Michigan's School of Information. Like other e-libraries, the Internet Public Library (ipl2) includes links to online books, magazines, and newspapers, along with online ready references (almanacs, dictionaries, encyclopedias, etc.), links to periodical databases, online exhibits, links to special collections organized by subject area, and even "live" librarians.

Although e-libraries can be extremely useful stand-ins for traditional, physical libraries, they can never entirely take the place of traditional libraries. They are limited to resources available in electronic form, which will not include current books under copyright or a wide range of magazine and newspaper articles and other resources. Supplement what you discover at an e-library with hard-copy materials from a traditional library.

Periodical Databases. Virtually all libraries have their own Web site where, if you are a library cardholder or a student, you can access a wide variety of periodical databases. Periodical databases are electronic collections of articles from newspapers, magazines, journals, and other publications. You can search these databases by title, author, keyword, and so on.

When searching a periodical database, follow the same keyword guidelines you would use when searching online (pages 29–30); for instance, narrow your search when you get too many hits or expand your search if you don't find enough relevant material. Once you have typed in your keyword(s), you will be presented with a citation page that includes some or all of the following information: author(s), title, source, subject area, abstract (a brief summary of the article), ISSN (International Standard Serial Number—an identifier for the article much like a book's ISBN), and DOI (or Digital Object Identifier—where the article can be found on the Web if it is available online).

Some of the most popular general periodical databases include *InfoTrac*, *NewsBank*, *ProQuest*, and *EBSCOHost*, but there are also many specialized periodical databases in a variety of subjects areas to which your library may also subscribe.

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

Hard-Copy Secondary Sources

As noted previously, traditional printed secondary research tools are still of great value. Unlike much of what you may find on the Web, most hard-copy secondary sources are carefully reviewed and edited before they are published.

Although it may take more time to go to the library and look through a printed book or other hard-copy source, it's often a better way to get solid information. Also, even though the digitizing of hard-copy materials continues to grow, many of these printed sources are not available on the Web, particularly the full texts of books.

Hard-copy secondary sources can be located in your library by using the “card catalog,” or, to use a more contemporary term (because cards are no longer used in most libraries), your library's online public access catalog (OPAC). This catalog can be accessed online or at terminals in the library. You can search a library's holdings by subject, author, title, or keyword in that library's OPAC. Visit the library's Web site, or ask a librarian for help. To search catalogs from libraries worldwide, go to the *Library of Congress Gateway* or *LibrarySpot*.

Locate hard-copy secondary sources using your library's “card catalog,” or OPAC

The following are the principal categories of hard-copy information sources found at libraries and one type of source material (gray literature) that you will need to track down on your own.

Books and Periodicals. Most obviously, any library will be well stocked with books as well as numerous hard-copy magazines, journals, and newspapers. The smaller and more general the library you visit, the less likely you are to find highly specialized print sources, and the larger or more specialized the library, the more likely you are to find books by specialist publishers and periodicals that delve into more specific subject areas.

Although not technically in hard-copy format, some older publications may be available on CD-ROMs and microfiche. However, many publications in these formats have now been converted to digital texts, available online.

When consulting books and periodicals, be sure to check the copyright date and supplement the source with additional information from more recent sources, if necessary.

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

- **Bibliographies.** Bibliographies are lists of books or articles by subject field. To locate bibliographies in your field, begin by consulting the *Bibliographic Index Plus*, a list (by subject) of major bibliographies, which indexes more than 500,000 bibliographies worldwide. You can also consult such general bibliographies as *Books in Print* or the *Reader's Guide to Periodical Literature*. Or consult subject area bibliographies, such as *Bibliography of World War II History*, or highly focused bibliographies, such as *Health Hazards of Video Display Terminals: An Annotated Bibliography*.
- **Indexes.** Book and article bibliographies may also be referred to as indexes. However, other types of indexes collect information not likely to be found

in standard bibliographies, such as indexes to conference proceedings (e.g., the *Index to Scientific and Technical Proceedings* and *Engineering Meetings*), which collect the most current information in various fields not yet published in book or periodical form; patent indexes (e.g., the *Index of Patents Issued from the United States Patent and Trademark Office* and the *World Patents Index*), which collect cutting-edge technological descriptions not yet widely available to the public; and technical report indexes (e.g., *Scientific and Technical Aerospace Reports* and the *Government Reports Announcements and Index*), which also collect highly current information unavailable elsewhere.

