28 | Writing Reader-Centered Instructions

Instructions come in many lengths, shapes, and levels of complexity. They range from the terse directions on a shampoo bottle ("Lather. Rinse. Repeat.") to the huge manuals that are hundreds or thousands of pages long for servicing airplane engines, managing large computer systems, and performing biomedical procedures.

Although some instructions are prepared by professional writers and editors, most other employees also need to prepare instructions. Whether you are developing a new procedure, training a new co-worker, or preparing to leave for vacation, you may need to provide written directions to someone else. You may write for people who will read your instructions on paper, a computer monitor, a smartphone screen, or other electronic device.

This chapter provides advice that you will find valuable regardless of the subject or size of the instructions you write. The advice given in the first part of this chapter applies equally to instructions written for paper and screen. A special section at the end of the chapter provides additional suggestions for instructions that will be delivered digitally as a website or as a video.

WEB For additional examples and advice for writing instructions, go to your English CourseMate at *www.cengagebrain.com.*

HOW TO GET THE MOST VALUE FROM THIS CHAPTER

Almost certainly, you are reading this chapter because your instructor asked you to. It's likely that your instructor also asked you to write a set of instructions. To get the most out of reading this chapter, think of the two assignments together: as you read each piece of advice, focus on planning ways to apply it to your instructions. In particular, concentrate on the points that will help you do the following.

LEARNING OBJECTIVES FOR THIS CHAPTER

1. Describe the major questions asked by readers of instructions.
2. Describe the superstructure for instructions, including the ways its parts correspond with the readers' questions.
3. Adapt the reader-centered writing process to the special goals of instructions.
4. Write effective instructions.

FEATURES OF INSTRUCTIONS THAT HELP YOU

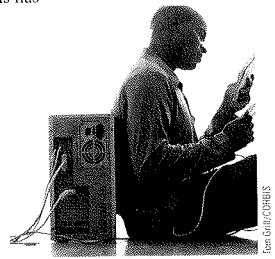
LEARN MORE For a detailed explanation of superstructures, see page 487.

Two features of instructions can be very helpful to you. First, no matter what procedure they want help with, readers want the same basic kinds of information. Second, instructions are prepared so often in the workplace that a set of conventions has developed concerning their content, organization, and other key elements. These conventions have proven successful in helping writers provide the information their readers want in a structure the readers find easy to use. The conventions constitute the *superstructure* or *genre* of instructions. As you research, plan, and write instructions in college and your career, you will be helped immensely by your knowledge of the readers' typical questions and the superstructure for answering them. The next two sections describe the questions and superstructure.

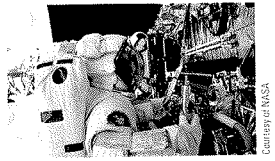
THE QUESTIONS READERS ASK MOST OFTEN

Readers read instructions in many different ways. Some follow the directions meticulously, concentrating on every word. Others look at the directions only if they get stumped while relying solely on their experience and intuition. Whether they read every word or look only occasionally at instructions, the questions readers ask are almost always versions of the following six.

- **What will these instructions help me do?** Some readers will ask this question exactly as it reads. When others use these or similar words, they are asking, "Do I really have to read these?"
- **Is there anything special I need to know to be able to use these instructions effectively?**
- **If I'm working with equipment, where are the parts I need to use?**
- **What materials, equipment, and tools do I need?**
- **Once I'm ready to start, what—exactly—do I do?**
- **Something isn't working correctly. How do I fix it?**



Tom Grill/CORBIS



Courtesy of NASA

Nigel Cattlin/Alamy

Instructions must meet the needs of readers performing vastly different tasks in a wide range of settings and circumstances. To keep both hands free, astronaut Kathryn Thornton has her instructions strapped to her arm.

SUPERSTRUCTURE FOR INSTRUCTIONS

The superstructure for instructions includes five elements that answer the six questions readers ask most often.

The simplest instructions contain only the directions. More complex instructions contain some or all of the other four elements listed

below. And some instructions also include such additional elements as covers, title pages, tables of contents, appendixes, lists of references, glossaries, lists of symbols, and indexes.

To determine which elements to include in any instructions you write, follow this familiar advice: Consider your readers' aims and needs as well as their characteristics that will shape the way they read and respond to your communication.

SUPERSTRUCTURE FOR INSTRUCTIONS

TOPIC	READERS' QUESTIONS
Introduction	What will these instructions help me do? Is there anything special I need to know to be able to use these instructions effectively?
Description of the equipment	If I'm working with equipment, where are the parts I need to use?
List of materials and equipment needed	What materials, equipment, or tools do I need?
Directions	Once I'm ready to start, what—exactly—do I do?
Troubleshooting	Something isn't working correctly. How do I fix it?

GUIDING YOU THROUGH THE PROCESS OF PREPARING INSTRUCTIONS

When creating instructions, writers perform the same activities as when they are preparing any workplace communication: defining the communication's goals, conducting research, planning, drafting, and revising. The following sections describe ways to perform each activity in ways especially suited to this special kind of communication.

Defining Your Communication's Goals

The overall usefulness goal for instructions is obvious: to enable readers to perform a procedure correctly and efficiently. By thinking about what people do while reading instructions, you can define the instructions' goals more specifically. People read a step, do a step, read the next step, and do the step. Your instructions goals should include helping readers perform each step quickly and accurately. Each time they complete a step, they must find their place again in the instructions. Your instructions should help readers find that place quickly. People also use instructions as reference sources, looking for a certain part without wanting to use the other parts. Your instructions should help them locate the part they want very rapidly.

Instructions' persuasive objectives are much less obvious than their usefulness objectives, but they are equally important. Many people dislike reading instructions. They want to start right in on the task without taking time to look at the instructions. Thus, one persuasive objective for instructions is to persuade people to read them at all. When people do read instructions, they can be impatient and easily frustrated. Another persuasive objective is to entice readers to look back at the page after they've looked away to perform a step. If your instructions are for a product made by your employer, they will have a third persuasive objective: to persuade readers to feel so good about the product that they will buy from your employer again and recommend that others do likewise.

LEARN MORE For detailed advice about defining your instructions' goals, see Chapter 3.

The Writer's Guide for Defining Your Communication's Goals on page 62 will help you identify the additional information about your instructions' purpose, readers, and context that is needed to fully define their goals.

Conducting Research

The amount of research you'll have to do when writing instructions can vary widely. Sometimes, you'll know the procedure and readers so well that no research will be required at all.

At other times, you may be asked to write instructions for a procedure you know little or nothing about. This is often the case for professional technical communicators, but it also happens to engineers, scientists, and specialists in other fields. Chapter 6 provides detailed advice about conducting research.

LEARN MORE For detailed advice on conducting research, see Chapter 6. For instructions, interviewing is very commonly the main research method used.

When you are relying solely on your own memory, you might conduct a simple form of research that checks on your memory. Write down all the steps in the process and then perform the process by following the steps you listed. You may be surprised at how many steps you didn't remember to write down even though you haven't forgotten to perform them.

Planning

For the instructions to achieve their usefulness and persuasive goals, three features of instructions must work together harmoniously. For all three, planning overlaps with drafting.

