Enhancing
Learning with Visuals

Knowledge Outcomes

The chapter addresses ISTE NETS-T 2.

1. Define visual literacy in your own words and identify two general strategies that you may use to teach visual literacy.
2. Name six types of visuals and describe an example of each.
3. Describe the roles that visuals play in learning.
4. Identify four methods for viewing visuals in the classroom.
5. Describe the advantages, limitations, and integration of visuals.
6. State in your own words the goals that good visual design aims to achieve.
7. Discuss four techniques for creating visuals.
8. Discuss two methods for capturing images.

Goal

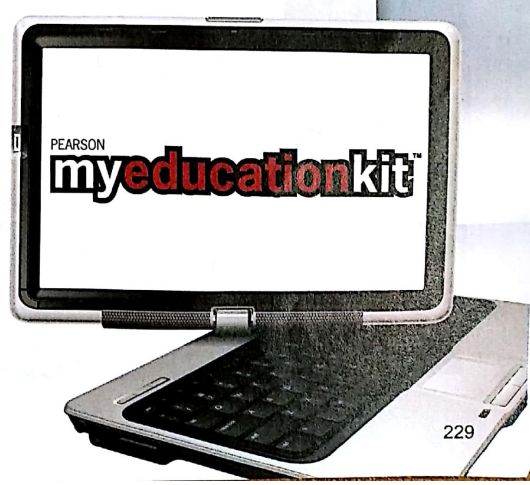
Discuss the various types and uses of visuals and the general principles for creating and using visuals to enhance student learning.

ASSURE Classroom Case Study

Mrs. Roman, a third-grade teacher, noted that her students' test scores indicated problems with visualizing mathematical figures. She especially noted their difficulties with mentally converting a two-dimensional picture on the test into the three-dimensional image that it represented. She spoke with Mrs. Edlund, the art teacher, to seek ways of helping her students understand visualization of ideas. Mrs. Edlund also wanted to find ways to use art to assess learning due to the school's interest in using art and technology in the learning process. She was trying to find a way to bring technology into the art classroom. Both teachers have noted that the children have difficulty thinking about their learning and expressing themselves.

*To view the **ASSURE Classroom Case Study** Video for this chapter, go to the MyEducationKit for your text and click on the ASSURE Video under Chapter 8 to explore how Mrs. Roman works with the art teacher, Mrs. Edlund, to seek ways of using art and technology to help her students understand the visualization of ideas.*

Throughout the chapter you will find reflection questions to relate the chapter content to the ASSURE Classroom Case Study. At the end of the chapter you will be challenged to develop your own ASSURE lesson that incorporates use of these strategies, technology, media, and materials, for a topic and grade level of your choice.



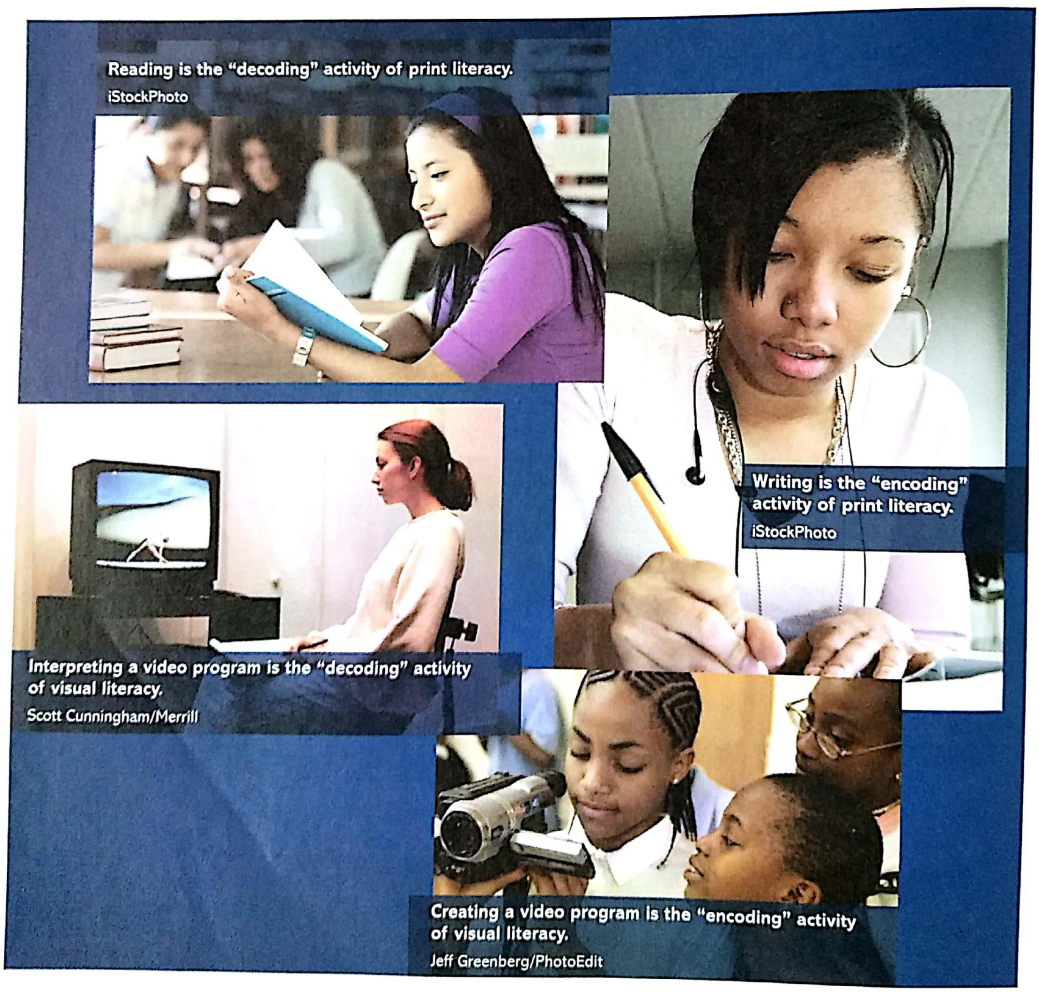
Introduction

In this chapter we will explore the selection and use of visuals for learning. Even though visuals are a commonly used classroom resource, the actual benefit to student learning is dependent on the teacher's ability to choose or create effective materials.

The design and use of visuals in instruction is an important consideration because so much learning involves visual imagery. Students must be able to visualize ideas, often using technology in the process. Most of the media discussed in this text—computer courseware, multimedia, video programs, and digital images—have a visual component. Although teaching is saturated with images, these visuals are underused in instruction and often relegated to the motivational or decorative aspects of learning. Many students learn more readily through visual imagery, and even verbal learners need visual supports to grasp certain concepts.

Visual Literacy

Visual literacy refers to the learned ability to interpret visual messages accurately and to create such messages. Visual literacy can be developed through two major approaches: helping learners to **decode,** or "read," visuals proficiently



TAKING A LOOK AT TECHNOLOGY INTEGRATION

Visual Literacy

Visuals inundate today's students, so their ability to read, understand, create, analyze, and learn from the persuasiveness of visuals has become more important than ever. Recent research has highlighted the value of using and creating visuals as learning tools in which students exhibit their learning, share their work with a global audience, and gain the skills and competencies required to succeed in an increasingly visual world. Technology plays a critical role in visual media design, development, and production, which all utilize critical thinking and problem-solving skills that enhance students' abilities to learn. Visual literacy development has been embedded within education programs throughout the United States and in many other countries to introduce students to the concepts and skills related to interpreting visuals and communicating visually. In these programs, teachers are encouraged to think visually and to focus students' attention on the visual aspects of printed and digitally available materials, including textbooks and storybooks. With programs designed for children from preschool through high school and college and encompassing both encoding and decoding visual information in all media, visual literacy has now become well accepted as an important aspect of the curriculum at all levels of education, best developed when embedded within content areas, using activities and assessment related to local, state, or national learning standards. The International Visual Literacy Association (IVLA) is an organization established for professionals involved in visual literacy.

