LANNcp14.doc - 1

PART IV Visual, Design, and Usability Elements

CHAPTER 14 Designing Visual Information 288

CHAPTER 15 Designing Pages and Documents 339

CHAPTER 16 Designing and Testing the Document for Usability 365

To PowerPoint or Not to PowerPoint?

Is Microsoft's ubiquitous presentation software

PowerPoint a useful tool for designing and delivering presentations? Or is it the latest example of the dumbing-down of professional discourse? Led by critics like Edward Tufte, a debate about the power of *PowerPoint* has reached a fever pitch. The *New York Times* comments that "*PowerPoint* has a tendency to turn any information into a dull recitation of look-alike factoids" (Schwartz 3). *Fast Company* commentator Seth Godin argues, simply, that "*PowerPoint* is a disaster" (Godin).

For a delighful example of the stylistic and design effects of *PowerPoint*, check out a parody of Abraham Lincoln's famous Gettysburg Address at <<u>http://www.norvig.com/Gettysburg/index.htm</u>>.

Musician and artist David Byrne presents a

different perspective: "Although I began by making fun of the medium, Isoon realized I could actually create things that were beautiful. I could bend the program to my own whim and use it as an artistic agent. "Byrne recently published a book including a DVD of *PowerPoint* artworks ("Learning to Love *PowerPoint*"). •

14 Designing Visual Information

LANNcp14.doc - 3

WHY VISUALS ARE IMPORTANT HOW VISUALS WORK WHEN TO USE A VISUAL WHAT TYPES OF VISUALS TO CONSIDER HOW TO SELECT VISUALS FOR YOUR PURPOSE AND AUDIENCE TABLES GRAPHS CHARTS GRAPHIC ILLUSTRATIONS COMPUTER GRAPHICS USING WEB SITES FOR GRAPHICS SUPPORT HOW TO AVOID VISUAL DISTORTION CHECKLIST for Usability of Visuals GUIDELINES for Fitting Visuals with Printed Text A visual is any pictorial representation used to clarify a concept, emphasize a particular meaning, illustrate a point, or analyze ideas or data. Besides saving space and words, visuals help people process, understand, and remember information. Because they offer powerful new ways of looking at data, visuals reveal trends, problems, and possibilities that otherwise might remain buried in lists of facts and figures.

WHY VISUALS ARE IMPORTANT

In printed or online documents, in oral presentations or multimedia programs, visuals are a staple of communication today. Compare, for example, a typical textbook or newspaper from the late 1980s or early 1990s with a recently published edition.

With graphics software, color printers, digital cameras, and video manipulation devices, anyone can create charts, graphs, diagrams, and digitally altered photo-graphs. People routinely download clip art from the Internet, create their own Web pages, or give visual presentations at business meetings.

This doesn't mean that verbal messages have become obsolete. Instead, words integrate with shapes and images to create what design expert Robert Horn calls *visual language*:

As the world increases in complexity, as the speed at which we need to solve business and social problems increases, as it becomes increasingly critical to have the "big picture" as well as multiple levels of detail immediately accessible, visual language will become more and more prevalent in our lives. (15)

In the workplace, our reliance on visuals is driven by the fact that communication is global and instantaneous, that people work in teams—often scattered worldwide, and that success depends on harnessing an increasing volume of complex information.

Ultimately, we rely on visuals because our audiences expect them. Bombarded with information from all sources, people want to find what they need quickly and easily, and they want it to be understandable. People like to feel intelligent, to understand the message at a glance. Visuals help answer many of the questions users ask as they process information:

NOTE *Visual design is a complex art in which plenty can go wrong. No amount of visual technology can substitute for careful decisions about your audience, the purpose of your communication, and the design options you have available.*

HOW VISUALS WORK

More receptive to images than to words, most people resist unbroken pages of printed text. Visuals help diminish this resistance in several ways:

- Visuals enhance comprehension by displaying abstract concepts in concrete, geometric shapes. "How does the metric system work?" (Figure 14.1). "How do lasers work?" (Figure 14.35).
- *Visuals make meaningful comparisons possible.* "How do industries compare in terms of the toxic chemicals they release into the environment?" (Figure 14.2). "How does one pound compare with one kilogram?" (Figure 14.1).
- *Visuals depict relationships.* "How does seasonal change affect the rate of construction in our county?" (Figure 14.10). "What is the relationship between Fahrenheit and Celsius temperature?" (Figure 14.1).
- *Visuals serve as a universal language*. In the global workplace, carefully designed visuals can transcend cultural and language differences, and thus facilitate international communication (Figure 14.1).

As one expert points out, "the visual elements of a text affect how readers interact with the words" (Hilligoss 9).

WHEN TO USE A VISUAL

In general, use visuals whenever they make your point more clearly than the text. Use visuals to direct the audience's focus or to help them remember something, as in the following situations (Dragga and Gong 46– 48):

- when you want to instruct or persuade
- when you want to draw attention to something immediately important
- when you expect the document to be consulted randomly or selectively (e.g., a manual or other reference work) instead of being read in its original sequence (e.g., a memo or letter)
- when you expect the audience to be relatively less educated, less motivated, or less familiar with the topic
- when you expect the audience to be distracted

There may be organizational reasons for using visuals; for example, some companies may always expect a chart or graph as part of their annual report. Certain industries, such as the financial sector, often use graphs and charts (such as the graph of the daily Dow Jones Industrial Average). **NOTE** Use visuals to clarify and enhance your discussion, and not merely to decorate your document.

WHAT TYPES OF VISUALS TO CONSIDER

Different types of visuals serve different functions. The following overview sorts visual displays into four categories: tables, graphs, charts, and graphic illustrations. Each type of visual offers a new way of seeing, a different perspective.

HOW TO SELECT VISUALS FOR YOUR PURPOSE AND AUDIENCE

To select the most effective display, consider your specific purpose and the abilities and preferences of your audience. Here are a few examples of the choices you must consider in selecting visuals:

- If you merely want the audience to know facts and figures, a table might suffice, but if you want them to make a particular judgment about these data, a bar graph, line graph, or pie chart might be preferable.
- To depict the operating parts of a mechanism, an exploded or cutaway diagram might be preferable to a photograph.
- Expert audiences tend to prefer numerical tables, flowcharts, schematics, and complex graphs or diagrams they can interpret for themselves.
- General audiences tend to prefer basic tables, graphs, diagrams, and other visuals that direct their focus and interpret key points extracted from the data.

Although several alternatives might be possible, one particular type of visual (or a combination) usually is superior. The best option, however, may not always be available to you. Your particular audience or organization may express its own preferences. Or your choices may be limited by lack of equipment (software, scanners, digitizers), insufficient personnel (graphic designers, technical illustrators), or insufficient budget. In any case, your basic task is to enable the audience to interpret the visual correctly.

NOTE Although visual communication has global appeal, certain visual displays can be inappropriate in certain cultures. For example, not all cultures read from left to right, so a chart designed to be read from left to right that is read in the opposite direction could be misunderstood.

TABLES

A table is a powerful way to display dense textual information such as specifications, comparisons or conditions. Assume, for example, that you are researching recent death rates for heart disease and cancer. From various sources, you collect these data:

- 1. In 1970, 419 males and 309 females per 100,000 people died of heart disease; 172 males and 135 females died of cancer.
- 2. In 1980, 369 males and 305 females per 100,000 people died of heart disease; 205 males and 164 females died of cancer.
- 3. In 1990

In the textual form above, numerical information is repetitious and hard to interpret. As the numerical data increase, so does our difficulty in processing this material. In Table 14.1 (constructed via the "Table" command in a word-processing program), the above statistics are easier to compare and analyze.