- **Organization of the directions.** By organizing the directions hierarchically, you can help readers find the next step as they look back at the instructions after completing the previous step. This organization can also help them find particular information when consulting the instructions as a reference document.

  To create a hierarchical organization, begin by listing all the steps in the process. Next, check the list for thoroughness as described in the previous paragraph. Then, group related steps under headings, such as "preparing the equipment," "using the equipment," and "cleaning up." If the instructions are long, shorter groups can be gathered into larger ones.

LEARN MORE For advice about how to group the steps in your process, see the discussion of segmenting, pages 215–218.

- **Graphics.** For many purposes, well-designed graphics are even more effective than words. Words cannot show readers where the parts of a machine are located, how to grasp a tool, or what the result of a procedure should look like. Graphics are especially helpful in instructions for readers who speak languages other than your own. Sometimes graphics alone can convey all the

LEARN MORE For advice about creating graphics, see Chapter 14.

information your readers need (see Figure 14.1 on page 293). Look actively for places where adding a drawing, diagram, photo, or other graphic would make your directions easier for your readers to understand. Chapter 14 provides suggestions for designing graphics that your readers will welcome.

- **Page design.** Strategically designed pages can help you and your readers in several ways. Page design can help readers find their places as they bounce back and forth between reading steps and performing them. Good page design helps readers see the connections between related blocks of information, such as a written direction and the drawing that accompanies it. An attractive design can entice readers' attention back to instructions they would otherwise choose to ignore. Chapters 16 and 22 can guide you through the process of designing effective printed and on-screen pages.

LEARN MORE For advice about designing pages and screens, see Chapter 16. Chapter 22 provides additional advice about screen design.

Drafting and Revising

Later in this chapter, you will find suggestions for drafting each element of your instructions. The following advice applies to *all* elements: Write clearly and succinctly. Choose words that convey your meaning clearly. Construct sentences your readers will comprehend effortlessly. Use as few words as possible. More words make more work for your readers and increase the chances your readers will stop reading what you've written.

LEARN MORE For advice about writing clearly and succinctly, see Chapter 10.

When you want to find ways to revise a draft of instructions, nothing beats watching members of your target audience using the draft to perform the procedure. Where you see them succeed with some steps, you know that part of your draft is effective. Where they have problems, you have an opportunity to improve. Chapter 18 guides you through the process of planning, conducting, and interpreting the results of user tests. When testing, remember to evaluate your draft's ability to achieve its persuasive objectives as well as its usefulness objectives.

LEARN MORE To learn how to conduct user tests, see Chapter 18.

CRAFTING THE MAJOR ELEMENTS OF INSTRUCTIONS

All the advice about drafting provided in Chapters 8 through 16 can help you write effective instructions. The following sections supplement that advice with suggestions for writing the five elements of the superstructure for instructions.

Introduction

Introductions should be as short as possible—or nonexistent. Many instructions don't need one. The title alone provides all the introductory information readers require. See Figure 28.5 (page 585). On the other hand, readers sometimes do need information up front. The following sections describe the eight elements most commonly included in introductions, together with suggestions for deciding whether your readers need each of them.

Subject

As mentioned above, often the title will fully convey the subject of your instructions. Especially in longer instructions, however, you may need to announce the subject

in an introduction. Here is the first sentence from the 50-page operator's manual for a 10-ton machine used in the manufacture of automobile and truck tires:

> This manual tells you how to operate the Tire Uniformity Optimizer (TUO).

Opening sentence that announces the subject

The first page of a manual for a popular desktop publishing program reads:

> The Microsoft Word User's Guide contains detailed information about using Microsoft® Word 2007 for Windows™ and Microsoft Word 2008 for Mac.

Purpose of the Procedure

If the purpose of the procedure your instructions describe isn't obvious from the title, announce it in the introduction. You may be able to convey your instructions' aim by listing the major steps in the procedure or the capabilities of the equipment whose operation you are describing. Here is the second sentence of the manual for the Tire Uniformity Optimizer:

> Depending upon the options on your machine, it may do any or all of the following jobs:
>
> - Test tires
> - Find irregularities in tires
> - Grind to correct the irregularities, if possible
> - Grade tires
> - Mark tires according to grade
> - Sort tires by grade

A list of the purposes for which readers can use the equipment

Intended Readers

When they pick up instructions, people often want to know whether the instructions are directed to them or to people who differ from them in interests, responsibilities, level of knowledge, or some other variable.

Sometimes, they can tell merely by reading the instructions' title. For instance, the operator's manual for the Tire Uniformity Optimizer is obviously addressed to people hired to operate that machine.

In contrast, people who consult instructions for a computer program may wonder whether the instructions assume that they know more (or less) about computers than they actually do. In such situations, answer their question in your introduction. Readers who don't already possess the required knowledge can then seek help or acquire the necessary background.

Scope

By stating the scope of your instructions, you help readers know whether the instructions contain directions for the specific tasks they want to perform. The manual for the Tire Uniformity Optimizer describes the scope of its instructions in the third and fourth sentences:

> This manual explains all the tasks you are likely to perform in a normal shift. It covers all of the options your machine might have.

Statement of scope

A manual for Microsoft Windows NT, an operating system, describes its scope in this way:

Scope of Part I

Scope of Part II

> In Part I, you'll learn the basic features of Windows NT 4.0, including the new Windows 2000 interface. Designed to get you up-to-speed quickly and easily, Part I provides the step-by-step procedures you'll need to get started. Part II lists the system requirements for running this new version, and then guides you through installing this new operating system.

Organization

By explaining how the instructions are organized, an introduction can help readers understand the overall structure of the tasks they will perform and locate specific pieces of information without having to read the entire set of instructions.

Often introductions explain scope and organization together. If you look back at the statement of scope from the Microsoft Windows NT manual, you will see that it also describes the manual's organization: It announces that the manual is organized into two parts, each with two types of content.

Similarly, the introduction to the Tire Uniformity Optimizer devotes several sentences to explaining that manual's organization, and this information also fills out the readers' understanding of the manual's scope.

Paragraph describing a manual's organization

> The rest of this chapter introduces you to the major parts of the TUO and its basic operation. Chapter 2 tells you step by step how to prepare the TUO when you change the type or size of tire you are testing. Chapter 3 tells you how to perform routine servicing, and Chapter 4 tells you how to troubleshoot problems you can probably handle without needing to ask for help from someone else. Chapter 5 contains a convenient checklist of the tasks described in Chapters 3 and 4.

Conventions

If your instructions use abbreviations or conventions that the reader needs to know in order to interpret the directions correctly, explain them in the introduction. For instance, the introduction for a manual for operating a machine for harvesting corn says, "Right-hand and left-hand sides are determined by facing the direction of forward travel."

Motivation

As pointed out above (and as you may know from your own experience), some people are tempted to toss instructions aside and rely on their common sense. A major purpose of many introductions is to persuade readers to read the instructions. You can accomplish this goal by using an inviting and supportive tone and by creating an attractive design. You can also include statements that tell readers directly why it is important to pay attention to the instructions. The following example is from instructions for a ceiling fan that purchasers install themselves.