Programs in public schools involve students in critical viewing activities and media production projects with the aim of meeting standards in technology while achieving content standards in subject areas such as language, literacy, social studies, and science. For example, students examine materials with a focus on how elements within each medium, such as color, perspective, design, or pacing can affect the impact of visual messages. Museum websites such as the National Gallery or the Library of Congress and many others support this analysis. Teachers are encouraged to consider students' visual learning styles in selecting materials, and the importance of visuals in developing multimodal skills and assisting second language learners is emphasized. In many districts, students are engaged in learning and in using technology appropriately to create poster campaigns, design new products and advertising, examine their television viewing habits, analyze commercial messages, and digitally report the results of their research. They produce and share digital movies, create websites, and produce photo exhibits and other media to both extend their learning and share their knowledge with the global society to which they belong.

Source: Rhonda S. Robinson, Northern Illinois University

by practicing visual analysis skills and helping learners to **encode,** or "write," visuals to express themselves and communicate with others.

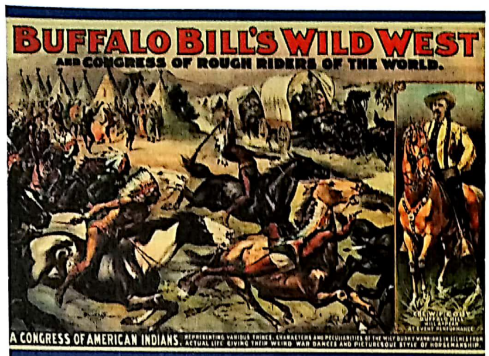
DECODING: INTERPRETING VISUALS

Seeing a visual does not automatically ensure that one will learn from it. Learners must be guided toward correct decoding of visuals. One aspect of visual literacy, then, is the skill of interpreting and creating meaning from visuals.

Many variables affect how a learner decodes a visual. Young children tend to interpret images more literally than older children. Very young children have been shown to have difficulty discriminating between realistic images and the objects they depict (DeLoache, 2005). Prior to the age of 12, children tend to interpret visuals section by section rather than as a whole. In reporting what they see in a picture, they are likely to single out specific elements within the scene. Students who are older, however, tend to summarize the whole scene and report a conclusion about the meaning of the picture.

In teaching, we must keep in mind that the act of decoding visuals may be affected by the viewer's cultural background. Different cultural groups may perceive visual materials in different ways. For example, let's say your instruction includes visuals depicting scenes typical of the home and street life of inner-city children. It is almost certain that students who live in such an area will decode these visuals differently than will students whose cultural backgrounds do not include firsthand knowledge of inner-city living. Similarly, a Native American child might interpret scenes depicting life in the Old West quite differently than an African American, Caucasian, or Mexican American child.

In selecting visuals, teachers have to make appropriate choices between the sorts of visuals that are preferred and those that are most effective. People do not necessarily learn best from the kinds of pictures they prefer. Most learners prefer colored visuals to black-and-white visuals. However, there is no significant difference in the amount of learning from either type except when color is related to the content to be learned. Most learners also prefer photographs over line drawings, even though in many situations



The cultural biases of a communicator, although unspoken, may be perceived by viewers having different cultural backgrounds.
SuperStock

The camcorder is a handy tool for creating visual reports.
Zunique/Newscom

line drawings may communicate better. Many learners prefer very realistic visuals to abstract representations, but teachers must strike a balance between the two to achieve their instructional purposes. Young learners prefer simple visuals and older students prefer more complex depictions, but simpler visuals are usually more effective, whatever the age group.

ENCODING: CREATING VISUALS

Another aspect of visual literacy is the ability to create visual presentations. Just as writing can spur reading, producing visuals can be a highly effective way of understanding their uses.

You should encourage students to present reports to the class by carefully selecting images from a CD or online collection, which will help them to develop their aesthetic talents. The video camcorder is a convenient tool for students to practice creating and presenting ideas and events pictorially. Students can also scan photos or drawings and insert them into a computer-generated presentation using presentation software such as PowerPoint and Keynote. Remind them to follow copyright guidelines in all these activities.

One skill nearly always included in visual education curricula is that of sequencing. Reading specialists have long known that the ability to sequence—that is, to arrange ideas in logical order—is an extremely important factor in verbal literacy, especially in the ability to communicate in writing. Students may need practice in arranging visuals into a logical sequence, which is a learned skill, like the verbal sequencing in reading and writing. For this reason, many visual education programs, especially for younger children, emphasize activities that call for arranging visuals. The sequential nature of digital presentations such as PowerPoint assists students in acquiring this skill.

TYPES OF VISUALS USED IN THE CLASSROOM

Let's explore six types of visuals commonly found in the classroom: pictures, drawings (including sketches and diagrams), charts, graphs, posters, and cartoons.

PICTURES

Pictures are photographic (or photograph-like) representations of people, places, and things. They are readily available on the Internet and in books, magazines, and newspapers. Although pictures are two-dimensional, you can compensate for the lack of three-dimensionality by providing a group of pictures showing the same object or scene from several different angles or positions. In addition, a series of sequential still pictures can suggest motion.

You may use photographs in a variety of ways. Photographs of local architecture, for example, can illustrate a unit on architectural styles. Digital pictures taken on field trips can be valuable for classroom follow-up activities.

Students should understand that textbook pictures are not decorations but are intended to be study aids and should be used as such. Encourage students to read them just as they do the printed words. You should teach skills for decoding textbook and computer pictures and motivate learners

to use them for study purposes. The quality and quantity of illustrations are, of course, important factors in textbook and media choice.

DRAWINGS

Drawings, sketches, and diagrams employ the graphic arrangement of lines to represent persons, places, things, and concepts. Drawings are readily found in textbooks and computer-based materials. You can use them in all phases of instruction, from introduction of topics through evaluation.

Teacher-made drawings can be effective aids to learning. You can sketch on a whiteboard to illustrate specific aspects of your instruction. For example, you may quickly and easily draw stick figures and arrows to show motion in an otherwise static representation.

You and your students can use such software programs as iWorks, Photoshop, and Adobe Illustrator for layout, design, and illustration. Most computer graphics software programs come with hundreds or even thousands of typefaces and clip-art images and can manipulate visuals in every imaginable way. Most word processing and presentation software comes with basic drawing tools and some enhanced tools, such as Microsoft's SmartArt.

CHARTS

Charts are visual representations of abstract relationships such as chronologies, quantities, and hierarchies. They appear frequently as tables and flowcharts. They are also presented in the form of organization charts, classification charts (e.g., the periodic table), and timelines (see Figure 8.1).

A chart should have a clear, well-defined instructional purpose. In general, it should express only one major concept or concept relationship. A well-designed chart should communicate its message primarily through the visual channel. The verbal material should supplement the visual, not the reverse. If you have a lot of information to convey, develop a series of simple charts rather than a single complex one.

GRAPHS

Graphs provide a visual representation of numerical data. They also illustrate relationships among units of data and trends over time. Data can be interpreted more quickly in graph form than in tabular form. Graphs are also more visually interesting than tables. Of the four major types of graphs—bar, pictorial, circle, and line (Figure 8.2)—the type you choose will depend largely on the complexity of the information you wish to present and the graph interpretation skills of your students.

Numerous computer software programs, typically spreadsheet software such as Microsoft Excel, make it easy to produce professional-looking graphs. Enter your data into the spreadsheet and with just a few clicks of the mouse the software creates the type of graph you wish.

POSTERS

Posters incorporate visual combinations of images, lines, color, and words. They are intended to capture and hold the viewer's attention at least long enough to communicate a brief message, usually a persuasive appeal. They must grab attention and communicate their message quickly. One drawback in using posters is that their message is quickly ignored because of familiarity. Consequently, they should not be left on display for too long.

Posters can be effective in numerous learning situations. They can stimulate interest in a new topic, announce a special event, or promote social skills. They may be employed for motivation—attracting students to a school recycling meeting or to the media center or encouraging them to read more. In industrial education courses, science laboratories, and other situations in which danger may be involved, posters can remind people of safety tips. Posters can also promote good health practices such as not using drugs and avoiding junk food or to illustrate a concept such as photosynthesis (Figure 8.3).