NOTE

Include a caption with your visual, to analyze or interpret the trends or key points you want readers to recognize.

Numerical tables such as Table 14.1 present *quantitative information* (data that can be measured). Prose tables present *qualitative information* (prose descriptions, explanations, or instructions). Table 14.2, for example, combines numerical data, probability estimates, comparisons, and instructions—all organized for the smoker's understanding of radon gas risk in the home.

No table should be overly complex for its audience. Although impressive-looking, Table 14.3 is hard for nonspecialists to interpret because it presents too much information at once. We can see how an unethical writer might use a complex table to bury numbers that are questionable or embarrassing (Williams 12). For laypersons, use fewer tables and keep them simple.

NOTE

Like all other parts of a document, visuals are designed with audience and purpose in mind (Journet 3). An accountant doing an audit might need a table listing exact amounts, whereas the average public stockholder reading an annual report would prefer the "big picture" in an easily grasped bar graph or pie chart (Van Pelt 1). Similarly, scientists might find the complexity of data shown in Table 14.3 perfectly appropriate, but a nonexpert audience (say, environmental groups) might prefer the clarity and simplicity of a chart like Figure 14.2. For displaying information in a table, follow these general guidelines:

- *Try to limit the table to one page*. Otherwise, write "continues" at the bottom, and begin the second page with the full title, "continued," and the original column headings.
- *If the table is too wide for the page, turn it 90 degrees so that the left-hand side faces the bottom of the page.* Or divide the data into two tables. (Few readers may bother rotating the page to read the table broadside.)
- In your discussion, refer to the table by number, and explain what readers should be looking for. Or include a prose caption. In short, introduce the table, present it, and then interpret it.

For specific information about creating tables, see How to Construct a Table and the accompanying Table 14.4 on the next page.

Tables work well for displaying exact values, but readers find graphs or charts easier to interpret. Geometric shapes (bars, curves, circles) are generally easier to remember than lists of numbers (Cochran et al. 25).

NOTE Any visual other than a table is usually categorized as a figure, and so titled (Figure 1 Aerial View of the Panhandle Site).

GRAPHS

Graphs translate numbers into shapes, shades, and patterns. A graph displays, at a glance, the approximate values, the point being made about those values, and the relationship being emphasized. Graphs are especially useful for depicting comparisons, changes over time, patterns, or trends.

A graph's horizontal axis shows categories (the independent variables) to be compared, such as years within a period (1980, 1990, 2000). The vertical axis shows the range of values (the dependent variables) for comparing or measuring the categories, such as the number of deaths from heart failure in a given year. A dependent variable changes according to activity in the independent variable (for example, a decrease in quantity over a set time, as in Figure 14.3).

Bar Graphs

Generally easy to understand, bar graphs show discrete comparisons, such as year-by-year or month-by-month. Each bar represents a specific quantity. You can use bar graphs to focus on one value or to compare values over time.

SIMPLE BAR GRAPH. A simple bar graph displays one trend or theme. The graph in Figure 14.3 shows one trend extracted from Table 14.1, male deaths from heart disease. To aid interpretation, you can record exact values above each bar--but only if the audience needs exact numbers.

MULTIPLE-BAR GRAPH. A bar graph can display two or three relationships simultaneously. Figure 14.4 contrasts two sets of information, allowing readers to see two trends. When you create a multiple-bar graph, be sure to use a different pattern or color for each bar, and include a key (or *legend*) so your audience knows which color or pattern corresponds with which bar.

The more relationships you include on a graph, the more complex the graph becomes, so try not to include more than three on any one graph.

HORIZONTAL-BAR GRAPH. Horizontal-bar graphs are good for displaying a large series of bars arranged in order of increasing or decreasing value, as in Figure 14.5. This format leaves room for labeling the categories horizontally (*Doctorate*, and so on).

STACKED-BAR GRAPH. Instead of displaying bars side-by-side, you can stack them. Stacked-bar graphs are especially useful for showing how much each item contributes to the whole. Figure 14.6 displays other comparisons from Table 14.1. To avoid confusion, don't display more than four or five sets of data in a single bar.

100-PERCENT BAR GRAPH. A type of stacked-bar graph, the 100-percent bar graph shows the value of each part that makes up the 100-percent value, as in Figure 14.7. Like any bar graph, the 100-percent graph can have either horizontal or vertical bars. Notice how bar graphs become harder to interpret as bars and patterns increase. For a general audience, the data from Figure 14.7 might be displayed in pie charts (page 310).

DEVIATION BAR GRAPH. Most graphs begin at a zero axis point, displaying only positive values. A deviation bar graph, however, displays both positive and negative values, as in Figure 14.8. Notice how the vertical axis extends to the negative side of the zero baseline, following the same incremental division as the positive side of the graph.

3-D BAR GRAPH. Graphics software makes it easy to shade and rotate images for a three-dimensional view. The 3-D perspectives in Figure 14.9 engage our attention and visually emphasize the data.

NOTE Although 3-D graphs can enhance and dramatize a presentation, an overly complex graph can be misleading or hard to interpret. Use 3-D only when a two-dimensional version will not serve as well. Never sacrifice clarity and simplicity for the sake of visual effect.

HOW TO DISPLAY A BAR GRAPH. Once you have decided on a type of bar graph, follow these suggestions for achieving a userfriendly display.

- Use a bar graph only to compare values that are noticeably different. Small value differences will yield bars that look too similar to compare.
- *Keep the graph simple and easy to read.* Don't plot more than three types of bars in each cluster. Avoid needless visual details.
- *Number your scales in units familiar to the audience.* Units of 1 or multiples of 2, 5, or 10 are best (Lambert 45). Space the numbers equally.
- Label both scales to show what is being measured or *compared*. If space allows, keep all labels horizontal for easier reading.
- Label each bar or cluster of bars at its base.
- Use tick marks to show the points of division on your scale. If the graph has many bars, extend the tick marks into grid lines to help readers relate bars to values.
- To avoid confusion, make all bars the same width (unless you are overlapping them).

- In a multiple-bar graph, use a different pattern, color, or shade for each bar in a cluster. Provide a key, or legend, identifying each pattern, color, or shade.
- If you are trying for emphasis, be aware that darker bars are seen as larger, closer, and more important than lighter bars of the same size (Lambert 93).
- In your discussion, refer to the graph by number ("Figure 1"), and explain what the user should look for. Or include a prose caption along with the graph.
- *Cite data sources beneath the graph.* When adapting or reproducing a copyrighted graph for a work to be published, you must obtain written permission from the copyright holder.
- **NOTE** Failure to cite the creator of a visual or the information sources you used in making your own visual is plagiarism.

Computer graphics programs automatically employ most of these design features. Anyone producing visuals, however, should know the conventions.

Line Graphs

A line graph can accommodate many more data points than a bar graph (for example, a twelve-month trend, measured monthly). Line graphs help readers synthesize large bodies of information in which exact quantities don't need to be emphasized.

SIMPLE LINE GRAPH. A simple line graph, as in Figure 14.10, uses one line to plot time intervals (or categories) on the horizontal scale and values on the vertical scale.

MULTILINE GRAPH. A multiline graph displays several relationships simultaneously, as in Figure 14.11. Include a caption to explain the relationships readers are supposed to see.

DEVIATION LINE GRAPH. Extend your vertical scale below the zero baseline to display positive and negative values in one graph, as in Figure 14.12. Mark values below the baseline in intervals parallel to those above it.

BAND OR AREA GRAPH. By shading in the area beneath the main plot lines, you can

highlight specific features. Figure 14.13 is another version of the Figure 14.10 line graph.