Statement of scope

Motivation to read the instructions

> We're certain that your Hampton Bay fan will provide you with many years of comfort, energy savings, and satisfaction. To ensure your personal safety and to maximize the performance of your fan, please read this manual.

Safety

Your readers depend on you to prevent them from taking actions that could spoil their results, damage their equipment, or cause them injury. Moreover, product liability laws require companies to pay for damages or injuries that result from inadequate warnings in their instructions.

To satisfy your ethical and legal obligations, you must provide prominent, easy-to-understand, and persuasive warnings. If a warning concerns a general issue that covers the entire set of instructions (e.g., "Don't use this electrical tool while standing on wet ground"), place it in your introduction. If it pertains to a certain step, place it before that step. The following principles apply to warnings in either location:

- **Make your warnings stand out visually.** Try printing them in large, bold type and surrounding them with a box. Sometimes, writers use the following international hazard alert symbol to draw attention to the warning.

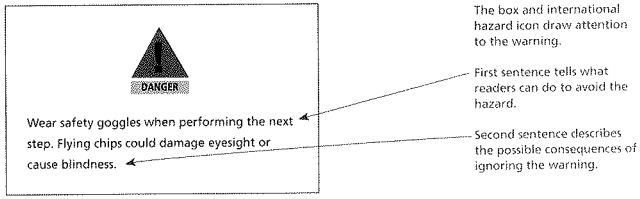
You may also include an icon to convey the nature of the danger. Here are some icons developed by Westinghouse.


Electrical Shock


Fire


Eye Protection

- **Place your warnings so that your readers will read them before performing the action the warnings refer to.** It won't help your readers to discover the warning after they've performed the step and the damage has been done.
- **State the nature of the hazard and the consequences of ignoring the warning.** If readers don't know what could happen, they may think that it's not important to take the necessary precautions.
- **Tell your readers what steps to take to protect themselves or avoid damage.**



Sample Introductions

Figure 28.1 shows the introduction to the instruction manual for the Tire Uniformity Optimizer. The introduction to another manual appears in Figure 28.2 (page 581).

FIGURE 28.1

Introduction to the Instruction Manual for the Tire Uniformity Optimizer

The first sentence identifies the **subject** of the manual.

The second sentence and list identify the **purposes of the procedures** that can be performed by following the instructions.

This sentence describes the **scope** of the manual: all of the procedures the reader is likely to perform during a normal shift.

This paragraph describes the **organization** of the manual.

The photograph and labels provide readers with a **description of the equipment** that enables them to locate all the major parts they will have to find while following the instructions. More detailed photos are provided later in the manual to guide the reader when using the Operator's Control Panel and other parts.

The manual presents **safety** warnings and information to **motivate** readers to follow certain parts of the procedures at the appropriate places later in the manual. This manual does not use any **conventions** that need to be explained in the introduction.

Chapter 1—Introduction

This manual tells you how to operate the Tire Uniformity Optimizer (TUO) and its controller, the Tire Quality Computer (TQC). The TUO has many options. Depending upon the options on your machine, it may do any or all of the following jobs:

- Test tires
- Find irregularities in tires
- Grind to correct the irregularities, if possible
- Grade tires
- Mark tires according to grade
- Sort tires by grade

This manual explains all the tasks you are likely to perform in a normal shift. It covers all of the options your machine might have.

The rest of this chapter introduces you to the major parts of the TUO and its basic operation. Chapter 2 tells you step-by-step how to prepare the TUO when you change the type or size of tire you are testing. Chapter 3 tells you how to perform routine servicing, and Chapter 4 tells you how to troubleshoot problems with the TUO. Chapter 5 contains a convenient checklist of the tasks described in Chapter 3.

Major Parts of the Tire Uniformity Optimizer

You can find the major parts of the TUO by looking at Figure 1-1. To operate the TUO, you will use the Operator's Control Panel and the Computer Panel.

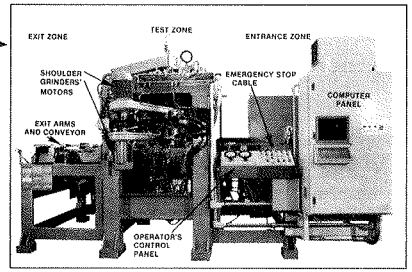


Figure 1-1. *Overview of the TUO and TQC.*

Page 1

Akron Standard, Operator's Manual for the Tire Uniformity Optimizer, (1988) p. 1. Used with permission of The Ride Quality Products.

Notice that the manual for the Tire Uniformity Optimizer uses the word *Introduction* and the introduction to the Detroit Diesel Engine Series 53 manual (Figure 11.2) is headed "General Information." The material that this chapter refers to as the *Introduction* is called many other names in other instructions. Sometimes, it is given no title at all.

LEARN MORE To describe equipment, use the pattern for describing an object (pages 214–215) or use a photograph or drawing (pages 295–296).

Description of the Equipment

To be able to operate or repair a piece of equipment, readers need to know the location of its parts. Sometimes, they need to know their functions as well. Instructions often include a description of the equipment to be used, usually by including a labeled photograph or drawing of it. For example, the first page of the manual for the Tire Uniformity Optimizer displays a labeled photograph of the machine. In some instructions, such illustrations are accompanied by written explanations of the equipment and its parts.

List of Materials and Equipment Needed

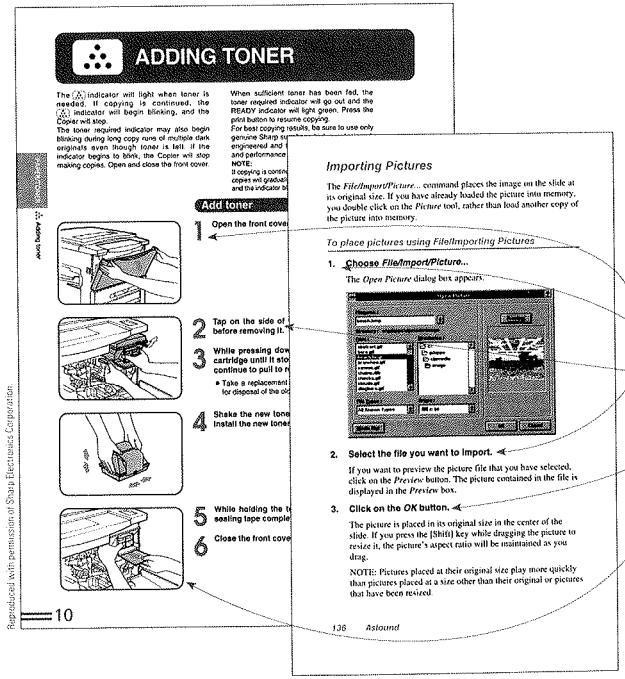
Some procedures require materials or equipment that readers wouldn't normally have at hand. If yours do, include a list of these items. Present the list *before* giving your step-by-step instructions. This will save your readers from the unpleasant surprise of discovering that they cannot go on to the next step until they have gone to the shop, supply room, or store to obtain an item that they didn't realize they would need.