You can obtain posters from a variety of sources, including commercial companies, airlines, travel agencies, government departments, and professional organizations. You can make your own posters with colored markers, computer printouts, and devices that print poster-sized pages.

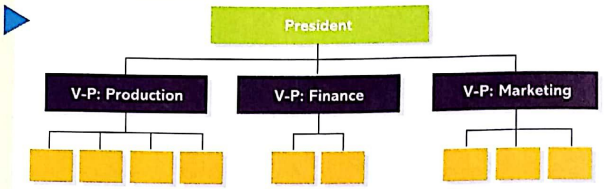
CARTOONS

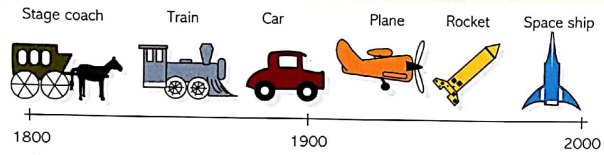
Cartoons are line drawings that are rough caricatures of real or fictional people, animals, and events. They appear in a variety of print media—newspapers, periodicals, textbooks—and range from comic strips intended primarily to entertain to drawings intended to make important social or political comments. Humor and satire are mainstays of the cartoonist's skill.

Cartoons are easily and quickly read and appeal to children of all ages. The best examples contain wisdom as well as wit. You can often use them to make or reinforce a point of instruction. Appreciation and interpretation, however, may depend on the experience and sophistication of the learner. Be sure the cartoons you use for instructional purposes are within the experiential and intellectual range of your students.

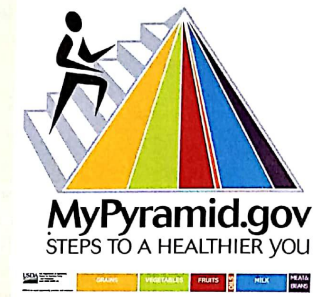
An additional option is for students to create cartoons with free online software, such as ToonDoo (see Figure 8.4). The software provides an array of characters, settings, and props for students to assemble into a cartoon that depicts the assigned message. For example, students can create cartoons

Organization charts show the structure or chain of command in an organization such as a company, corporation, civic group, or government department. Usually they deal with the interrelationships of personnel or departments.

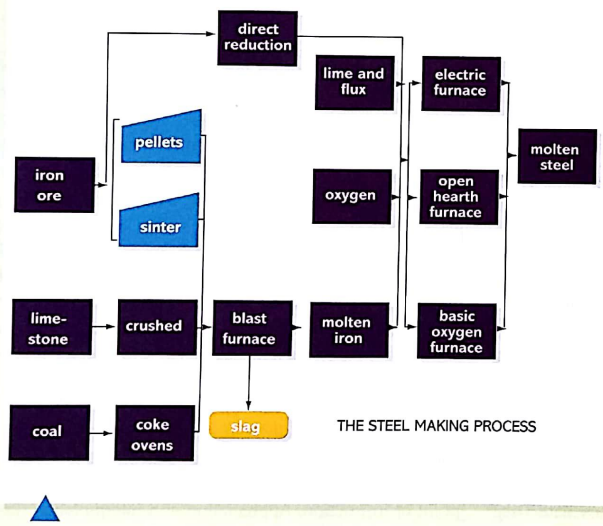




Timelines illustrate chronological relationships between events. They are most often used to show historical events in sequence or the relationships of famous people and these events. Pictures or drawings can be added to the time line to illustrate important concepts. Timelines are very helpful for summarizing a series of events.



Classification charts are similar to organization charts but are used chiefly to classify or categorize objects, events, or species. A common type of classification chart is one showing the taxonomy of animals and plants according to natural characteristics. The Food Guide Pyramid uses colors to organize foods into groups and to represent the proportions of these groups in a healthy diet.



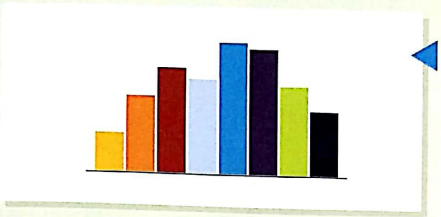
Flowcharts, or process charts, show a sequence, a procedure, or, as the name implies, the flow of a process. Flowcharts show how different activities, ingredients, or procedures are interrelated.

Import Percentages

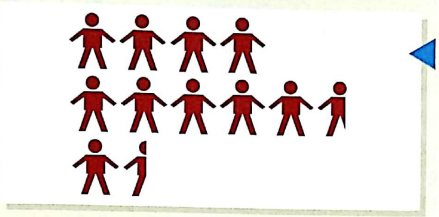
	Wheat	Cotton	Steel	Oil
USA	0	0	20	35
England	65	95	35	10
France	15	95	30	90
Japan	85	15	0	95
Brazil	0	0	20	70

Tabular charts, or tables, contain numerical information, or data. They are also convenient for showing time information when the data are presented in columns, as in timetables for railroads and airlines.

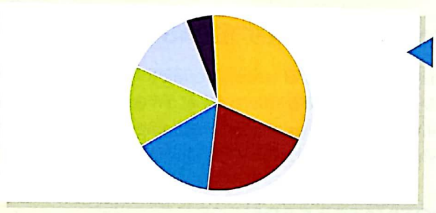
Figure 8.1
Types of Charts
It is important to understand which type of chart is best for conveying information to your students.



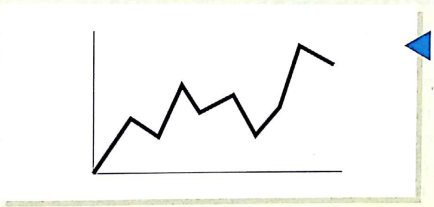
Bar graphs are easy to read and can be used with all students. The height of the bar is the measure of the quantity being represented. The width of all bars should be the same to avoid confusion. A single bar can be divided to show parts of a whole. It is best to limit the quantities being compared to eight or less; otherwise the graph becomes cluttered and confusing. The bar graph is particularly appropriate for comparing similar items at different times or different items at the same time; for example, the height of one plant over time or the heights of several students at any given time. The bar graph shows variation in only one dimension.



Pictorial graphs are an alternate form of the bar graph in which numerical units are represented by a simple drawing. Pictorial graphs are visually interesting and appeal to a wide audience, especially young students. However, they are slightly more difficult to read than bar graphs. Since pictorial symbols are used to represent a specific quantity, partial symbols are used to depict fractional quantities. To help avoid confusion in such cases, print values below or to the right of each line of figures.



Circle (or pie) graphs are relatively easy to interpret. In this type of graph, a circle or "pie" is divided into segments, each representing a part or percentage of the whole. One typical use of the circle graph is to depict tax-dollar allocations. The combined segments of a circle graph should, of course, equal 100 percent. Areas of special interest can be highlighted by illustrating a piece of pie separately from the whole.



Line graphs are the most precise and complex of all graphs. Line graphs are based on two scales at right angles. Each point has a value on the vertical scale and a value on the horizontal scale. Lines (or curves) are drawn to connect the points. Line graphs show variations in two dimensions, or how two or more factors change over time. For example, a graph can show the relation between pressure and temperature when the volume of a gas is held constant. Because line graphs are precise, they are very useful in plotting trends. They can also help simplify a mass of complex information.

Figure 8.2
Types of Graphs
It is important to understand which type of graph is best for conveying information to your students.

representing ideas on recycling, global warming, historical events, current events, or storylines from a book.

PURPOSES OF VISUALS

Visuals can serve a multitude of purposes in the classroom—to provide meaningful references for ideas, make abstract ideas more concrete, motivate your students, help direct attention to important concepts, repeat learning with different modalities, provide assistance in recalling prior learning, and most importantly reduce the effort required to learn.