The multiple bands in Figure 14.14 depict relationships among sums instead of the direct comparisons depicted in the Figure 14.11 line graph. Despite their visual appeal, multipleband graphs are easy to misinterpret: In a multiline graph, each line depicts its own distance from the zero baseline. But in a multiple-*band* graph, the very top line depicts the *total*, with each band below it being a part of that total. Always clarify these relationships for users.

HOW TO DISPLAY A LINE GRAPH. Follow the suggestions for displaying a bar graph (page 305), with these additions:

• Display no more than three or four lines on one graph.

• Mark each individual data point used in plotting each line.

- Make each line visually distinct (using color, symbols, and so on).
- Label each line so users know what each one represents.
- Avoid grid lines that users could mistake for plotted lines.

Graphs with Three Variables

As discussed on page 300, graphs usually depict a relationship between one independent variable (say, *time*) and one dependent variable (say, *global temperature fluctuations*). To provide additional perspective on the data, a graph might display two different but related dependent variables on parallel vertical axes. For example, Figure 14.15 plots the relationship between global temperatures and carbon dioxide levels over time, showing how one dependent variable (*temperature*) changes in respect to another one (CO₂ *levels*). Notice how the correlation between CO₂ levels and temperature becomes apparent.

NOTE Even though it may signal a possible causal relationship, correlation alone does not "prove" a direct causal link. See page 182 for more discussion.

CHARTS

The terms *chart* and *graph* often are used interchangeably. But a chart displays relationships (quantitative or cause-andeffect) that are not plotted on a coordinate system (*x* and *y* axes).

Pie Charts

Easy for almost anyone to understand, a pie chart displays the relationship of parts or percentages to the whole. Readers can compare the parts to each other as well as to the whole (to show how much was spent on what, how much income comes from which sources, and so on). Figure 14.16 shows a simple pie chart. Figure 14.17 is an exploded pie chart. Exploded pie charts help highlight various pieces of the pie.

For displaying pie charts, follow these suggestions:

- Make sure the parts add up to 100 percent.
- *Differentiate each slice clearly*. Use different colors or shades, or differentiate by "exploding" out various pie slices.
- Include a key, or legend, to help readers identify each slice, or label each slice directly.
- *Include no less than two and no more than eight segments*. A pie chart containing more than eight segments can be hard to interpret, especially if the segments are small (Hartley 96).
- Combine very small segments under the heading "Other."
- For easy reading, keep all labels horizontal.

Organization Charts

An organization chart shows the hierarchy and relationships between different departments and other units in an organization, as in Figure 14.18.

Flowcharts

A flowchart traces a procedure or process from beginning to end. Figure 14.19 traces the procedure for producing a textbook. (Another flowchart example appears on page 582.)

Tree Charts

Whereas flowcharts display the steps in a process, tree charts show how the parts of an idea or concept relate to each other. Figure 14.20 displays part of an outline for this chapter so that users can better visualize relationships. The tree chart seems clearer and more interesting than the prose listing.

Gantt and PERT Charts

Named for engineer H. L. Gantt (1861–1919), a Gantt chart depicts how the parts of an idea or concept relate to each other. A series of bars or lines (time lines) indicates start-up and completion dates for each phase or task in a project. Gantt charts are useful for planning a project (as in a proposal) and for tracking it (as in a progress report). The Gantt chart in Figure 14.21 illustrates the schedule for a manufacturing project. Many professionals use project management software to produce Gantt and similar charts (see pages 100, 314).

A related type of chart used for scheduling activities on a project is the PERT chart. See page 100.

Pictograms

Pictograms are something of a cross between a bar graph and a chart. Like line graphs, pictograms display numerical data, often by plotting it across an x and y axis. But like a chart, pictograms use icons, symbols, or other graphic devices rather than simple lines or bars. In Figure 14.22 stick figures illustrate population changes during a given period. Pictograms are visually appealing and can be especially useful for nontechnical or multicultural audiences. Graphics software makes it easy to create pictograms.

GRAPHIC ILLUSTRATIONS

An illustration is sometimes the best and only way to convey information. Illustrations can be diagrams, maps, drawings, icons, photographs, or any other visual that relies mainly on pictures rather than on data or words. For example, the diagram of a safety-belt locking mechanism in Figure 14.23 accomplishes what the verbal text alone cannot: it portrays the mechanism in operation.

The safety-belt apparatus includes a tiny pendulum attached to a lever, or locking mechanism. Upon sudden deceleration, the pendulum swings forward, activating the locking device to keep passengers from pitching into the dashboard.

Illustrations are invaluable when you need to convey spatial relationships or help your audience see what something actually looks like. Drawings can be more effective than photographs because in a drawing you can simplify the view, remove any unnecessary features, and focus on what is important.

Diagrams

Diagrams are especially effective for presenting views that could not be captured by photographing or observing the object.

Exploded diagrams, like that of a brace for an adjustable basketball hoop in Figure 14.24, show how the parts of an item are assembled; they often appear in repair or maintenance manuals. Notice how parts are numbered for the user's easy reference to the written instructions.

Cutaway diagrams show the item with its exterior layers removed in order to reveal interior sections, as in Figure 14.25. Unless the specific viewing perspective is immediately recognizable (as in Figure 14.25), name the angle of vision: "top view," "side view," and so on.

Block diagrams are simplified sketches that represent the relationship between the parts of an item, principle, system, or process. Because block diagrams are designed to illustrate *concepts* (such as current flow in a circuit), the parts are represented as symbols or shapes. The block diagram in Figure 14.26 illustrates how any process can be controlled automatically through a feedback mechanism. Figure 14.27 shows the feedback concept applied as the cruise-control mechanism on a motor vehicle.

It is easy to create impressive-looking visuals by using electronic drawing programs, clip art, and image banks. However, specialized diagrams generally require the services of graphic artists or technical illustrators. The client requesting or commissioning the visual provides the art professional with an *art brief* (often prepared by writers and editors) that spells out the visual's purpose and specifications. The art brief is usually reinforced by a *thumbnail sketch*, a small, simple sketch of the visual being requested. (See Chapter 15 for thumbnail sketches also used in planning page layouts.) For example, part of the brief addressed to the medical illustrator for Figure 14.25 might read as follows:

- Purpose: to illustrate transsphenoidal adenomectomy for laypersons
- View: full cutaway, sagittal
- **Range:** descending from cranial apex to a horizontal plane immediately below the upper jaw and second cervical vertebra
- **Depth:** medial cross-section
- Structures omitted: cranial nerves, vascular and lymphatic systems

• Structures included: gross anatomy of bone, cartilage, and soft tissue—delineated by color, shading, and texture

Structures highlighted: nasal septum, sphenoid sinus, and sella turcica, showing the pituitary embedded in a 1.5 cm tumor invading the sphenoid sinus via an area of erosion at the base of the sella

Maps

Besides being visually engaging and easily remembered, maps are useful for showing comparisons and for helping users to *visualize* position, location, and relationships among complex data. Figure 14.28 conveys important statistical information in a format that is both accessible and understandable. Color enhances the percentage comparisons.

Photographs

Photographs are useful for showing exactly how something looks (Figure 14.29) or how something is done (Figure 14.30). But a photograph is hard to interpret if it includes needless details or fails to identify or emphasize the important material. One graphic design expert offers this advice for using photos in technical documents:

To use pictures as tools for communication, pick them for their capacity to carry meaning, not just for their prettiness as photographs, ...[but] for their inherent significance to the [document]. (White, *Great Pages* 110, 122)

Specialized photographs often require the services of a professional who knows how to use angles, lighting, and special film to achieve the desired focus and emphasis.