Directions

At the heart of a set of instructions are the step-by-step directions that tell readers what to do. The following sections describe strategies for writing directions your readers will find easy to understand and use. Figure 28.2 illustrates much of this advice.

FIGURE 28.2

Well-Designed Presentation of Procedures



Though very different in design, both are easy to read and use because they apply the principles discussed on pages 581–585.

Step numbers are prominent, easy to see.

Each step describes only one action.

Each direction is short and easy to comprehend.

Directions are on a line of their own, separate from explanations, to make them easy to read.

Figures provide additional guidance.

Reproduced with permission of Sharp Electronics Corporation.

Write Each Direction for Rapid Comprehension and Immediate Use

Readers want to understand as quickly as possible what they should do next.

1. **In each direction give readers only enough information to perform the next step.** If you give more, they may forget some or become confused.
2. **Present the steps in a list.** A list format helps readers see each step as a separate action.
3. **Use the active voice and the imperative mood.** Active, imperative verbs give commands: "*Stop* the engine." (This statement is much simpler than "The operator should then stop the engine.")
4. **Highlight keywords.** In some instructions, a direction may contain a single word that conveys the critical information. You can speed the readers' task by using bold, all-capital letters or a different typeface to make this word pop off the page. Example: Press the RETURN key.

Help Readers Locate the Next Step Quickly

There are many ways you can help your readers as they turn their eyes away from the task and back to your text:

1. **Number the steps.** With the aid of numbers, readers will not have to reread earlier directions to figure out which one they last read.
2. **Put blank lines between steps.** This white space helps readers pick out a particular step from among its neighbors.
3. **Give one action per step.** It's easy for readers to overlook a direction that is tucked in with another direction rather than having its own number.
4. **Put step numbers in their own column.** Instead of aligning the second line of a direction under the step number, align it with the text of the first line. Not this:

Step number is obscured.

2. To quit the program, click the CLOSE button in the upper right-hand corner of the window.

But this:

Step number is in its own column.

2. To quit the program, click the CLOSE button in the upper right-hand corner of the window.

Within Steps, Distinguish Actions from Supporting Information

When actions don't stand out from supporting information, readers can make errors.

1. **Present actions before responses.** As the following example shows, you make reading unnecessarily difficult if you put the response to one step at the beginning of the next step.

The computer response obscures the action to be performed.

4. Press the RETURN key.
5. The Customer Order Screen will appear. Click on the TABS button.

Instead, put the response after the step that causes it.

Improved placement of the computer reaction lets the actions stand out.

4. Press the RETURN key.
   The Customer Order Screen will appear.
5. Click on the TABS button.

2. **Make actions stand out visually from other material.**
   In the following example, bold is used to signal to the readers that the first part of step 4 is an action and the second part is the response.

Use bold and layout to make actions stand out.

4. **Press the RETURN key.** The Customer Order Screen will appear.

You can also use layout to make such distinctions.

4. **Press the RETURN key.**
   - The Customer Order Screen will appear.

And you can use similar techniques when explaining steps.

7. **Enter ANALYZE.** This command prompts the computer to perform seven analytical computations.

Group Related Steps Under Action-Oriented Headings

By arranging the steps into groups, you divide your procedure into chunks that readers are likely to find manageable. You also help them *learn* the procedure so that they will be able to perform it without instructions in the future. Moreover, if you use action-oriented headings and subheadings for the groups of steps, you aid readers who need directions for only one part of the procedure. The headings enable them to locate quickly the information they require.

To create action-oriented headings, use participles, not nouns, to describe the task. For example, use *Installing* rather than *Installation* and use *Converting* rather than *Conversion*. Here are some of the action-oriented headings and subheadings from Chapter 4 of the Microsoft Windows NT manual.

The first word in each heading and subheading is a participle.

Setting Up Your Computers on Your Network
- Connecting to Computers on Your Network
- Sharing Your Printer
  - Viewing Network Drives
  - Using Dial-Up Networking
- Using Peer Web Services
  - Installing Peer Web Services
  - Configuring and Administering Peer Web Services

Use Many Graphics

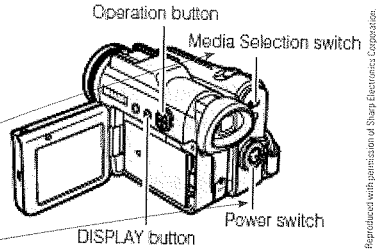
Drawings, photographs, and similar illustrations often provide the clearest and simplest means of telling your readers such important things as:

1. **Where things are.** For instance, Figure 28.3 shows the readers of an instruction manual where to find four control switches.
2. **How to perform steps.** For instance, by showing someone's hands performing a step, you provide your readers with a model to follow as they attempt to follow your directions (see Figure 28.4).
3. **What should result.** By showing readers what should result from performing a step, you help them understand what they are trying to accomplish and help them determine whether they have performed the step correctly (see Figure 28.5).

LEARN MORE Chapters 14 and 15 tell how to design effective graphics for instructions.

FIGURE 28.3

Drawing That Shows Readers Where to Locate Parts of a Camcorder



Reproduced with permission of Sharp Electronics Corporation.

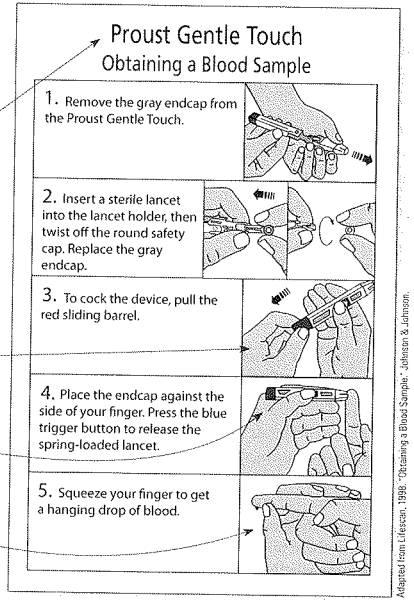
Writers at Sharp Electronics used this diagram to show new owners of a camcorder the location of buttons and switches they will use.

The writers placed the labels far enough from the drawing to stand out.

To avoid ambiguity, they drew the arrows directly to the labeled part.

FIGURE 28.4

Drawings That Show How to Do Something



Adapted from Lifescan, 1998. "Obtaining a Blood Sample." Johnson & Johnson.

The writers created these instructions to tell people with diabetes how to obtain the drop of blood they need in order to check their blood glucose level.

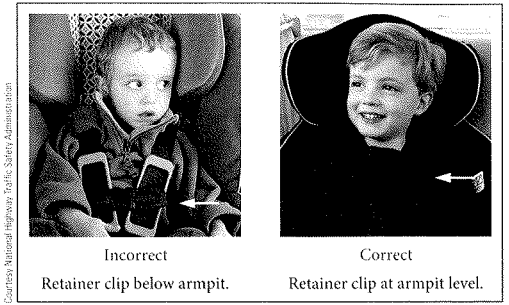
The title provides all the information readers need to understand and use these instructions. No separate introduction is needed.

The lancet is a sharp needle used to prick the skin.

The writers designed each drawing to show exactly how to hold the Gentle Touch.