- **Encyclopedias.** Encyclopedias are alphabetically arranged collections of articles (written by the encyclopedia's editors and contributors). You may want to start by consulting a general encyclopedia, such as *Encyclopedia Britannica* or the *Columbia Encyclopedia*, but then consult more specific subject-focused encyclopedias, such as *Encyclopedia of Nutritional Supplements*, *American Jurisprudence*, *Encyclopedia of Business and Finance*, or *Illustrated Encyclopedia of Aircraft*.
- **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 are books that offer condensed facts (formulas, tables, advice, examples) about particular fields. Examples include the *Civil Engineering Handbook* and *The McGraw-Hill Computer Handbook*.
- **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, like the *Almanac for Computers* or *Baer's Agricultural Almanac*.
- **Directories.** Directories are books that 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*. For electronic versions, ask your librarian about *Hoover's Company Capsules* (for basic information on thousands of companies) and *Hoover's Company Profiles* (for detailed information).
- **Abstracts.** Abstracts are collections of summaries of books or articles, as you might find when searching a periodical database, but collected in one place. Abstracts can save you from having to track down a journal before deciding whether to read or skip the article. 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*.

Many of the reference works mentioned here are accessible free via the Internet Public Library or other sites. When using a reference work, check the copyright date to make sure you are accessing the most current information available.

Gray Literature. Some useful printed information may not be available at any library. This is known as “gray literature,” or materials that are unpublished or not typically catalogued. Examples include such helpful documents as pamphlets published by organizations or companies (such as medical pamphlets or company marketing materials), unpublished government documents (available under the Freedom of Information Act, with the exception of classified documents), dissertations by graduate students, papers presented at professional conferences, or self-published works.

The only way to track down gray literature is to contact organizations, companies, or individuals who may produce such literature and ask them if they have anything available in your subject area. For instance, you could contact a professional organization asking for papers on your topic delivered at its recent annual conference or contact a specific government agency for statistics reports directly relevant to your topic. Before doing so, know your research topic well and know specifically whom to contact and why, in case you should be asked. Don’t contact potential gray literature providers with vague, general requests for information.

Keep in mind that gray literature, like much material found on the Web, is often not carefully scrutinized for content by editors. Therefore, the material may not be reliable and should be backed up by information from other sources.

EXPLORING PRIMARY SOURCES

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

Types of primary sources

Unsolicited Inquiries

The most basic form of primary research is making simple unsolicited inquiries. Letters, phone calls, or email inquiries to experts listed in Web pages or to people you find out about in other ways can yield information that adds to, clarifies, or supplements information you already have. When making an unsolicited inquiry, make sure you contact the right individual or individuals. Don’t just contact a company or department. Also, ask exactly what you need to know, rather than vague, general questions, and be sure what you ask is not confidential or otherwise sensitive.

Note that unsolicited inquiries, especially by phone or email, can be intrusive or even offensive. Therefore, limit yourself to one or two questions that don’t require extensive research or thought on the part of the person or persons you contact.

Unsolicited inquiries uncover basic but important information

Informational Interviews

Informational interviews lead to original, unpublished material

Expert opinion is not always reliable

An excellent primary source of information is the informational interview, a solicited and extended form of inquiry. Much of what an expert knows may never be published. Therefore, you can uncover highly original information by spending time with someone 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. Like patients who seek second opinions about serious medical conditions, researchers seek a balanced range of expert opinions about complex problems or controversial issues—not only from a company engineer and environmentalist, for example, but also from independent and presumably more objective third parties such as a professor or journalist who has studied the issue. See the following Strategies for advice on effective interviews.