Whenever you include photographs in a document or presentation, follow these suggestions:

- Try to simulate the approximate angle of vision readers would have in identifying or viewing the item or, for instruction, in doing the procedure (Figure 14.31).
- *Trim (or crop) the photograph to eliminate needless details (Figures 14.32 and 14.33).*
- For emphasizing selected features of a complex mechanism or procedure, consider using diagrams in place of photographs or as a supplement (Figures 14.34 and 14.35).
- Label all the parts readers need to identify (Figure 14.36).
- For an image unfamiliar to readers, provide a sense of scale by including a person, a ruler, or a familiar object (such as a hand) in the photo.

- If your document will be published, obtain a signed release from any person depicted in the photograph and written permission from the copyright holder. Beneath the photograph, cite the photographer and the copyright holder.
- In your discussion, refer to the photograph by figure number and explain what readers should look for. Or include a prose caption.

Digital imaging technology allows you to work with photographs in all sorts of ways. Also, commercial vendors such as PhotoDisc, Inc. <www.photodisc.com> offer digital libraries of royalty-free stock photographs via CD-ROM or the Web. (See page 329 for more Web sources.) For a fee, you can download photographs, edit, and alter them as needed by using a program such as *Adobe Photoshop*, and then insert these images in your own print or electronic documents.

This capacity for altering photographic content creates potential for distortion and raises ethical questions about digital manipulation as well as legal questions about copyright and privacy infringement. On the ethical front, for example, a few key clicks can edit out, or insert, people or objects in a photograph or a video. Even live television video is subject to the same type of manipulation in real time. On the legal front, the unauthorized reproduction of a person's image could involve you in an expensive lawsuit.

COMPUTER GRAPHICS

NOTE

Many of the tasks formerly done by graphic designers and technical illustrators now fall to people with little or no formal training. Whatever your career, you could be expected to produce high-quality graphics for conferences, presentations, and in-house publications. This text offers only a brief introduction to these matters. Your best bet is to learn all you can about computer graphics and graphic design (perhaps by taking a class).

Selecting Design Options

Here is a brief listing of design options offered by various computer programs:

• Using spreadsheet software such as *Microsoft Excel*, you can create a variety of charts and graphs and update them easily whenever the data change. Or you can use the "Insert Chart" or "Insert Table" features in most word-processing programs.

- Using a drawing program such as *CorelDraw* or *Adobe Illustrator*, you can sketch, edit, and refine your diagrams and drawings on screen.
- Using project management software such as *Microsoft Project*, you can create Gantt charts, PERT charts, and other organizational and scheduling charts.
- Using presentation software such as *Microsoft PowerPoint*, you can create dynamic slides and other animated presentations.
- Using Web resources, you can import an endless array of graphics. For more on Web-based visual resources, see page 329.

Other, more specialized, programs for visual design are also available, but the ones above are fairly easy to master and useful to know.

Using Clip Art

Clip art is a generic term for collections of ready-to-use images (of computer equipment, maps, machinery, medical equipment, and so on), all stored electronically. Clip art packages allow you to import into your document countless images like the one in Figure 14.37. Using a drawing program, you can enlarge, enhance, or customize the image, as in Figure 14.38.

NOTE Although handy, clip art often has a generic or crude appearance that makes a document look unprofessional. Consider using clip art for icons only, for in-house documents, or for situations in which time or budget preclude using original artwork (Menz 5).

One form of clip art especially useful in technical writing is the icon (an image with all nonessential background removed). Icons convey a specific idea visually as in Figure 14.39. Icons appear routinely in computer documentation and in other types of instructions because the images immediately signal the action desired.

Whenever you use an icon, be sure it is "intuitively recognizable" to multicultural users ("Using Icons" 3). Otherwise, people could misinterpret its meaning—in some cases with disastrous results.

NOTE Certain icons have offensive connotations in certain cultures. Hand gestures, for example, are especially problematic: some Arab cultures consider the left hand unclean; a pointing index finger—on either hand—as in Figure 14.39, is a sign of rudeness in Venezuela or Sri Lanka (Bosley 5–6).

Using Color

Color often makes a presentation more interesting. Moreover, color attracts and focuses users' attention and helps them identify the various elements. In Figure 14.21, for example, color helps users sort out the key schedule elements of a Gantt chart for a major project: activities, time lines, durations, and meetings.

Color can help clarify a concept or dramatize how something works. In Figure 14.40 bright colors against a darker, duller background enable users to *visualize* the "heat mirror" concept.

Color can help clarify complex relationships. In Figure 14.41, an area map using six distinctive colors allows users to make various comparisons at a glance.

Color also can help guide users through the material. Used effectively on a printed page, color helps organize the user's understanding, provides orientation, and emphasizes important material.

On a Web page, color can mirror the site's main theme or "personality," orient the user, and provide cues for navigating the site. Figure 14.42 is a page from the National Oceanic and Atmospheric Administration. Sky-blue (or ocean-blue) as the dominant color (set against the blackness of outer space) reflects NOAA's mission in monitoring global climate. The striking image of the sun intersecting (or piercing) a depleted ozone shield helps underscore the urgency of ozone depletion as an environmental issue. In the masthead and elsewhere, subtle links in gray reversed type evoke the subtlety of the ozone depletion itself—a gradual, subtle process, but one with potentially grave consequences.

Following are just a few possible uses of color in page design (White, *Color* 39–44; Keyes 647–49). For more on designing pages, see Chapter 15.

USE COLOR TO ORGANIZE. Users look for ways of organizing their understanding of a document (Figure 14.43). Color can reveal structure and break material up into discrete blocks that are easier to locate, process, and digest.

- A color background screen can set off like elements such as checklists, instructions, or examples.
- Horizontal rules can separate blocks of text, such as sections of a report or areas of a page.
- Vertical rules can set off examples, quotations, captions, and so on.

USE COLOR TO ORIENT. Users look for signposts that help them find their place or find what they need (Figure 14.44).

- Color can help headings stand out from the text and differentiate major from minor headings.
- Color tabs and boxes can serve as location markers.
- Color sidebars (for marginal comments), callouts (for labels), and leader lines (for connecting a label to its referent) can guide the eyes.

USE COLOR TO EMPHASIZE. Users look for places to focus their attention in a document (Figure 14.45).

- Color type can highlight key words or ideas.
- Color can call attention to cross-references or to links on a Web page.
- A color ruled box can frame a warning, caution, note, or hint.

HOW TO INCORPORATE COLOR. To use color effectively, follow these suggestions:

- Use color sparingly. Color gains impact when it is used selectively. It loses impact when it is overused (*Aldus Guide* 39). Use no more than three or four distinct colors—including black and white (White, *Great Pages* 76).
- Apply color consistently to elements throughout your *document*. Inconsistent use of color can distort users' perception of the relationships (Wickens 117).
- *Make color redundant.* Be sure all elements are first differentiated in black and white: by shape, location, texture, type style, or type size. Different readers perceive colors differently or, in some cases, not at all. Many readers have

impaired color vision (White, Great Pages 76).

- Use a darker color to make a stronger statement. The darker the color the more important the material. Darker items can seem larger and closer than lighter objects of identical size.
- *Make color type larger or bolder than text type.* Try to avoid color for text type, or use a high-contrast color (dark against a light background). Color is less visible on the page than black ink on a white background. The smaller the image or the thinner the rule, the stronger or brighter the color should be (White, *Editing 229, 237*).

- *Create contrast.* For contrast in a color screen, use a very dark type against a very light background, say a 10- to 20-percent screen (Gribbons 70). The larger the screen area, the lighter the background color should be (Figure 14.46).
- **NOTE** Colors have different meanings in different cultures. In the United States for example, red signifies danger and green traditionally signifies safety. But in Ireland, green or orange carry political connotations in certain contexts. In Muslim cultures, green is a holy color (Cotton 169).