PROVIDE A CONCRETE REFERENT FOR IDEAS

Words don't look or sound like the objects they stand for, but visuals are **iconic**—that is, they have some resemblance to what they represent (see Figure 8.5). Just like icons on a

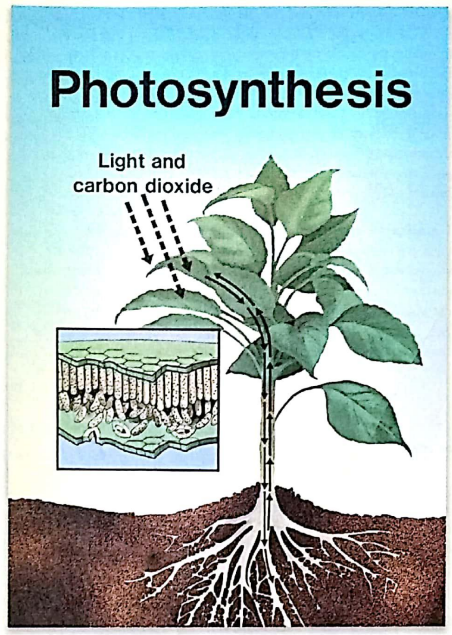


Figure 8.3
Poster
Posters catch the eye to convey a single message.

computer screen are used to represent the hard drive, your Internet browser, or the trash bin, visuals serve as an easily remembered link to the original idea. In the classroom, a teacher uses visuals to help students more easily remember

A color photograph can be a highly iconic visual, capturing much of the reality of the original referent.
Scott Cunningham/Merrill

the content being taught. For instance, a geometry teacher may bring in a bag of grocery items to teach shapes (e.g., orange = sphere, can = cylinder).

MAKE ABSTRACT IDEAS CONCRETE

Using photographs of people voting to represent freedom, a series of connected beads to show a model of DNA, or a diagram of word endings to assist beginning readers are examples of showing something "real" to illustrate abstract ideas.

MOTIVATE LEARNERS

Interest enhances motivation. Because visuals can increase interest in a lesson, they can motivate learners by attracting and holding their attention while generating engagement in the learning process. Visuals draw on learners' personal interests to make instruction relevant. For example, when teaching a history lesson, show "then" and "now" photos, such as buttons used before zippers, rotary telephones before cell phones, or butter churns before margarine tubs.

Figure 8.4
ToonDoo
ToonDoo software provides easy-to-use tools for students to create their own cartoons.
Source: www.toondoo.com. ToonDoo.com and the education-friendly version, ToonDooSpaces.com, are property of Zoho Corp, Inc. Reprinted by permission.

DIRECT ATTENTION

A **visual pointer** draws the learner's attention and thinking to relevant parts of a visual. Visual pointers may be color, words, arrows, icons, shading, or animation. Use these signals to focus attention to important points within complex visual content (Jeng, Chandler, & Sweller, 1997).

REPEAT INFORMATION

When visuals accompany spoken or written information, they present that information in a different modality, giving

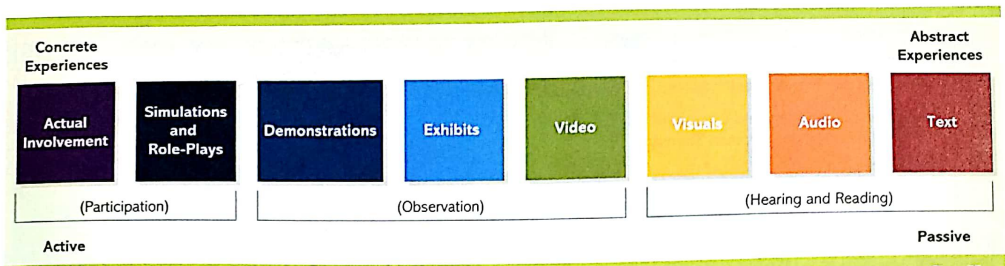


Figure 8.5
The Concrete–Abstract Continuum
Source: Adapted from Dale's Cone of Experience (Dale, 1969).

some learners a chance to comprehend visually what they might miss in verbal or text format.

RECALL PRIOR LEARNING

At the beginning of a lesson visuals can activate prior knowledge stored in long-term memory and at the end they can summarize the content from a lesson. These same visuals can be used at the beginning of the next lesson to remind the learners of what should have been learned (Figure 8.6).

REDUCE LEARNING EFFORT

Visuals can simplify information that is difficult to understand (Figure 8.7). Diagrams can make it easy to store and retrieve such information. They can also serve an organizing function by illustrating the relationships among elements, as in flowcharts or timelines. Often content can be communicated more easily and effectively visually (Mayer & Moreno, 2003). As a teacher, you want to convey your message in such a way that students expend little effort making sense out of what they are seeing, freeing them to use most of their mental effort for understanding the message itself.

CATAGORIES OF VISUALS

The visual selected for a particular situation should depend on the learning task. Visuals can be subdivided into six categories: realistic, analogical, organizational, relational, transformational, and interpretive (Clark & Lyons, 2004).

REALISTIC

Realistic visuals show the actual object under study. They can translate abstract ideas into a more realistic format (Figure 8.8), allowing instruction to move from the level of abstract (verbal) symbols on the Concrete–Abstract Continuum (see Figure 8.5) to a more concrete (visual) level. For example, the color photograph of a covered wagon in Figure 8.9 is a realistic visual. Using natural colors can heighten the degree of realism. No representation, of course, is totally realistic. The real object or event will always have aspects that cannot be captured pictorially, even in a three-dimensional color motion picture.

Research shows that under certain circumstances, realism can actually interfere with communication and learning. Dwyer (1978) concluded that rather than being a simple yes-or-no issue, the amount of realism desired has a curvilinear relationship to learning: either too much or too little realism may affect achievement adversely (Figure 8.10).

ANALOGICAL

Analogical visuals convey a concept or topic by showing something else and implying a similarity. Teaching about electrical current by showing water flowing in a series of parallel pipes is an example of using analogic visuals. An analogy for white blood cells fighting off infection might be an army attacking a stronghold. A study by Newby, Ertmer, and Stepich (1995) showed that student learning of biological concepts benefited from the use of visual analogies. Such visuals help learners interpret new information in light of prior knowledge and thereby facilitate learning.

ORGANIZATIONAL

Organizational visuals show the qualitative relationships among various elements. Common examples include classification charts, timelines, flowcharts, and maps, discussed earlier in this chapter. These graphic organizers can show relationships among the main points or concepts in textual material. This type of visual helps communicate the organization of the content (Figure 8.11).

1850	The first National Women's Rights Convention takes place in Worcester, Mass.
1869	Susan B. Anthony and Elizabeth Cady Stanton form the National Woman Suffarage Association.
1893	Colorado is the first state to adopt an amendment granting women the right to vote.
1913	Alice Paul and Lucy Burns form the Congressional Union to work toward the passage of a federal law to give women voting rights.
1920	The 19th Amendment to the Constitution, granting women the right to vote, is signed into law.
1935	Mary McLeod Bethune organizes the National Council of Negro Women to lobby against job discrimination, racism, and sexism.
1961	President John Kennedy establishes the President's Commission on the Status of Women and appoints Eleanor Roosevelt as chairwoman.
1963	Congress passes the Equal Pay Act, making it illegal for employers to pay a woman less than what a man would receive for the same job.
1964	Title VII of the Civil Rights Act bars discrimination in employment on the basis of race and sex.
1966	The National Organization for Women (NOW), the largest women's rights group in the United States, is founded by a group of feminists.
1971	*Ms. Magazine* is first published as a sample insert in *New York* magazine.
1972	Title IX bans sex discrimination in schools. As a result of Title IX, the enrollment of women in athletic programs and professional schools increases dramatically.
1996	The Supreme Court rules that the all-male Virginia Military School has to admit women in order to continue to receive public funding.
2003	The Supreme Court rules that states can be sued in federal court for violations of the Family Leave Medical Act.
2009	President Obama signs the Fair Pay Restoration Act, which allows victims of pay discrimination to file a complaint with the government against their employer.