STRATEGIES for Informational Interviews

- ▶ **Know exactly what you're seeking.** Write out a purpose statement. For example, "The purpose of my interview with Leslie Brown, clinical nutritionist, is to ask about her latest research on the possible links between certain genetically modified foods and childhood attention deficit disorder."
- ▶ **Do your homework.** Learn all you can about the topic beforehand. If the interviewee has published anything relevant, read it. Be sure the information this person might provide is unavailable in print.
- ▶ **Request the interview at your respondent's convenience.** Ask whether the person objects to being quoted or taped. If possible, submit your questions beforehand.
- ▶ **Make each question clear, specific, and open-ended.** Don't ask vague or general questions, and avoid questions that can be answered with a mere *yes* or *no*. Get the benefit of the interviewee's elaboration.
- ▶ **Avoid loaded questions.** A loaded question invites or promotes a particular bias. For example, don't ask, "In what ways do you think the hazards of genetically modified foods have been overstated?" Ask impartial questions instead, such as "In your opinion, have the hazards associated with genetically modified food been accurately stated, overstated, or understated?"
- ▶ **Save the most difficult, complex, or sensitive questions for last.** Leading off with your toughest questions might annoy interviewees, making them uncooperative for the remainder of the interview.



STRATEGIES *continued*

- ▶ **Be polite and professional.** Arrive on time, express your gratitude, and explain why you believe the interviewee can be helpful and how you will use the information.
- ▶ **Let your interviewee do most of the talking.** Be a good listener. This courtesy ensures that the interviewee will provide the most information with the least interruption or leading from you.
- ▶ **Ask for clarification if needed, but do not put words in the respondent's mouth.** Questions such as "Could you go over that again?" or "What did you mean by that word?" are fine, but do not impose erroneous conclusions. Instead, paraphrase what the interviewee said so that she or he can verify your interpretation.
- ▶ **Stick to your interview plan.** If the interviewee wanders off topic, politely nudge him or her back on track (unless the information is useful).
- ▶ **Ask for closing comments.** Questions such as "Would you care to add anything?" or "Do you feel you've said what you wanted to say?" give the interviewee a chance to elaborate and clarify, and you may end up with useful additional information.
- ▶ **Ask for permission to follow up.** Additional questions may come to mind later, so find out if your interviewee would be willing to help with those new questions.
- ▶ **Invite the interviewee to read your version of the interview.** If the interview is to be published, this prevents possible misquotation or misinterpretation.
- ▶ **End on time and thank the interviewee.** Don't drag the interview on longer than the interviewee expected. Be sure to thank the interviewee for his or her time.
- ▶ **As soon as possible, transcribe your notes or recordings.** Get the interview down in writing before you forget important details.

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. Use the following Strategies to plan a survey and to develop a questionnaire.

Surveys provide multiple fresh viewpoints on a topic



STRATEGIES for Surveys

- ▶ **Define the survey's purpose and target population.** Ask yourself, “Why is this survey being performed?” “What, exactly, is it measuring?” “How much background research do I need?” “How will the survey findings be used?” and “Who is the exact population being studied?”
- ▶ **Identify the sample group.** Determine how many respondents you need. Generally, the larger the sample surveyed the more dependable the results (assuming a well-chosen and representative sample). Also determine how the sample will be chosen. Will participants be randomly chosen? In the statistical sense, *random* does not mean “haphazard.” A random sample means that each member of the target population stands an equal chance of being in the sample group.
- ▶ **Define the survey method.** Decide how the survey will be administered—by phone, by mail, or online. Each has its benefits and drawbacks. Phone surveys yield fast results and high response rates; however, they take longer than written surveys, many respondents find them annoying, and respondents tend to be less candid when speaking with someone in person. Mail surveys are less expensive than phone surveys and promote candid responses, but many people won't bother taking a trip to the mailbox or post office to return the survey, and results can be slow to arrive. Online surveys, conducted via a Web form or an email, are the least expensive and yield quick results, but computer connections can fail, and (in the case of Web surveys) you have less control over how many times the same person responds to the survey.
- ▶ **Decide on the types of questions.** Questions can be open-ended or closed-ended. Open-ended questions (“How much do you know about genetically modified food products?”) allow respondents to answer in any way they choose. Data gathered from open-ended questions are time-consuming to measure, but they provide rich information. Closed-ended questions (“Are you concerned about genetically modified food products? Yes/No.”) do not allow respondents to elaborate on their responses. Data from closed-ended questions are easily measured but more limited in value.
- ▶ **Develop an engaging and informative introduction.** Thank the respondents; persuade them that the questionnaire relates to their concerns and that their answers matter; provide directions for completing the survey; and ensure the anonymity of respondents. For example: “Thank you for helping us with our survey. Your responses will help determine the public's view regarding genetically modified foods. Please answer each question by filling in one reply only in black ink and return the completed questionnaire in the enclosed postage-paid return envelope. All responses will be kept confidential. Again, thank you for your input.”