USING WEB SITES FOR GRAPHICS SUPPORT

The World Wide Web offers a broad array of visual resources. Following is a sampling of useful Web sites and gateways:

- *Clip art:* For a comprehensive and updated directory to clip art sites, including numerous free sources, go to <www.clipart.com>.
- *Photographs:* Vintage photos of people, places, and products can be found at <www.classicphotos.com>. For links to all types of photography sites, go to <www.photolinks.net>, which offers a search engine as well.
- Art images (of paintings, sculpture, and so on): Go to <www.artresources.com> for a search engine and links to art sites worldwide.
- *Maps:* For links to countless varieties of local, global, and political maps, check out
- <www.nationalgeographic.com/maps/index.html>.

 Audio and video: For examples, instructions, and software for adding audio and video to your own Web site, go to
 <www.streamingmediaworld.com/>.
- *Miscellaneous resources:* For photographic images, illustrations, clip art, motion, audio, type fonts, and graphics software, go to <www.eyewire.com>.
- **NOTE** Be extremely cautious about downloading visuals (or any material, for that matter) from the Web and then using them. Review the copyright law (page 138). Originators of any work on the Web own the work and the copyright. Keep in mind that any photograph—including one that might be offered as "free" clip art—is protected by copyright.

How to Avoid Visual Distortion

Although you are perfectly justified in presenting data in its best light, you are ethically responsible for avoiding misrepresentation. Any one set of data can support contradictory conclusions. Even though your numbers may be accurate, your visual display could be misleading.

Present the Real Picture

Visual relationships in a graph should accurately portray the numerical relationships they represent. Begin the vertical scale at zero. Never compress the scales to reinforce your point.

Notice how visual relationships in Figure 14.47 become distorted when the value scale is compressed or fails to begin at zero. In version A, the bars accurately depict the numerical relationships measured from the value scale. In version B, item Z (400) is depicted as three times X (200). In version C, the scale is overly compressed, causing the shortened bars to understate the quantitative differences.

Deliberate distortions are unethical because they imply conclusions contradicted by the actual data.

Present the Complete Picture

Without getting bogged down in needless detail, an accurate visual includes all essential data. Figure 14.48 shows how distortion occurs when data that would provide a complete picture are selectively omitted. Version A accurately depicts the numerical relationships measured from the value scale. In version B, too few points are plotted. Always decide carefully what to include and what to leave out.

Don't Mistake Distortion for Emphasis

When you want to emphasize a point (a sales increase, a safety record, etc.), be sure your data support the conclusion implied by your visual. For instance, don't use inordinately large visuals to emphasize good news or small ones to downplay bad news (Williams 11). When using clip art, pictograms, or drawn images to dramatize a comparison, be sure the relative size of the images or icons reflects the quantities being compared.

A visual accurately depicting a 100-percent increase in phone sales at your company might look like version A in Figure 14.49. Version B overstates the good news by depicting the larger image four times the size, instead of twice the size, of the smaller. Although the larger image is twice the height, it is also twice the *width*, so the total area conveys the visual impression that sales have *quadrupled*.

Visuals have their own rhetorical and persuasive force, which you can use to advantage—for positive or negative

purposes, for the reader's benefit or detriment (Van Pelt 2). Avoiding visual distortion is ultimately a matter of ethics.

For additional guidance, use the planning sheet in Figure 14.50, and the checklist below.

EXERCISES

- 1. The following statistics are based on data from three colleges in a large western city. They give the number of applicants to each college over six years.
 - ^{*c*} In 2000, *X* college received 2,341 applications for admission, *Y* college received 3,116, and *Z* college 1,807.
 - ^{*c*} In 2001, *X* college received 2,410 applications for admission, *Y* college received 3,224, and *Z* college 1,784.
 - ^{*c*} In 2002, *X* college received 2,689 applications for admission, *Y* college received 2,976, and *Z* college 1,929.
 - In 2003, X college received 2,714 applications for admission, Y college received 2,840, and Z college 1,992.
 - In 2004, X college received 2,872 applications for admission, Y college received 2,615, and Z college 2,112.
 - In 2005, *X* college received 2,868 applications for admission, *Y* college received 2,421, and *Z* college 2,267.

Display these data in a line graph, a bar graph, and a table. Which version seems most effective for a reader who (a) wants exact figures, (b) wonders how overall enrollments are changing, or (c) wants to compare enrollments at each college in a certain year? Include a caption interpreting each version.

- 2. Devise a flowchart for a process in your field or area of interest. Include a title and a brief discussion.
- 3. Devise an organization chart showing the lines of responsibility and authority in an organization where you work.
- 4. Devise a pie chart to depict your yearly expenses. Title and discuss the chart.
- 5. Obtain enrollment figures at your college for the past five years by gender, age, race, or any other pertinent category. Construct a stacked-bar graph to illustrate one of these relationships over the five years.
- 6. Keep track of your pulse and respiration at thirty-minute intervals over a four-hour period of changing activities. Record your findings in a line graph, noting the times and specific activities below your horizontal coordinate. Write a prose interpretation of your graph and give the graph a title.
- 7. In textbooks or professional journal articles, locate each of these visuals: a table, a multiple-bar graph, a multiple-line graph, a diagram, and a photograph. Evaluate each according to the revision checklist, and discuss the most effective visual in class.
- 8. Choose the most appropriate visual for illustrating each of these relationships. Justify each choice in a short paragraph.
 - a. A comparison of three top brands of skis, according to cost, weight, durability, and edge control.
 - b. A breakdown of your monthly budget.
 - c. The changing cost of an average cup of coffee, as opposed to that of an average cup of tea, over the past three years.
 - d. The percentage of college graduates finding desirable jobs within three months after graduation, over the last ten years.

- e. The percentage of college graduates finding desirable jobs within three months after graduation, over the last ten years—by gender.
- f. An illustration of automobile damage for an insurance claim.
- g. A breakdown of the process of radio wave transmission.
- h. A comparison of five cereals on the basis of cost and nutritive value.
- i. A comparison of the average age of students enrolled at your college in summer, day, and evening programs, over the last five years.
- j. Comparative sales figures for three items made by your company.
- 9. Computer graphics: Compose and enhance one or more visuals electronically. You might begin by looking through a recent edition of the *Statistical Abstract of the United States* (in the government documents, reserve, or reference section of your library). From the *Abstract*, or from a source you prefer, select a body of numerical data that will interest your classmates. After completing the planning sheet in Figure 14.50 (page 333), compose one or more visuals to convey a message about your data to make a point, as in these examples:
 - ^{*c*} Consumer buying power has increased or decreased since 1990.
 - ^{*c*} Defense spending, as a percentage of the federal budget, has increased or decreased since 2000.
 - Average yearly temperatures across the United States are rising or falling.

Experiment with formats and design options, and enhance your visual(s) as appropriate. Add any necessary prose explanations.

Be prepared to present your visual message in class, using either an overhead or opaque projector or a large-screen monitor.