Figure 8.6
History Timeline

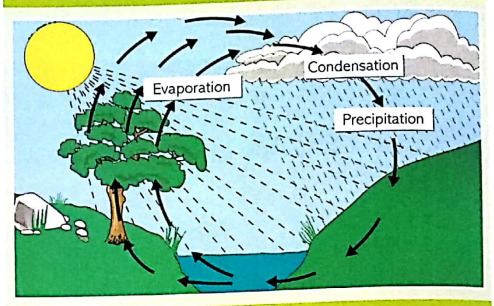


Figure 8.7
Visuals and Prior Learning
A complex process can be simplified visually and therefore made easier to understand and remember.

RELATIONAL

Relational visuals communicate quantitative relationships. Examples include bar and pie charts or line and pictorial graphs (see Types of Visuals Used in the Classroom section).

TRANSFORMATIONAL

Transformational visuals illustrate movement or change in time and space. Examples include an animated diagram showing how to perform a procedure such as tying a shoelace, a line drawing with movement indicators (Figure 8.12), or an animation of the water cycle.

ASSURE Case Study Reflection

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Review the ASSURE Classroom Case Study and video at the beginning of the chapter. Identify how the use of visuals helps students learn about visualizing three-dimensional objects. How might Mrs. Roman use visuals to assist her students in understanding how to visualize three-dimensional objects in a two-dimensional plane? What types of visuals might be most effective? How can visuals be used to facilitate learning in an art class? Would there be an advantage to using one type of visual over other choices?

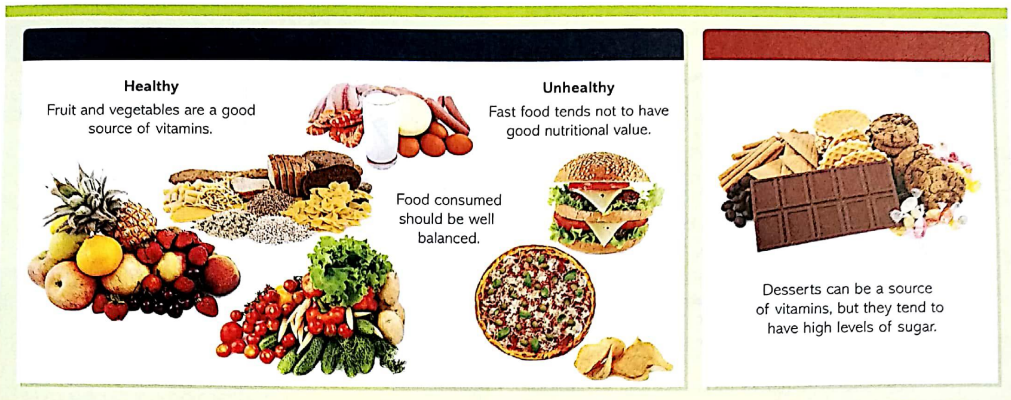


Figure 8.8
Chart as Realistic Visual
Visuals carry the main message in a well-designed chart.

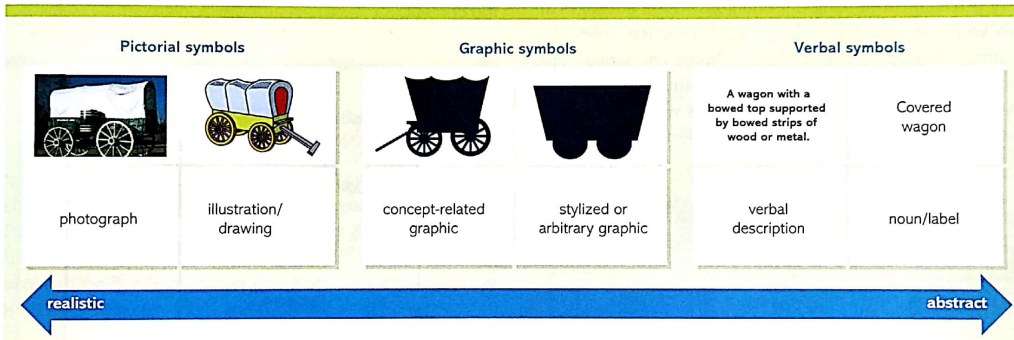


Figure 8.9
Photograph as Realistic Visual
Photographs, illustrations, graphics, and words represent a continuum of realism for different kinds of symbols.

INTERPRETIVE

Interpretive visuals illustrate theoretical or abstract relationships. Examples include a schematic diagram of an electrical circuit, the food pyramid, or an evacuation plan (Figure 8.13). Interpretive visuals help learners build mental models of events or processes that are invisible, abstract, or both.

VIEWING VISUALS

There are many ways to view visuals in a classroom. Still images may be enlarged and displayed on a screen by sending images from a computer or document camera to a digital projector or television monitor. Display surfaces for viewing visuals include whiteboards, interactive whiteboards, bulletin boards, cloth boards, magnetic boards, and flip charts (see Using Projected Visuals in the Classroom).

PRESENTATION SOFTWARE

Presentation software provides a format for displaying computer-based visuals with a digital projector. The most widely known presentation software is PowerPoint. Students, as well as teachers, can use templates to produce

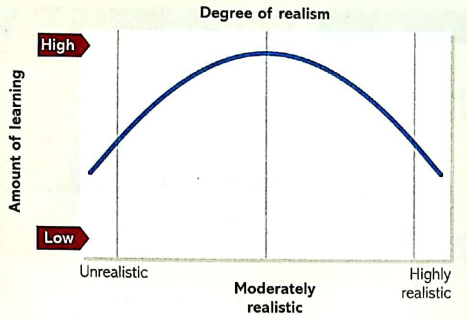


Figure 8.10
The Relationship between Realism and Learning
Visuals tend to become less useful as they approach the extremes of very realistic or very abstract.

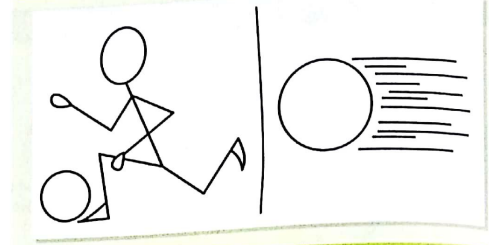


Figure 8.12
Transformational Visuals
An active posture, as in the drawing on the left, communicates movement more reliably than arbitrary graphic conventions such as speed lines, as in the drawing on the right.

very professional-looking presentations. These packages allow you to include text; draw pictures; produce tables, diagrams, and graphs; import digital photos and video clips; include audio; and create animation. Students, as well as teachers, can make digital presentations with little training on the software itself. Most software includes "Wizards," or guides, to assist users. Templates provide a variety of designs and all the user has to do is select the template and input the content.

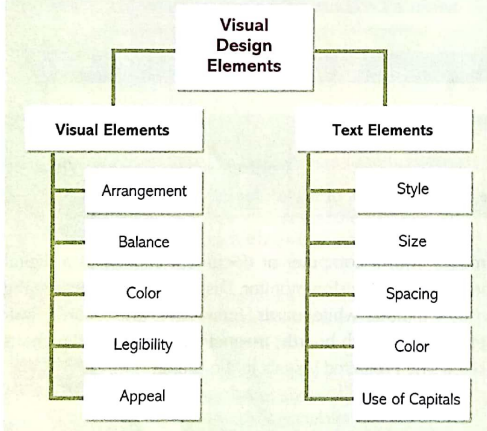


Figure 8.11
Organizational Charts
An organizational chart, such as this representation of a section of this chapter, can help show relationships among concepts.