In the drawing for step 4, the writers highlighted the placement of the endcap against the side of a finger.

In the drawing for step 5, the writers emphasized that the drop of blood must hang from the finger so that it may be applied to a test strip (in the next part of the procedure).



Courtesy National Highway Traffic Safety Administration

Incorrect
Retainer clip below armpit.

Correct
Retainer clip at armpit level.

FIGURE 28.5

Photos to Show the Successful Result of a Process

By showing both the correct and incorrect placement of the retainer clip, the National Highway Traffic Safety Administration helps readers understand the correct result of their adjustment of the retainer clip when placing children in car seats.

Chapter 16 provides detailed advice for using page design to help readers see which figure goes with which text.

Present Branching Steps Clearly

Sometimes instructions include alternative courses of action. For example, a chemical analysis might require one procedure if the acidity of a solution is at a normal level and another if the acidity is high. In such a situation, avoid listing only one of the alternatives.

6. If the acidity is high, follow the procedure described on page 20.

Possibly confusing direction

Instead, describe the step that enables readers to determine which alternative to choose (in the example, checking the acidity is that step) and then format the alternatives clearly:

6. Check the acidity.
   - If it is high, follow the procedure described on page 20.
   - If it is normal, proceed to Step 7.

Revised direction

Follow the same logic with other places where your instructions branch into two or more directions. The following example is from instructions for a computer program.

9. Determine which method you will use to connect to the Internet:
   - If you will use PPP (Point to Point Protocol), see Chapter 3.
   - If you will use SLIP (Serial Line Internet Protocol), see Chapter 4.

Tell What to Do in Case of a Mistake or Unexpected Result

Try to anticipate the places where readers might make mistakes or obtain an unexpected result. Unless the remedy is obvious, tell your readers what to do.

5. Depress and release the RUN switches on the operator's panel.

   NOTE: If the machine stops immediately and the FAULT light illuminates, reposition the second reel and repeat Step 5.

Troubleshooting

In various circumstances, readers find it easier to have information about correcting mistakes or unexpected results gathered into a single section. Often, a table format works best. Figure 28.6 shows the chapter of the manual for the

FIGURE 28.6

Troubleshooting Section from the Manual for the Tire Uniformity Optimizer

The writers used color to highlight a warning.

The writers created the three-column table to enable readers to locate quickly the error message given by the TQC and read across for the relevant information and remedy.

Chapter 4—Troubleshooting

This chapter tells you what to check when troubleshooting the TQC. It lists the problems that may occur, the probable causes, and the remedies.

The first list in this chapter consists of the error messages that appear on the CRT when a problem occurs. Next to the error messages are the causes of the problem and the possible remedies. A list of all the error messages can be found in Appendix B. The second list consists of observable phenomena that are listed in order of normal TQC operation.

One easily solved problem is caused by entering entries too quickly to the TQC through the keyboard. If the operator does not wait for the TQC to respond to one request before entering another, errors and inaccurate data will result. Make sure you allow sufficient time for the TQC to respond to your input before you press another key.

Warning

EXTERNAL TEST EQUIPMENT CAN DAMAGE THE TQC. If you use external equipment to troubleshoot the TQC, make sure that it does not introduce undesired ground currents or AC leakage currents.

Troubleshooting with Error Messages

Power-up Error Messages

Error Message	*Probable Cause*	*Remedy*
BACKUP BATTERY IS LOW	1. Battery on Processor Support PCB	1. Replace the battery on the Processor Support PCB.
CONTROLLER ERROR	1. PC interface PCB 2. Processor Support PCB	1. Swap the PC Interface PCB. 2. Swap the Processor Support PCB.
EPROM CHECKSUM ERROR	1. Configuration tables 2. Analog Processor PCB	1. Check the configuration tables. 2. Swap the Analog Processor PCB 88/40.
KEYBOARD MALFUNCTION: PORT	1. Keyboard or keyboard cable 2. Processor Support PCB	1. Check the keyboard and cable. 2. Swap the Processor Support PCB.
RAM FAILURE AT 0000:	1. Main Processor 86/30	1. Swap the 86/30.
RAM FAILURE AT 1000:	1. Main Processor 86/30	1. Swap the 86/30.
TIGRE PROGRAM CHECKSUM ERROR	1. TIGRE program	1. Reenter the TIGRE program or debug the program.

Table 4-1. *Power-up error messages.*

Page 59

Troubleshooting Section from the Manual for the Tire Uniformity Optimizer from the Akron Standard, Operator's Manual for the Tire Uniformity Optimizer (1986) p. 1. Used with permission of ITW Hyde Quality Products.

Tire Uniformity Optimizer that tells how to troubleshoot the TUO's Tire Quality Computer (TQC).

Physical Construction of Instructions

The physical construction of instructions is an important element of their design. Computer manuals are often printed in a small format because readers use them on crowded desktops. Cookbooks are sometimes printed on glossy paper to withstand kitchen spills. Be sure to adapt your instructions to the environment in which they will be used.

Sample Printed Instructions

It is much easier to understand writing advice if you see sample communications that follow that advice. Take a moment to look at the sample in Figure 28.7 and the marginal notes that point out some of the writer's major strategies. Other samples are provided throughout this chapter. Figure 28.7 explains how a student followed the advice you have just read while creating instructions for a lab procedure used in paper mills. For additional examples, see the book's website.

FIGURE 28.7

Instructions Written by a Student

Determining the Percentages of Hardwood and Softwood Fiber in a Paper Sample

These instructions tell you how to analyze a paper sample to determine what percentage of its fibers is from hardwood and what percentage from softwood. This information is important because the ratio of hardwood to softwood affects the paper's physical properties. The long softwood fibers provide strength but bunch up into flocks that give the paper an uneven formation. The short hardwood fibers provide an even formation but little strength. Consequently, two kinds of fibers are needed in most papers, the exact ratio depending on the type of paper being made.

Herman explains the importance of the procedure.

To determine the percentages of hardwood and softwood fiber, you perform the following major steps: preparing the slide, preparing the sample slurry, placing the slurry on the slide, staining the fibers, placing the slide cover, counting the fibers, and calculating the percentages. The procedure described in these instructions is an alternative to the test approved by the Technical Association of the Pulp and Paper Industry (TAPPI). The TAPPI test involves counting fibers in only one area of the sample slide. Because the fibers can be distributed unevenly on the slide, that procedure can give inaccurate results. The procedure given here produces more accurate results because it involves counting all the fibers on the slide.

He provides an overview of the procedure and indicates why the reader should follow it.

EQUIPMENT

He lists all of the equipment needed so readers can assemble it before starting the procedure.

Microscope
Microscope slide
Microscope slide cover
Microscope slide marking pen
Acetone solvent
Clean cloth
Hot plate
Paper sample
Blender
Beaker
Eyedropper
Graff "C" stain
Pointing needle

Courtesy Curtis J. Walker

(continued)

FIGURE 28.7

(continued)

Herman creates small groups of related steps. He places them under headings that help readers understand the overall procedure and quickly locate the directions they need when referring to the instructions in the future.