STRATEGIES *continued*

- ▶ **Phrase questions precisely.** Vague phrasing will only lead to inaccurate answers and findings. Avoid combining questions or asking the same basic question more than once.
- ▶ **Avoid loaded questions.** Do not invite or advocate a particular point of view or bias.
- ▶ **Make the survey brief, simple, and inviting.** Respondents don't mind giving up some time to help, but long and difficult-to-read questionnaires usually get few replies.
- ▶ **Have an expert review your questionnaire whenever possible.** A survey expert or an expert on the topic can help you ask just the right questions.

Observations and Experiments

Observations or experiments should be your final step because you now know exactly what to look for.

Observations are firsthand examinations of people, processes, places, and so on, using only your senses. When you make observations, have a plan in place. Know how, where, and when to look, and jot down your observations immediately. You might even take photos or draw sketches of what you observe.

Experiments are controlled forms of observations designed to verify assumptions (e.g., the role of fish oil in preventing heart disease) or to test something untried (e.g., the relationship between background music and productivity). Each field has its own guidelines for conducting experiments (e.g., you must use certain equipment, scrutinize your results in a certain way), and you must follow those guidelines to the letter when you conduct your own experiments.

Remember that observations and experiments are not foolproof. When making an observation or performing an experiment, you may be biased about what you see (focusing on the wrong events, ignoring something important). In addition, if you are observing people or experimenting using people as subjects, they may be conscious of being observed and may alter their normal behaviors.

Observations and experiments offer proof to back up assumptions about a topic



CHECKLIST for Doing Research

MyWritingLab™

- ☐ Have I maintained a high level of critical thinking while researching?
- ☐ Have I asked the right questions?
- ☐ Have I considered a balance of views?



CHECKLIST *continued*

- ☐ Have I explored my topic in sufficient depth?
- ☐ Have I evaluated each source for reliability?
- ☐ Have I interpreted my sources objectively?
- ☐ Have I effectively used search engines and subject directories to consult online secondary sources?
- ☐ Have I used critical thinking to assess online secondary sources?
- ☐ Have I consulted hard-copy secondary sources (including gray literature) as needed?
- ☐ Have I supplemented findings from secondary sources with primary research whenever possible?
- ☐ Have I added my own findings to existing findings whenever possible?
- ☐ Have I kept careful and precise track of each source I am using?

**APPLICATIONS****GENERAL APPLICATIONS**

MyWritingLab™

1. Locate an expert in your field or your major for an upcoming project (such as a long report). Contact that person and arrange for an interview. Follow the Strategies on pages 38–39. Discuss your interview experiences and your findings with classmates.
2. Identify two major indexes to locate research articles for your field or topic. One source should be a traditional periodical index, and the other should be an online search engine. Find a recent article on a specific topic (e.g., privacy laws in your state), and write a short summary.

TEAM APPLICATION

Divide into small groups, and prepare a comparative evaluation of literature search media. Each group member should select one of the resources listed here and create an individual bibliography of at least 12 recent and relevant works on a specific topic of interest selected by the group.

- Conventional print media
- Electronic catalogs