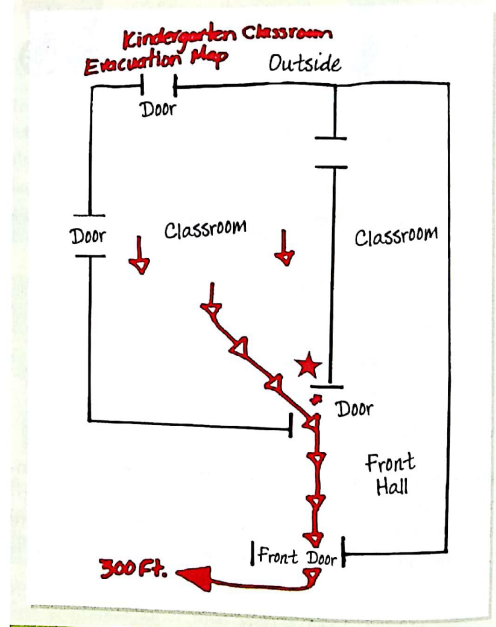
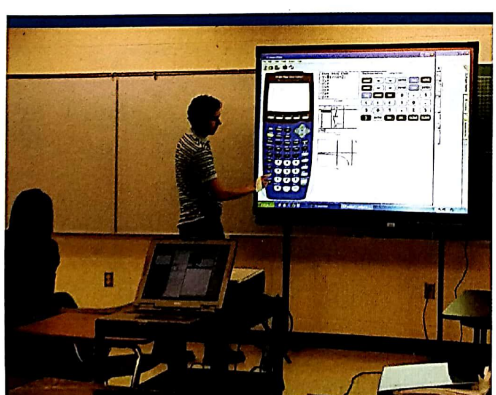


Figure 8.13
Evacuation Plan
An evacuation plan is an example of an interpretive visual.
Source: Annie Pickert/Pearson

USING Projected Visuals in the Classroom

- *Use visual variety.* Mix the types of visuals, adding verbal titles to help break the presentation into segments. Use visuals that are not cluttered with illegible details.
- *Rehearse.* Plan and rehearse your narration to accompany projected visuals if it is not already recorded in an audio medium.
- *Keep it moving.* Limit your discussion of each visual. In most cases, do not show a visual for more than 20 to 30 seconds without adding to it, changing to the next visual, or using a keyboard command to change the screen to black (press "B") or to white (press "W").
- *Pause for discussion.* Get students actively involved by asking relevant questions during your presentation. Provide written or verbal cues to highlight important information contained in the visuals.
- *Summarize frequently.* Every so often, assist your audience in their efforts to "see" the big picture.
- *Set up in advance.* Position the projector so that the image fills the screen from top to bottom and from left to right. Be sure that the image is not so near the bottom of the screen that students in the back of the room cannot see the whole image.
- *Get attention.* Shift students' attention to the screen by turning on the projector; direct it back to yourself by turning it off. Don't turn on the projector again until you are ready for students to look at the screen.
- *Use notes.* Plan ways to add meaningful details to the image during projection; this infuses an element of spontaneity and helps maintain student interest and active participation. Write key words on note cards to allow you to speak naturally instead of reading from a script.
- *Test visually.* Because the presentation presumably is providing critical visual information, consider using visuals to test mastery of visual concepts. You can ask individual students to identify or describe the object or process shown.

Presentation software allows you to generate handouts for your students. From one to nine slides can be put on each sheet of paper. The software also allows you to create "Note Pages" that contain only three slides per page and include blank lines next to each slide. With this format, students take notes on the handouts, rather than frantically copying down both what is on the slides and what you say.



Visuals can help learners recall prior learning.
Bob Daemmrich/PhotoEdit

ASSURE Case Study Reflection

PEARSON myeducationkit™

Review the ASSURE Classroom Case Study and video at the beginning of the chapter. Consider the benefits for Mrs. Roman in using PowerPoint when teaching math concepts? How can she get students to explain their ideas? How might Mrs. Edlund use PowerPoint as part of her art lessons? What can she do to have children connect what they are learning in art class with their math lessons?

DIGITAL IMAGES

Visuals can be captured and stored in a digital format by using a digital camera or a scanner. Digital storage methods include CDs, DVDs, portable storage devices, and computer hard drives. Individuals or small groups can view or project the images on a computer screen. For showing digital images to a group, you can use a large television monitor or a digital projector.



TECHNOLOGY for Diverse Learners

Presentation Software

Teachers can use several methods to make presentations more accessible for students with visual impairments, including converting text to Braille. Another approach involves increasing the interaction between teacher and students during and immediately after the presentation. Greater verbalization and descriptions of the text and images enhances comprehension and retention by students with visual impairments—and all other students as well!

Students who are developing new mathematical concepts may find the additional visuals to be very beneficial. The ability to connect the components of a subject such as mathematics with visuals helps students make their own mental images and thus enhances their understanding of the concepts being taught. For these students, displays such as graphs, line drawings, or charts might assist them in recalling essential information during an assessment.

Putting ideas into visual forms is a great way to challenge students who are ready to move beyond more traditional formats in demonstrating their learning. Asking students to prepare visuals in the form of drawings, charts, or graphics may allow them the flexibility to express their knowledge in unique and interesting ways.

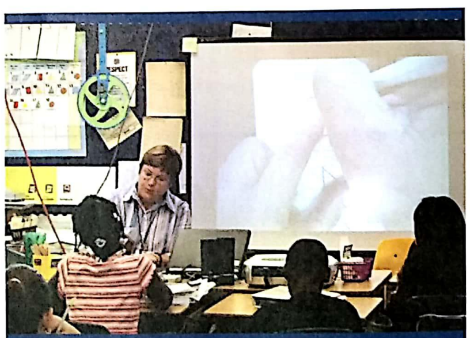
ASSURE Case Study Reflection

PEARSON myeducationkit™

Review the ASSURE Classroom Case Study and video at the beginning of the chapter. What kinds of images would be best for Mrs. Roman to use? What could Mrs. Edlund do with the school's digital cameras in art class?

A **document camera** is a video camera mounted on a copy stand that is pointed downward at documents, flat pictures, graphics, or small objects (such as coins). The image may be shown with a digital projector or a large-screen television monitor within the room, or it may be transmitted to distant sites via web-conferencing or telecommunications technology. Any sort of visual can be placed on the stage, and you can manipulate the material or write on paper placed on the stage.

One alternative to the copy stand version of a document camera is the computer flex camera, such as the Video Flex camera from Ken-A-Vision, which is designed for use in



Teacher or students can use document cameras to project large images of hands-on demonstrations.
Zuma/Newscom

The document camera is easy for the teacher to use to show visuals or small objects to a class.
Courtesy of AverMedia Technologies, Inc.

face-to-face classrooms as well as telecommunications. This camera can be connected to the television monitor, digital projector, or computer and used in a similar way as the document camera. The advantage to using this type of camera is that it is smaller and less expensive. A limitation is that the quality of the image may be compromised.

ASSURE Case Study Reflection

PEARSON myeducationkit™

Review the ASSURE Classroom Case Study and video at the beginning of the chapter. Consider what types of images Mrs. Roman might use to help the children explain their ideas? Will projecting images of paintings assist Mrs. Edlund in explaining art techniques to the third graders? What questions should she ask to help them with their thinking about visual images?

OVERHEAD PROJECTION

The **overhead projection** system is still widely used in classrooms because of its availability, low cost, and ease of use. The typical overhead projector is a simple device (Figure 8.14). Basically, it is a box with a large "glass" on the top surface. Light from a powerful lamp inside the box is condensed by a lens and passed through a transparency placed on the stage. A lens-and-mirror system mounted on a bracket above the box turns the light beam 90 degrees and projects the image back over the shoulder of the presenter.

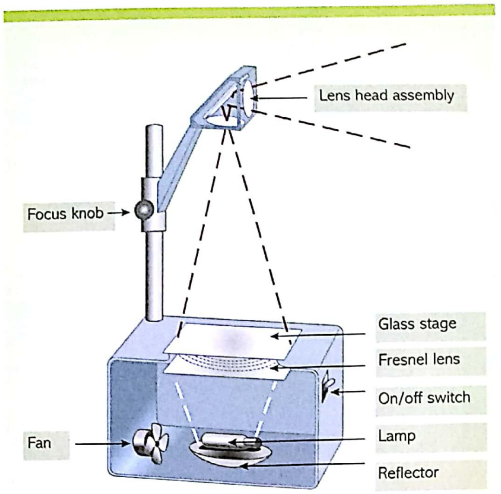


Figure 8.14
Overhead Projection
The overhead projector lamp transmits light through the glass stage to display content on the transparency.