Herman explains the reason for the caution as a way of motivating readers to avoid making a mistake.

He uses bold for the action taken in each step, thereby making the action stand out from explanatory information.

He places the graphic immediately after the step it helps to explain. He keeps the graphic within the gridlines for the directions and out of the grid column for the step numbers.

2

PREPARING THE SLIDE

1. **Clean slide.** Using acetone solvent and a clean cloth, remove all dirt and fingerprints. NOTE: Do not use a paper towel because it will deposit fibers on the slide.
2. **Mark slide.** With a marking pen, draw two lines approximately 1.5 inches apart across the width of the slide.
3. **Label slide.** At one end, label the slide with an identifying number. Your slide should now look like the one shown in Figure A.

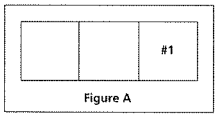


Figure A

4. **Turn on hot plate.** Set the temperature at warm. NOTE: Higher temperatures will "boil" off the softwood fibers that you will later place on the slide.
5. **Place slide on hot plate.** Leave the slide there until it dries completely, which will take approximately 5 minutes.
6. **Remove slide from hot plate.** Leave the hot plate on. You will use it again shortly.

PREPARING THE SAMPLE SLURRY

1. **Pour 2 cups of water in blender.** This measurement can be approximate.
2. **Obtain paper sample.** The sample should be about the size of a dime.
3. **Tear sample into fine pieces.**
4. **Place sample into blender.**
5. **Turn blender on.** Set blender on high and run it for about 1 minute.
6. **Check slurry.** After turning the blender off, see if any paper clumps remain. If so, turn the blender on for another 30 seconds. Repeat until no clumps remain.
7. **Pour slurry into beaker.**

Courtesy Curtis J. Walor

FIGURE 28.7

(continued)

3

PLACING THE SLURRY ONTO THE SLIDE

1. **Suck slurry into eyedropper.**
2. **Place 3 ml of slurry onto slide between the lines you marked on it.** This measurement can be approximate.
3. **Place slide onto black paper.**
4. **Check slide.** It should have between 300 and 1,000 fibers.
   - **If it has too few, use the eyedropper to add more slurry.**
   - **If it has too many, use the eyedropper to remove some slurry.**

   When done, your slide should look like the one shown in Figure B.

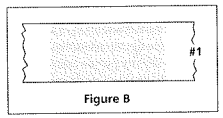


Figure B

5. **Place slide on hot plate.** Leave it there until all the water has evaporated, which will take about 1 hour.
6. **Remove slide from hot plate.**
7. **Turn off hot plate.**

   NOTE: If you cannot complete the entire procedure in one session, this is a good place to stop. The rest of the steps take about 1 hour.

STAINING THE FIBERS

1. **Place 3 drops of Graff "C" stain onto fibers.**
2. **Spread stain.** With the pointing needle, spread the stain evenly over the fibers, using the motion in Figure C.

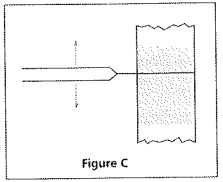


Figure C

PLACING THE SLIDE COVER

1. **Place one end of slide cover onto one of the lines you marked on the slide.** See Figure D.

Courtesy Curtis J. Walor

Herman begins each new section with step number 1.

He provides helpful suggestions for his readers.

He describes the desired result.

By using the bulleted list, Herman helps readers see immediately which of the branching steps they should take.

He provides a graphic showing the desired result so readers can compare their results with it.

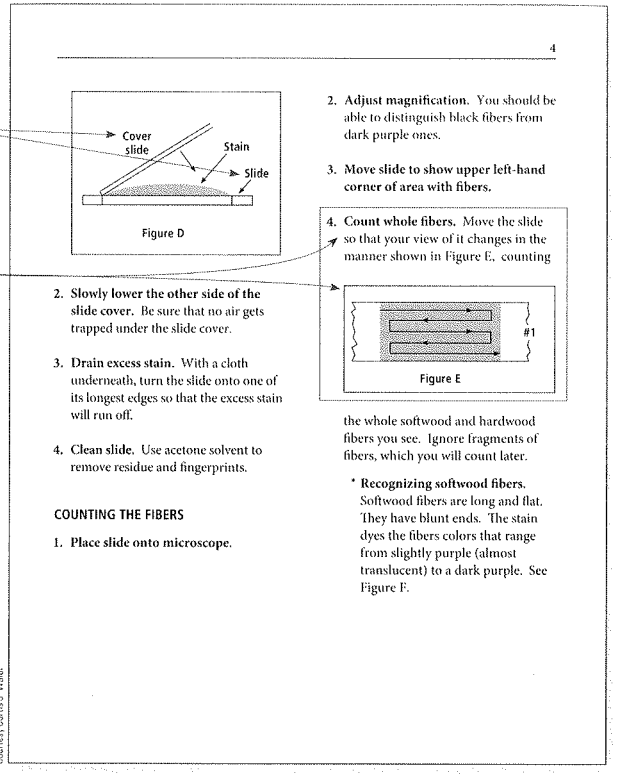
(continued)

FIGURE 28.7

(*continued*)

Herman labels items in his graphic to help readers understand what it illustrates.

He uses a figure to explain a procedure that would be difficult to understand if presented in words alone.



4

Figure D

2. **Slowly lower the other side of the slide cover.** Be sure that no air gets trapped under the slide cover.

3. **Drain excess stain.** With a cloth underneath, turn the slide onto one of its longest edges so that the excess stain will run off.

4. **Clean slide.** Use acetone solvent to remove residue and fingerprints.

COUNTING THE FIBERS

1. **Place slide onto microscope.**

2. **Adjust magnification.** You should be able to distinguish black fibers from dark purple ones.

3. **Move slide to show upper left-hand corner of area with fibers.**

4. **Count whole fibers.** Move the slide so that your view of it changes in the manner shown in Figure E, counting

Figure E

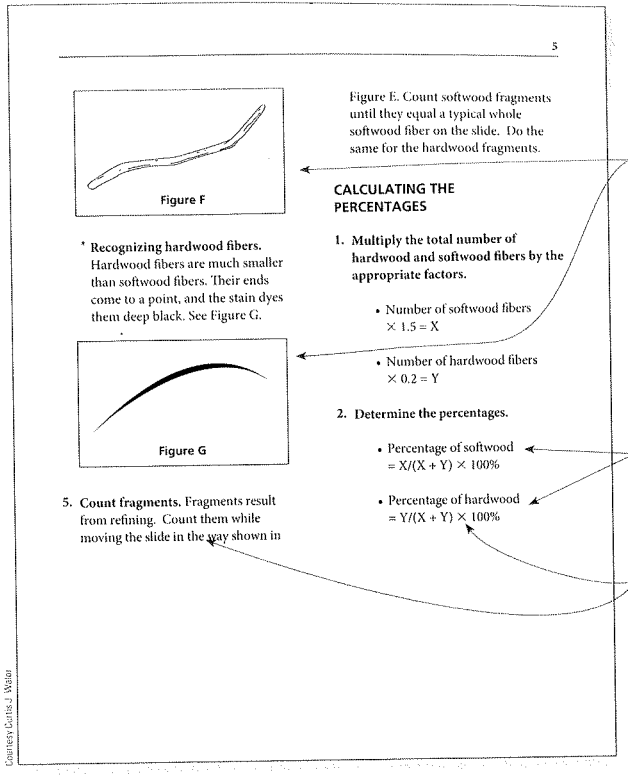
the whole softwood and hardwood fibers you see. Ignore fragments of fibers, which you will count later.