- 10. Revise the layout of Table 14.5 according to the guidelines on page 334, and explain to readers the significant comparisons in the table. (*Hint:* The unit of measurement is percentage.)
- 11. Display each of these sets of information in the visual format most appropriate for the stipulated audience. Complete the planning sheet in Figure 14.50 for each visual. Explain why you selected the type of visual as most effective for that audience. Include with each visual a brief prose passage interpreting and explaining the data.
 - a. (For general readers.) Assume that the Department of Energy breaks down energy consumption in the United States (by source) into these percentages: In 1970, coal, 18.5; natural gas, 32.8; hydro and geothermal, 3.1; nuclear, 1.2; oil, 44.4. In 1980, coal, 20.3; natural gas, 26.9; hydro and geothermal, 3.8; nuclear, 4.0; oil, 45.0. In 1990, coal, 23.5; natural gas, 23.8; hydro and geothermal, 7.3; nuclear, 4.1; oil, 41.3. In 2000, coal, 20.3; natural gas, 25.2; hydro and geothermal, 9.6; nuclear, 6.3; oil, 38.6.
 - b. (For experienced investors in rental property.) As an aid in estimating annual heating and air-conditioning costs, here are annual maximum and minimum temperature averages from 1911 to 2000 for five Sunbelt cities (in Fahrenheit degrees): In Jacksonville, the average maximum was 78.4; the minimum was 57.6. In Miami, the maximum was 84.2; the minimum was 69.1. In Atlanta, the maximum was 72.0; the minimum was 52.3. In Dallas, the maximum was 75.8; the minimum was 55.1. In Houston, the maximum was 79.4; the minimum was 58.2. (From U.S. National Oceanic and Atmospheric Administration.)
 - c. (For the student senate.) Among the students who entered our school four years ago, here are the percentages of those who graduated, withdrew, or are still enrolled: In Nursing, 71 percent graduated; 27.9 percent withdrew; 1.1 percent are still enrolled. In Engineering, 62 percent graduated; 29.2 percent withdrew; 8.8 percent are still enrolled. In Business, 53.6 percent graduated; 43 percent

withdrew; 3.4 percent are still enrolled. In Arts and Sciences, 27.5 percent graduated; 68 percent withdrew; 4.5 percent are still enrolled.

- d. (For the student senate.) Here are the enrollment trends from 1993 to 2005 for two colleges in our university. In Engineering: 1993, 455 students enrolled; 1994, 610; 1995, 654; 1996, 758; 1997, 803; 1998, 827; 1999, 1046; 2000, 1200; 2001, 1115; 2002, 1075; 2003, 1116; 2004, 1145; 2005, 1177. In Business: 1993, 922; 1994, 1006; 1995, 1041; 1996, 1198; 1997, 1188; 1999, 1227; 1999, 1115; 2000, 1220; 2001, 1241; 1992, 1366; 2003, 1381; 2004, 1402; 2005, 1426.
- 12. Anywhere on campus or at work, locate at least one visual that needs revision for accuracy, clarity, appearance, or appropriateness. Look in computer manuals, lab manuals, newsletters,

financial aid or admissions or placement brochures, student or faculty handbooks, newspapers, or textbooks. Use the planning sheet in Figure 14.50 and the checklist (page 334) as guides to revise and enhance the visual. Submit to your instructor a copy of the original, along with a memo explaining your improvements. Be prepared to discuss your revision in class.

13. Locate a document (news, magazine, or journal article, brief instructions, or the like) that lacks adequate or appropriate visuals. Analyze the document and identify where visuals would be helpful. In a memo to the document's editor or author, provide an art brief and a thumbnail sketch (page 318) for each visual you would recommend, specifying its exact placement in the document.

Note: Be sure to provide enough detail for your audience to understand your suggestion clearly. For example, instead of merely recommending a "diagram of the toxic effects of lead on humans," stipulate a "diagram showing a frontal outline of the human body with the head turned sideways in profile view. Labels and arrows point to affected body areas to indicate brain damage, hearing problems, digestive problems, and reproductive problems."

14. Locate a Web page that uses color effectively to mirror the site's main theme or personality, to orient the user, and to provide cues for easy navigation. Download the Web page to a floppy disk and print it out using a color printer (or print the page directly from your screen if your computer has its own color printer). Using the analysis of Figure 14.42 (page 326) as a model, prepare a brief memo justifying your choice. Be prepared to discuss and illustrate the Web page's effectiveness in class.

Note: If your classroom is equipped with a computer and a large-screen monitor, consider doing your presentation electronically.

COLLABORATIVE PROJECTS

1. Assume that your technical writing instructor is planning to purchase five copies of a graphics software package for students to use in designing their documents. The instructor has not yet decided which general-purpose package would be most useful. Your group's task is to test one package and to make a recommendation.

In small groups, visit your school's microcomputer lab and ask for a listing of the graphics packages that are available to students and faculty. Select one package and learn how to use it. Design at least four representative visuals. In a memo or presentation to your instructor and classmates, describe the package briefly and tell what it can do. Would you recommend purchasing five copies of this package for general-purpose use by writing students? Explain. Submit your report, along with the sample graphics you have composed.

Do the same assignment, comparing various clip art packages. Which package offers the best image selection for writers in your specialty?

2. Compile a list of six World Wide Web sites that offer graphics support by way of advice, image banks, design ideas, artwork catalogs, and the like. Provide the address for each site, along with a description of the resources offered and their approximate cost. Report your findings in the format stipulated by your instructor. See page 329 for URLs that will get you started.

TECHNICAL COMMUNICATION IN THE NEWS

TECHNICAL COMMUNICATION IN THE NEWS

Visuals are easier than ever to produce

Visual language provides the basis of modern communication Visuals make for efficient communication Our audiences expect visuals

TYPICAL AUDIENCE QUESTIONS IN PROCESSING INFORMATION

Which information is most important?
Where, exactly, should I focus?
What do these numbers mean?
What should I be thinking or doing?
FIGURE 14.1 Visuals That Clarify and Simplify Notice how the words and numbers are

enhanced and clarified by familiar images and shapes.

Source: National Institute of Standards and Technology, 1992.

How visuals help neutralize reader resistance

FIGURE 14.2

A Visual Displaying the "Big Picture"

Source: Data from U.S. Environmental Protection Agency. See Table 14.3.

14.1 See examples of effective visuals at <www.ablongman.com/ lannonweb> Use visuals in situations like these

Types of Visuals and Their Uses

TABLES display organized data across columns and rows for easy comparison.Numerical tablesUse to present exact numericalvalues.Values.

Prose tables explanations, or instructions.

Use to organize verbal descriptions,

LANNcp14.doc - 27

GRAPHS translate numbers into shapes, shades, and patterns.

Bar graphs

Use to show comparisons.

Line graphs or other variables. Use to show changes over time, cost,

CHARTS depict relationships via geometric, arrows, lines, and other design elements.

Pie charts whole.

Use to relate parts or percentages to the

Organization charts departments, management structures, or other elements of a company.

Use to show the links among

Flowcharts a procedure or stages in a process. Use to trace the steps (or decisions) in

Gantt charts project relate to each other.

Use to depict how the phases of a

CHARTS (continued)

Tree charts or a concept interrelate. Use to show how the parts of an idea

Pictograms displayed or measured via icons (or isotypes). Use to symbolize the items being

GRAPHICILLUSTRATIONS rely on pictures rather than on data or words.

Representational simplified view, usually with essential parts labeled. Use to present a realistic but

Exploded diagrams is put together or how a user should assemble a product.

Use to explain how an item

Cutaway diagrams help explain how a device works. Use to show what is inside of a device or to

GRAPHIC ILLUSTRATIONS (continued)

Schematic diagrams

elements of a principle, process, or system to depict *function* instead of appearance.

Maps

visualize a specific location or to comprehend data about a specific geographic region.

Use to help readers to

Use to present the conceptual

Photographs something looks like.

Use to show exactly what

Symbols and icons Use to make concepts understandable to broad audiences, including international audiences, children, or people who may have difficulty reading.

(continues)

Types of Visuals and Their Uses (continued)

diagrams

QUESTIONS ABOUT A VISUAL'S PURPOSE AND INTENDED AUDIENCE

What is my purpose?

- What do I want the audience to do or think (know facts and figures, follow directions, make a judgment, understand how something works, perceive a relationship, identify something, see what something looks like, pay attention)?
- Do I want users to focus on one or more exact values, compare two or more values, or synthesize a range of approximate values?

Who is my audience?