In the instructional setting, the general term **transparency** has taken on the specific meaning of the 8-by-10-inch transparent film used with the overhead projector. You may use transparencies individually or make them into a series of images consisting of a base visual with one or more overlays. **Overlays** are sheets of transparent film, each containing additional information, that are laid over the base transparency. You may then explain complex topics step by step by

USING Visuals in the Classroom

- *Use large visuals that everyone can see simultaneously.* Also be certain that the font size is legible. If visuals are not large enough for all to see, use one of the projection techniques described in this chapter.
- *Use visuals that are not cluttered with illegible details.*
- *Cover irrelevant material with plain paper.*
- *Hold visuals steady when showing them to a group by resting them against a desk or table or putting them on an easel.*
- *Limit the number of visuals used in a given period of time.* It is better to use a few visuals well than to overwhelm your audience with an abundance of underexplained visuals.
- *Use just one visual at a time, except for purposes of comparison.* Lay one visual flat before going on to the next.
- *Keep your students' attention and help them learn from a visual by asking direct questions about it.*
- *Teach your students to interpret visuals.*
- *Provide written or verbal cues to highlight important information contained in the visuals.*

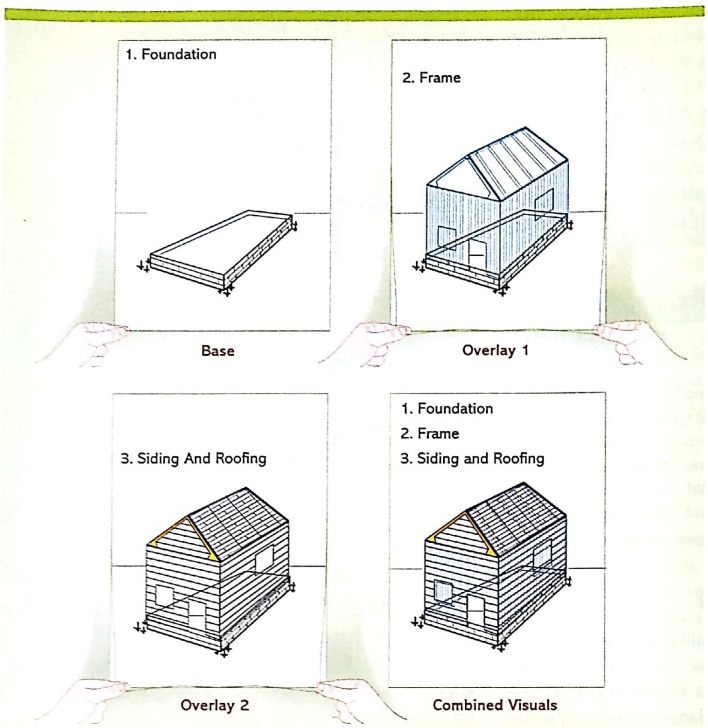


Figure 8.15
Overlays
By means of overlays, the presenter can build up complex visuals step by step.

flipping a series of overlays one at a time, adding additional features to a diagram (Figure 8.15).

PRINTED VISUALS

The simplest use of visuals is in printed form in a book, on the wall, or held by the teacher. Printed visuals are easy to use because they do not require any equipment. They are relatively inexpensive; in fact, many can be obtained at no cost. They can be used in many ways at all levels of instruction and in all disciplines.

ADVANTAGES

- *Readily available.* Visuals are pervasive. They are in textbooks, computer programs, and most instructional materials.
- *Range of materials.* Visuals cover the complete range of curriculum areas and grade levels.
- *Ease of preparation.* You can easily prepare your own visuals and displays as described in this chapter.
- *Inexpensive.* Visuals are available at little cost. Many are free.
- *Simplification of complex ideas.* Visuals help to simplify even the most complex content and relationships. As the old adage goes, "A picture is worth a thousand words!"
- *Ease of use.* Visuals are very easy to use. Even young children can effectively use them for presentation of ideas.
- *Interactivity.* Visuals are ideal for "what if" displays of spreadsheet data or brainstorming activities using such software as Inspiration. This becomes an interactive medium when viewers' decisions or ideas are fed into the program and the outcome is displayed on the screen.
- *All students have equal view.* Properly used visuals permit everyone to have an equal opportunity to view the same material easily at the same time.

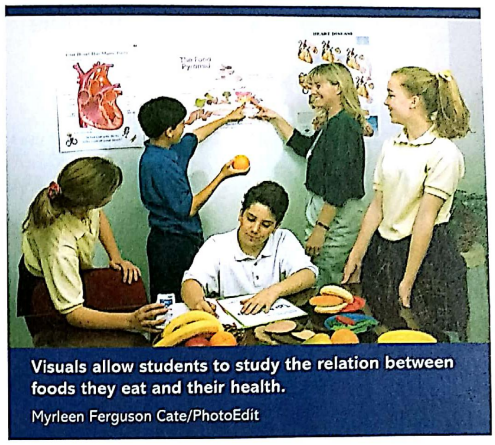
LIMITATIONS

- *Two-dimensional.* Visuals are two-dimensional and show only one view of an object or scene. Using multiple views or software that provides a three-dimensional perspective to images can compensate for this limitation.
- *Too much on one visual.* Some people put too many words on one visual. Limit the number of words on each.
- *Bulky hardware.* Visual displays often require a large monitor, which can be bulky, heavy, and cumbersome to move without a cart, or a digital projector, which requires a computer and a screen on which to project. You cannot use projected digital displays without a monitor or digital projector.
- *Expense.* High-quality digital cameras, scanners, and projectors are expensive to purchase. You may not be satisfied with lower-priced equipment that may lack the capability to meet your instructional needs.

INTEGRATION

Every teacher can integrate visuals effectively to promote learning. Visuals are useful in a wide variety of instructional situations. Applications may be found in all curriculum areas at all grade levels, as in the following examples:

- *Art.* Illustrate the use of color to evoke emotions; demonstrate what happens when two colors are combined; show examples of art from various periods.
- *Consumer and family science.* Group viewing of sewing patterns, textiles, and recipes; individual study of various furniture styles and layouts; guidelines for healthy eating.
- *Drama.* Put a floor plan on the base transparency and add overlays to show acting circles and how areas are lit; examples of different facial expressions; a variety of stage layouts for the same production.
- *Foreign language.* Students examine images and texts related to their study of German; the teacher assigns small groups of students to study different Spanish-speaking countries. Each small group works collaboratively to prepare a presentation, with drawings and charts, to share with the class. They use pictures to help present their information.
- *Health.* Study the need for a healthy diet to support growing bodies. For example, some posters and other visual materials were obtained by one teacher from local sources. The students put together a display of visuals showing various foods, along with additional visual materials to explain the significance of the foods that were selected.
- *Language arts.* Demonstrate examples of plagiarism; use elementary-level books with colorful visuals accompanying the story to motivate young readers; show a study print illustrating a rural scene and ask each student to write a short story related to the visual.
- *Library skills.* Show a floor plan of the layout of the school media center as part of library orientation; illustrate the various sections of a card from the card catalog; show examples of bibliographic citations.
- *Mathematics.* Display a graph showing the algebraic relationship between the values of x and y in an equation; demonstrate how to measure the distance between any two points on a map using a clear plastic ruler over a transparency.
- *Music.* Show a staff with notes arranged in three-part harmony, with different colored notes for each part; provide pictures of various types of instruments for students to study.
- *Physical education.* Use still pictures of warm-up exercises to remind each student of the body positions and sequence; illustrate various basketball plays.
- *Science.* Require each student before attempting a solution to visualize a physics problem by drawing a diagram that shows the relationships among the known qualities and the unknown value; provide a CD for students to view animals of the world as they prepare to present a play for the PTA depicting endangered species; demonstrate the stages of volcanic eruptions.
- *Social studies.* Compare typical living conditions of children from various countries around the world; study battles and timelines for a war; "tour" local historical sites.
- *Vocational/technical.* Invite a guest speaker from a local manufacturing company to provide a photographic tour for students without traveling to the plant; project blueprints for group study.