* **Recognizing softwood fibers.** Softwood fibers are long and flat. They have blunt ends. The stain dyes the fibers colors that range from slightly purple (almost translucent) to a dark purple. See Figure F.

Courtesy Curtis J. Wolter

FIGURE 28.7

(*continued*)



5

Figure F

Figure E. Count softwood fragments until they equal a typical whole softwood fiber on the slide. Do the same for the hardwood fragments.

CALCULATING THE PERCENTAGES

1. **Multiply the total number of hardwood and softwood fibers by the appropriate factors.**

   - Number of softwood fibers × 1.5 = X
   - Number of hardwood fibers × 0.2 = Y

2. **Determine the percentages.**

   - Percentage of softwood = X/(X + Y) × 100%
   - Percentage of hardwood = Y/(X + Y) × 100%

* **Recognizing hardwood fibers.** Hardwood fibers are much smaller than softwood fibers. Their ends come to a point, and the stain dyes them deep black. See Figure G.

Figure G

5. **Count fragments.** Fragments result from refining. Count them while moving the slide in the way shown in

Herman uses graphics to help readers distinguish between the two kinds of fibers they will see through the microscope.

He presents the calculations in a format that is easy to read and imitate.

He creates a balanced appearance for the final page by ending the two columns at about the same distance from the top of the page.

Courtesy Curtis J. Wolter

WEB PAGE INSTRUCTIONS

As explained at the beginning of this chapter, all the advice you have read so far applies not only to printed instructions but also to web page instructions, which are becoming increasingly common. Often they are included as the online Help in computer programs. Many sites on the Internet provide instructions meant for on-screen use. Although there are special computer programs designed specifically for creating web page instructions, you can also use the feature

WEB To view other examples of online instructions, go to your English CourseMate at *www.cengagebrain.com.*

of your desktop publishing program that enables you to convert text files into website pages. The following guidelines highlight some of the advice given earlier in the chapter that you will find most helpful when creating web page instructions. Figure 28.8 shows sample pages from professionally developed online instructions. Figure 28.9 shows pages from online instructions created by a student.

LEARN MORE For detailed advice on creating websites and web pages from which they are constructed, see Chapter 22.

GUIDELINES FOR WEB PAGE INSTRUCTIONS

1. **Organize the steps into small, related groups arranged hierarchically.** This organizational strategy facilitates quick access to the specific directions that a reader wants. If you devote a separate web page to each of the smallest groups, you also save your readers from the inconvenience and, sometimes, confusion caused when people need to scroll through directions.
2. **Give readers quick access to a complete list of the topics.** When using online instructions, many readers want to skip around among tasks. Help them by creating a complete list of items in your hierarchy so they don't have to move through layers of pages to locate what they want. Make this list available on every page, for instance, by putting a link to it in a navigation bar at the top or side of each page.
3. **Provide links to helpful information.** If your directions use a term that some of your readers may not know, provide a link to an explanation. If readers would find it helpful to learn about an alternative or related procedure, include a link to it.
4. **Write succinct, precise directions.** Even more than on paper, succinctness is valued in online instructions. Extra words not only make extra reading but also extra scrolling.
5. **Include clear, well-labeled graphics.** Tables, drawings, screen shots, and other graphics are just as helpful online as in print.
6. **Use a consistent design on all pages.** As in a printed document, a consistent design makes online instructions easier for readers to use.
7. **Use all the page design strategies you would use on paper.** Despite the many differences between a computer screen and a printed page, online instructions are pages. All of the design features that make paper pages usable and persuasive do the same for digital pages.
8. **If the instructions are for a computer program, enable readers to see your instructions and their work simultaneously.** When people are working on a computer, nothing is more frustrating to them than having to switch between windows to follow directions. Design your web pages and their contents so that readers can keep their work open in a window beside yours.
9. **Conduct user testing.** All instructions, whether in print or online, have to be tested by members of the target audience, who try to use them under conditions identical to those of the anticipated actual use.

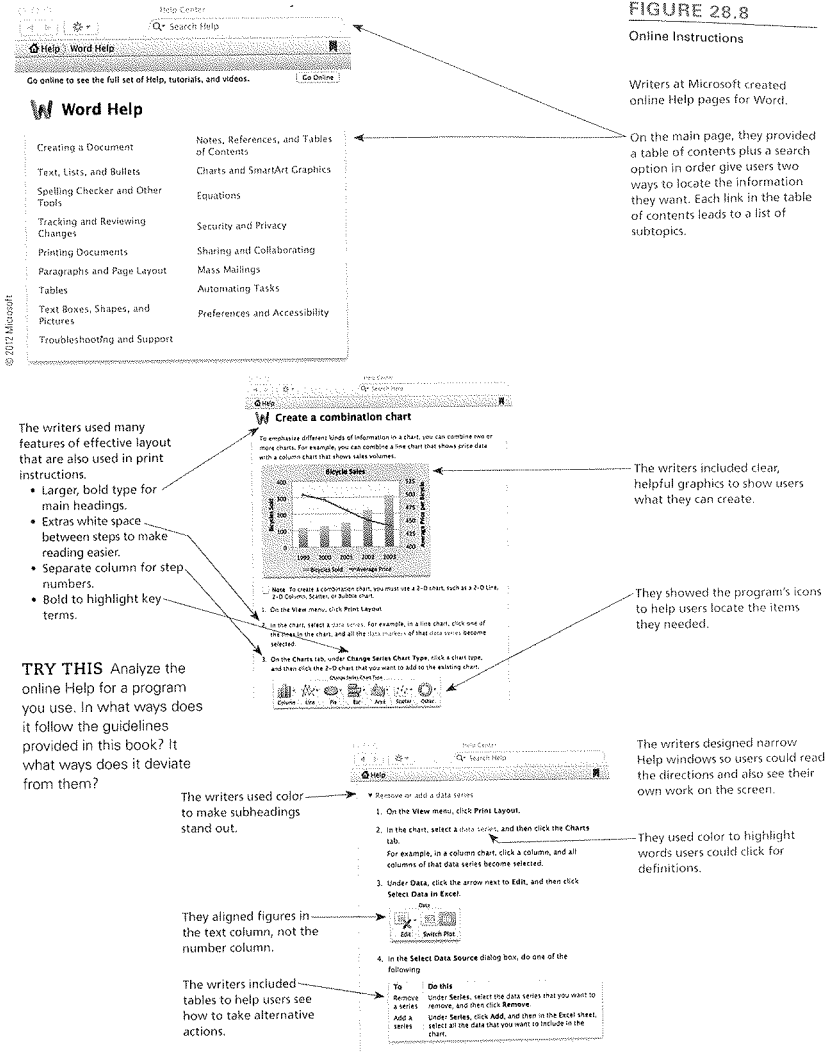
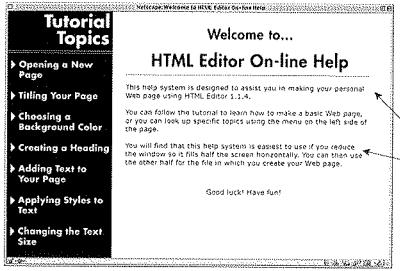


FIGURE 28.8
Online Instructions

FIGURE 28.9

Online Instructions Created by a Student



Amy's instructions tell how to use a program that helps people make web pages.