- What is their technical background on this topic?
- What is their level of interest in this topic?
- Would they prefer the raw data or interpretations of the data?
- Are they accustomed to interpreting visuals?
- What is their cultural background?

Which type of visual might work best in

this situation?

- What forms of information should this visual depict (numbers, shapes, words, pictures, symbols)?
- Which visual display would be most compatible with the type of judgment, action, or understanding I seek from this audience?
- Which visual display would this audience find most accessible? Choices to consider in selecting visuals

PREFERRED DISPLAYS FOR SPECIFIC VISUAL PURPOSES

Purpose

Preferred Visual

| L | Organize numerical data | Table |
|---|---------------------------------|---|
| l | Show comparative data | Table, bar graph, line graph |
| ι | Show a trend | Line graph |
| ι | Interpret or emphasize data | Bar graph, line graph, pie chart, map |
| l | Introduce an unfamiliar object | Photo, representational diagram |
| l | Display a project schedule | Gantt chart |
| ι | Show how parts are assembled | Photo, exploded diagram |
| ι | Show how something is organized | Organization chart, map |
| ι | Give instructions | Prose table, photo, diagrams, flowchart |
| ι | Explain a process | Flowchart, block diagram |
| ι | Clarify a concept or principle | Block or schematic diagram, tree chart |
| l | Describe a mechanism | Photo, representational diagram, or cutaway |
| | 7. | |

diagram Technical data in printed form can be hard to interpret **TABLE 14.1**

Data Displayed in a Table

Organizes data in columns and rows, for easy comparison.

A caption explaining the numerical relationships

TABLE 14.2A Prose Table

Displays complicated numerical and verbal information.

Source: Home Buyer's and Seller's Guide to Radon. Washington: GPO, 1993.

TABLE 14.3 A Complex Table Can cause information overload for nontechnical audiences.

 Source: U.S. Environmental Protection Agency, Annual Toxics Release Inventory.

 How to use and display a table

HOW TO CONSTRUCT A TABLE

1. Number the table in its order of appearance and provide a title that describes exactly what is being compared or measured.

- 2. Label stub, column, and row heads (*Number of Awards; 1999, 2000, and so on; Federal Pell Grant*) so readers know what they are looking at.
- 3. Stipulate all units of measurement or use familiar symbols and abbreviations (\$, hr., no.). Define specialized symbols or abbreviations (Å for *angstrom, db* for *decibel*) in a footnote.
- 4. Compare data vertically (in columns) instead of horizontally (in rows). Columns are easier to compare than rows. Try to include row or column averages or totals, as reference points for comparing individual values.
- 5. Use horizontal rules to separate headings from data. In a complex table, use vertical rules to separate columns. In a simple table, use as few rules as clarity allows.
- 6. List the items in a logical order (alphabetical, chronological, decreasing cost). Space listed items for easy comparison. Keep prose entries as brief as clarity allows.
- Convert fractions to decimals, and align decimals and all numerical values vertically. Keep decimal places for all numbers equal. Round insignificant decimals to the nearest whole number.
- 8. Use *x*, *NA*, or a dash to signify any omitted entry, and explain the omission in a footnote ("Not available," "Not applicable").

- 9. Use footnotes to explain entries, abbreviations, or omissions. Label footnotes with lowercase letters so readers do not confuse the notation with the numerical data.
- 10. Cite data sources beneath any footnotes. When adapting or reproducing a copyrighted table for a work to be published, obtain written permission from the copyright holder.

FIGURE 14.3 A Simple Bar Graph

Shows a single relationship in the data.

FIGURE 14.4 A Multiple-Bar Graph

Shows two or more relationships simultaneously.

FIGURE 14.5 A Horizontal-Bar Graph

Accommodates lengthy labels. *Source: Bureau of Labor Statistics.*

FIGURE 14.6 A Stacked-Bar Graph

Compares the parts that make up each total.

FIGURE 14.7 A 100-percent Bar Graph

Compares percentage values. Source: U.S. Bureau of the Census. FIGURE 14.8

A Deviation Bar Graph

Displays both positive and negative values. Source: Bureau of Labor Statistics. 14.2 Microsoft Excel can generate many kinds of charts. Find out how at <www.ablongman.com/ lannonweb>

FIGURE 14.9 3-D Bar Graphs Adding a third axis creates the appearance of depth.

Source: Bureau of Labor Statistics. How to display a bar graph

FIGURE 14.10 A Simple Line Graph

Displays one relationship.

14.3 What is "chartjunk?" Find out more at <www.ablongman.com/ lannonweb>

FIGURE 14.11 A Multiple-Line Graph

Displays multiple relationships. Source: Bureau of Labor Statistics. A caption explaining the visual relationships FIGURE 14.12

A Deviation Line Graph

Displays both negative and positive values. Source: Chart prepared by U.S. Bureau of the Census. FIGURE 14.13 A Simple Band Graph Shading adds emphasis. FIGURE 14.14 A Multiple-Band Graph

Each item is added to the one below it.

How to display a line graph

FIGURE 14.15 A Graph with Three Variables

Compares two variables (time and temperature) with a third one (CO₂ levels).

Source: Federal Office of Science and Technology Policy (OSTP). Climate Change: State of Knowledge. Reprinted in Executive Office of Environmental Affairs. The State of Our Environment. Boston: State of Massachusetts, April 2000. How to display a pie chart

FIGURE 14.16 A Simple Pie Chart

Shows the relationships of parts or percentages to the whole.

FIGURE 14.17 An Exploded Pie Chart.

Source: Bureau of Labor Statistics. FIGURE 14.18 An Organization Chart

Shows how different people or departments are ranked and related.

FIGURE 14.19 A Flowchart for Producing a Textbook

Depicts a sequence of events, activities, steps, or decisions. *Source: Adapted from* Harper & Row Author's Guide.

FIGURE 14.20 An Outline Converted to a Tree Chart

Shows what items belong together and how they are connected.

FIGURE 14.21 A Gantt Chart

Depicts how the phases of a proj-ect relate to each other. Source: Chart created in Fast Track Schedule[™]. Reprinted by permission from AEC Software. 14.4 Learn more about project management at <www.ablongman.com/ lannonweb>

FIGURE 14.22 A Pictogram

In place of lines and bars, icons and symbols lend appeal and clarity, especially for nontechnical or multicultural audiences. *Source: U.S. Bureau of the Census.* Verbal text that requires a visual supplement **FIGURE 14.23**

A Diagram of a Safety-Belt Locking Mechanism

Shows how the basic parts work together.

Source: U.S. Department of Transportation.

FIGURE 14.24 An Exploded Diagram of a Brace for a Basketball Hoop

Shows how the parts are assembled.

Source: Courtesy of Spalding.

FIGURE 14.25 Cutaway Diagram of a Surgical Procedure Shows what

is inside. Source: Trans-sphenoidal Approach for Pituitary Tumor, © 1986 by The Ludann Co., Grand Rapids, MI. FIGURE 14.26

A Block Diagram Illustrating the Concept of Feedback

Depicts a single concept.

FIGURE 14.27 A Block Diagram Illustrating a Cruise-Control Mechanism

Depicts a specific application of the feedback concept.

An art brief for Figure 14.25

A thumbnail sketch of Figure 14.25

FIGURE 14.28 A Map Rich in Statistical Significance

Shows the geographic distribution of data. Source: U.S. Bureau of the Census. How to display a photograph **14.5** Learn some basic photo editing techniques at <www.ablongman.com/ lannonweb> FIGURE 14.29 Shows the Appearance of Something A Fixed-Platform Oil Rig FIGURE 14.30 Shows How Something Is Done Antibody Screening Procedure Source: SuperStock. Source: SuperStock. FIGURE 14.32 A Photograph That Needs to Be Cropped Replacing the Microfilter Activation Unit FIGURE 14.31 Shows a Realistic Angle of Vision Titration in Measuring Electron-Spin Resonance Source: SuperStock. Source: SuperStock. FIGURE 14.34 Shows a Complex Mechanism Sapphire Tunable Laser FIGURE 14.33 The Cropped Version of Figure 14.32 Source: SuperStock. FIGURE 14.36 Shows Essential Features Labeled Standard Flight Deck for a Long-Range Jet Source: SuperStock. flight engineer's panel FIGURE 14.35 A Simplified Diagram of Figure 14.34 Major Parts of the Laser overhead switch panel autopilot control first officer captain central levers central console Source: SuperStock. A sampling of resources for electronic visual design **FIGURE 14.38 A Customized Image** Source: Professor R. Armand Dumont. **FIGURE 14.37** A Clip Art Image Offers a ready-made image that can be customized. Source: Desktop Art[®]; Business I, [©] Dynamic Graphics, Inc. **FIGURE 14.39** Icons Provide a simple picture of the object, action, or concept each image represents. Source: <4YEO.com/pageelements/icons/ signs/index.htm> **FIGURE 14.40** Color Used as a Visualizing Tool Source: Courtesy of National Audubon Society. **FIGURE 14.41**

Colors Used to Show Relationships Source: National Oceanic and Atmospheric Administration (NOAA), National Climatic Data Center <www. ncdc.noaa.gov>.

14.6

Where is technical visualization going with 3-D graphics? Find out more at <www.ablongman.com/

lannonweb>

FIGURE 14.42 A Web Page That Uses Color Effectively This design embodies the advice on page 328 for incorporating color.

Source: National Oceanic and Atmospheric Administration <www.ozonelayer.noaa.gov>.

FIGURE 14.43

Color Used for Organization How color reveals organization FIGURE 14.44 Color Used for Orientation How color provides orientation FIGURE 14.45 Color Used for Emphasis

How color emphasizes How to use color for greatest effect

FIGURE 14.46

A Color Density Chart

Sources for visuals on the Web FIGURE 14.47 An Accurate Bar Graph and Two Distorted Versions Absence of a zero

baseline in B shrinks the vertical axis and exaggerates differences among the data. In C, the excessive value range of the vertical axis dwarfs differences among the data.

FIGURE 14.48 An Accurate Line Graph and a Distorted Version

Selective omission of data points in B causes the lines to flatten.

FIGURE 14.49

An Accurate Pictogram and a Distorted Version In B, the relative sizes of the images are not equivalent to the quantities they represent.

♦_ CHECKLIST for Usability of Visuals

(Numbers in parentheses refer to the first page of discussion.)

Content

- Does the visual serve a legitimate purpose (clarification, not mere ornamentation) in the document? (292)
- \clubsuit Is the visual titled and numbered? (334)
- \diamond Is the level of complexity appropriate for the audience? (334)
- $\hat{\Phi}$ Are all patterns in the visual identified by label or legend? (302)
- Are all values or units of measurement specified (grams per ounce, millions of dollars)? (301)
- \diamond Are the numbers accurate and exact? (301)
- $\hat{\Phi}$ Do the visual relationships represent the numerical relationships accurately? (330)
- \diamond Are explanatory notes added as needed? (301)
- ♦ Are all data sources cited? (301)

- Has written permission been obtained for reproducing or adapting a visual from a copyrighted source in any type of work to be published? (301)
- Is the visual introduced, discussed, interpreted, integrated with the text, and referred to by number? (334)
- $\hat{\Phi}$ Can the visual itself stand alone in terms of meaning? (334)

Arrangement

- Is the visual easy to locate? (334)
- Do all design elements (title, line thickness, legends, notes, borders, white space) work to achieve balance? (334)
- $\hat{\Phi}$ Is the visual positioned on the page to achieve balance? (334)
- $\hat{\Phi}$ Is the visual set off by adequate white space or borders? (334)
- Is a broadside visual turned 90 degrees so that the left-hand side is at the bottom of the page?
 (300)
- $^{\circ}$ Is the visual in the best location in the document? (334)

Style

- $\hat{\Phi}$ Is this the best type of visual for your purpose and audience? (295)
- \triangle Are all decimal points in each column of your table aligned vertically? (301)
- \diamond Is the visual uncrowded and uncluttered? (334)
- Is the visual engaging (patterns, colors, shapes), without being too busy? (334)
- \clubsuit Is the visual ethically acceptable? (330)

FIGURE 14.50 A Planning Sheet for Preparing Visuals

GUIDELINES for Fitting Visuals with Printed Text

Ensure that your document's visual and verbal elements complement each other:

- 1. *Place the visual where it will best serve your readers.* If it is central to your discussion, place the visual as close as possible to the material it clarifies. (Achieving proximity often requires that you ignore the traditional "top or bottom" design rule for placing visuals on a page.) If the visual is peripheral to your discussion or of interest to only a few readers, place it in an appendix so that interested readers can refer to it. Tell readers when to consult the visual and where to find it.
- 2. *Never refer to a visual that readers cannot easily locate.* In a long document, don't be afraid to repeat a visual if you discuss it again later.
- 3. *Never crowd a visual into a cramped space*. Set the visual off by framing it with plenty of white space, and position it on the page for balance. To save space and to achieve proportion with the surrounding text, consider the size of each visual and the amount of space it will occupy.
- 4. *Number the visual and give it a clear title and labels.* Your title should tell readers what they are seeing. Label all the important material and cite the source of data or of graphics.

- 5. *Match the visual to your audience*. Don't make it too elementary for specialists or too complex for nonspecialists. Your intended audience should be able to interpret the visual correctly.
- 6. *Introduce and interpret the visual.* In your introduction, tell readers what to expect:

INFORMATIVE As Table 2 shows, operating costs have increased 7 percent annually since 1980. UNINFORMATIVE See Table 2.

Visuals alone make ambiguous statements (Girill, "Technical Communication and Art" 35); pictures need to be interpreted. Instead of leaving readers to struggle with a page of raw data, explain the relationships displayed. Follow the visual with a discussion of its important features:

INFORMATIVE This cost increase means that

Always tell readers what to look for and what it means.

- 7. Use prose captions to explain important points made by the visual. Captions help readers interpret a visual. Use a smaller type size so that captions don't compete with text type (*Aldus Guide* 35).
- 8. *Never include excessive information in one visual.* Any visual that contains too many lines, bars, numbers, colors, or patterns will overwhelm readers. In place of one complicated visual, use two or more straightforward ones.
- 9. *Be sure the visual can stand alone.* Even though it repeats or augments information already in the text, the visual should contain everything users will need to interpret it correctly.

For more exercises, visit <www.ablongman.com/lannon>

TABLE 14.5

An Example of a Poor Layout

Educational Attainment of Persons 25 Years Old and Over

Highest level completed

| YEAR | HIGH SCHOOL (4 YEARS OR MORE) | COLLEGE (4 YEARS OR |
|-------|-------------------------------|----------------------------|
| MORE) | | |
| 1970 | 52.3164 | 10.7431 |
| 1980 | 66.5432 | 16.2982 |
| 1982 | 71.0178 | 17.7341 |
| 1984 | 73.3124 | 19.1628 |
| 1993 | 80.2431 | 21.9316 |
| 1996 | 81.7498 | 23.6874 |
| 2000 | 84.1354 | 26.7216 |

Source: Adapted from Statistical Abstract of the United States: 2003 (123rd ed.). Washington, DC: GPO. 154.

Source: U.S. Environmental Protection Agency. Protect Your Family from Lead in Your Home, 1995. 3.