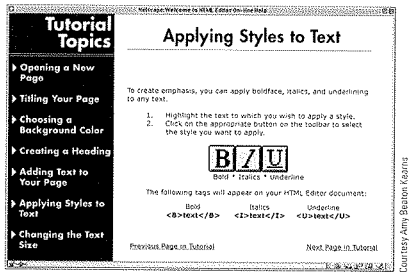
Her introduction tells:

- What the instructions do
- How to use them

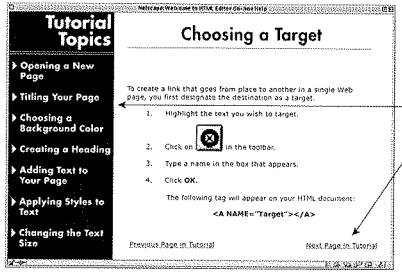
Amy uses the same basic design for all pages.

Most of her screens require no scrolling (though the menu on the left must be scrolled).

Note her use of figures.



Courtesy Amy Boynton Kearns



On each screen, Amy provides two ways of navigating her instructions:

- The menu at left provides rapid access to specific topics.
- The links at the bottom guide the reader through a step-by-step process.

VIDEO INSTRUCTIONS

Increasingly, instructions are prepared as videos, with the text being spoken and the graphics being either a series of still images or video clips. New cars now come with DVDs that provide instructions to new owners. Company websites include movies that tell people how to use the company's products. The Help feature of many computer programs, such as Microsoft Word, include videos that explain how to use some of the program's features. YouTube features an ever-growing collection of movie instructions.

Although web page instructions closely resemble printed instructions, video instructions are quite different. You couldn't create an effective script simply by reading directions prepared for print or a web page. In movie instructions, the relationship between images and script are coordinated through timing rather than placement on the page. In the movie version, you need to have images continuously. You can't leave the visual portion of the movie blank until you come to a place where you would use the next graphic in printed or web page instructions. Tone of voice and pace of reading make a great difference in the effectiveness of video instructions.

Movie-making programs are available for free on almost every computer. For Windows, you can download an easy-to-use program called Windows Movie Maker at *www.microsoft.com*. Apple computers have iMovie. Most new computers are now equipped with cameras and microphones.

At this book's website, you can read a bonus chapter about making video instructions, link to examples made by professionals, and view samples made by students. Go to your English CourseMate at www.cengagebrain.com.

TRY THIS In the Help feature of a program on your computer, find a video that includes step-by-step instructions. Most desktop publishing programs, such as Microsoft Word, have them. Imagine that you are making a set of print instructions for the same procedure. Quickly draft the written instructions for the first few steps, including text and graphics. How are your print instructions like the movie instructions? How do they differ? Alternatively, write the video script, including graphics, for a simple, step-by-step procedure.

WRITER'S GUIDES AND OTHER RESOURCES

Figure 28.10 presents a Writer's Guide for Revising Instructions that you can use in your course and on the job. At this book's website, you can download a copy of this Writer's Guide as well as one for planning instructions.

Note to the Instructor To tailor the Writer's Guides to your course, download them from the website.

WEB To download Writer's Guides for planning and revising instructions, go to your English CourseMate at *www.cengagebrain.com.*

FIGURE 28.10

Writer's Guide for Revising Instructions

To download a copy of this Writer's Guide as well as a Writer's Guide for Planning Instructions, go to your English CourseMate at www.cengagebrain.com.

Writer's Guide
REVISING INSTRUCTIONS

The following headings reflect the elements of the conventional superstructure for instructions. In many situations, some of the elements are unnecessary. Include only the elements that will make your instructions useful and persuasive to your readers.

Introduction

- ☐ Describes the purpose, aim, or desired outcome of the procedure, if it is not clear from the title
- ☐ Identifies the intended readers (their knowledge level, job descriptions, etc.)
- ☐ Tells the scope and organization, either separately or together
- ☐ Provides motivation (reasons for following the instructions rather than using another procedure)
- ☐ Explains the conventions used
- ☐ Includes safety information

Description of the Equipment

- ☐ Shows the location of the key parts
- ☐ Explains the function of the key parts

Materials and Equipment

- ☐ Tells readers what materials and equipment to gather before starting the procedure

Directions

- ☐ Supports rapid comprehension and immediate use by providing only the information your readers need, listing the steps, using the active voice and imperative mood ("Do this."), and highlighting keywords
- ☐ Helps readers locate the next step quickly by numbering the steps and putting blank lines between them, giving one action per step, and putting step numbers in their own column
- ☐ Distinguishes action from supporting information by putting actions before responses, and making actions stand out visually
- ☐ Groups related steps under action-oriented headings
- ☐ Uses many graphics
- ☐ Presents branching steps clearly

Troubleshooting

- ☐ Tells what to do if something fails or there is an unexpected result

Graphics (See Chapter 14)

- ☐ Included wherever readers would find them helpful or persuasive
- ☐ Looks neat, attractive, and easy to read
- ☐ Referred to them at the appropriate points in the prose
- ☐ Located where your readers can find them easily

FIGURE 28.10

(continued)

Writer's Guide
REVISING INSTRUCTIONS
(continued)

Page Design (See Chapter 16)

- ☐ Looks neat and attractive
- ☐ Helps readers find specific information quickly

Proofreading (See Chapter 18)

- ☐ Uses correct spelling, grammar, and punctuation
- ☐ Provides directions that have been user-tested

USE WHAT YOU'VE LEARNED

EXERCISE YOUR EXPERTISE

1. Find and photocopy a short set of instructions (five pages or less). Analyze the instructions, noting how the writers have handled each element of the superstructure for instructions. If they have omitted certain elements, explain why you think they did so. Comment on the page design and graphics (if any). Then evaluate the instructions. Tell what you think works best about them and identify ways you think they can be improved.
2. Complete the Instructions project in Appendix B.

EXPLORE ONLINE

Choose one:

a. Find a set of instructions designed to be read on the World Wide Web and discuss ways they might be changed to be effective in print.

b. Find a set of print instructions and discuss ways they might be changed to make them as effective as possible if viewed on the World Wide Web.

COLLABORATE WITH YOUR CLASSMATES

Working with another student, conduct an informal user test of a set of online instructions for a program on your computer. First, evaluate the screen design together. Next, while one of you uses part of the instructions, the other should record observations about parts of the text and graphics that work well and parts that could be improved. Present your results in a memo to your instructor. Consider the guidelines given on pages 581–585 and your own experience as you prepare your memo.