Visuals allow students to study the relation between foods they eat and their health.

Myrleen Ferguson Cate/PhotoEdit

Students use visuals to study a foreign language.

Jonathan Nourok/Getty

WHEN to USE Visuals

Use when student learning will be enhanced by . . .

Guidelines	Examples
simplifying complex concepts	A high school teacher uses a genetics chart to show dominant and recessive traits. Students take digital photos of each classmate and classify them into genetic groups (e.g., attached ear lobes, curly hair, eye color). Middle school students select and assemble photos into a PowerPoint presentation that represents their concept of freedom.
seeing relationships	Early childhood students study historical photos from the 1800s that show children in their homes to identify similarities and differences with their current home lives. A high school history teacher projects a spreadsheet chart showing population growth in the local community over the past 100 years. She has students predict changes over the next 100 years and then shows the predicted changes on the chart by changing the numerical values of various cells.
depicting processes	Elementary students in social studies build a model Alaskan igloo while using a disposable camera to create a photo journal of the building process. An ESL elementary teacher projects an interactive bilingual (English/Spanish) chart showing the life of a seed.
stimulating interest	When introducing Shakespeare to middle school students, the teacher begins the lesson by using study prints showing different scenes of a Shakespearean play to stimulate interest in the topic. When studying cultural backgrounds, each elementary student uses the document camera to share a drawing of her or his ethnic history.
encouraging creativity	Students work in pairs to create their own political cartoons of a historical event. Middle school student pairs write original math word problems on a transparency so the problem can be solved as a whole-group activity led by the teacher.

VISUAL DESIGN GUIDELINES

Designing a visual begins with gathering or producing the individual pictorial and text elements that you expect to use. This assumes, of course, that you have already determined students' needs and interests regarding the topic and decided what objective(s) you hope to achieve through the visual you are planning. The following guidelines are applicable to computer screens, multimedia programs, printed materials, whiteboards, exhibits, overhead transparencies, PowerPoint slides, and bulletin boards.

ARRANGEMENT

First you must decide which elements to include in your visual. Then you are ready to consider its overall "look" or **arrangement.** The idea is to establish an underlying pattern—to determine how the viewer's eye will flow across your display.

If you are planning a series of visuals, such as a set of PowerPoint slides, a multipage handout, or a series of computer screens, you should be consistent in your arrangement of the elements. As viewers go through the series of visuals they begin unconsciously to form a set of rules about where information will appear in your display.

BALANCE

A psychological sense of equilibrium, or **balance,** is achieved when the "weight" of the elements in a visual is equally distributed on each side of an axis, either horizontally or vertically or both. When the design is repeated on both sides, the balance is symmetrical, or formal.

In most cases, though, for visuals that will catch the eye and serve an informational purpose you should aim to achieve an asymmetrical, or informal, balance. With asymmetrical balance there is rough equivalence of weight, but with different elements on each side (e.g., one large open

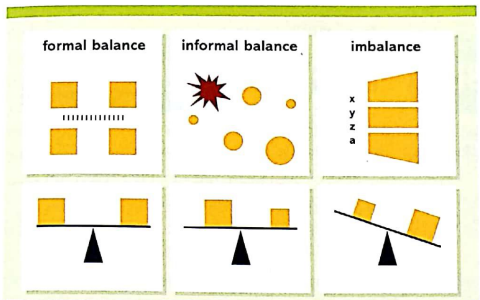


Figure 8.16
Visual Balance
The analogy of a balance scale, shown in the bottom row, represents the three different types of balance.

square on one side, three small dark circles on the other). Informal balance is preferred because it is more dynamic and interesting than formal balance (Figure 8.16). In general, try to avoid imbalance—using a distinctly disproportionate weight distribution—because it tends to be jarring to the viewer.

COLOR

When choosing a color scheme for a visual, consider the harmoniousness of the colors. The color wheel is useful in helping us understand the relationships among the colors of the visible spectrum (Figure 8.17).

Any two colors that lie directly opposite each other on the color wheel are called **complementary colors**—for example, red and green or yellow and violet. Complementary colors often harmonize well in terms of an overall color scheme. However, try not to directly juxtapose two complementary colors (e.g., placing green letters on a red background). There are two reasons for this. First, if the colors are of equal value, or darkness, the letters will not have good contrast. Second, when saturated (intense) complementary colors are placed directly next to each other the eye cannot focus on both at the same time, so you get an unpleasant vibrating effect.

Colors that lie next to each other on the color wheel are called **analogous colors**—for example, blue-green, blue, and blue-violet. Analogous colors may also form pleasing combinations when used together in a visual.

When thinking about a color scheme for PowerPoint slides or a computer screen, it may be helpful to think in terms of a background color, a color for the images or text appearing against that background, and a color for highlights. Colors that work well together are shown in Table 8.1.

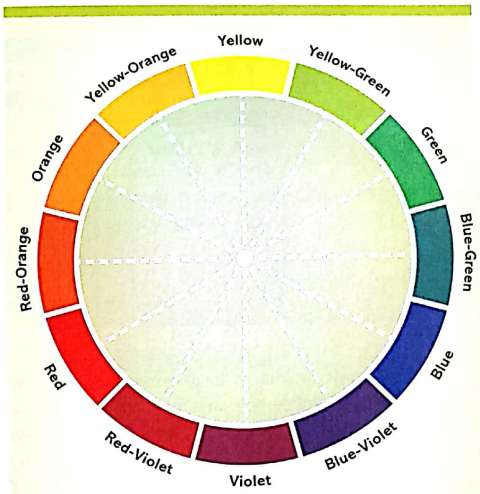


Figure 8.17
Color Wheel
The traditional color wheel helps one visualize complementary colors.

Different color combinations provide different contrasts. As indicated in Figure 8.18, black on yellow is the most legible combination. Obviously, a combination of dark figures on a dark background will be even less legible than the combinations shown.

Table 8.1 Effective Combinations for Background and Images for PowerPoint Slides and Computer Screens

Background	Foreground Images and Text	Highlights
white	dark blue	red, orange
light gray	blue, green, black	red
blue	light yellow, white	yellow, red
light blue	dark blue, dark green	red-orange
light yellow	violet, brown	red

Source: Based on recommendations in Loosmore, Judy. (1994, November–December). "Color in Instructional Communication." *Performance and Instruction*, 33(10), 36–38.

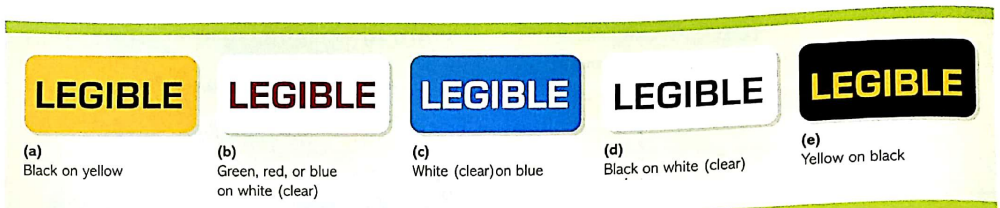


Figure 8.18
Color and Legibility
Black lettering on a yellow background (a) is the most legible; the other combinations are shown in descending order of legibility.

Colored words or images in a monochrome display will draw the eye. Notice how the "hot" arrows in Figure 8.19 stand out from the cool background. Further, a color repeated in different parts of a display tends to show a relationship between or among those parts. For example, if only two symbols in a display are shown in cherry red, they will appear to be related to each other, and the viewer's gaze will go back and forth between them. Please view these suggestions about color schemes as general guidelines, not as absolute rules, because in any situation many factors will have an impact on whether particular colors will work well together.

Colors on a computer screen may not be the same from one computer to another. Projected colors may also be different. Colors that look good on your computer may look different when projected. It is a good idea to practice your presentation to determine whether the projected colors efficiently transmit your message.

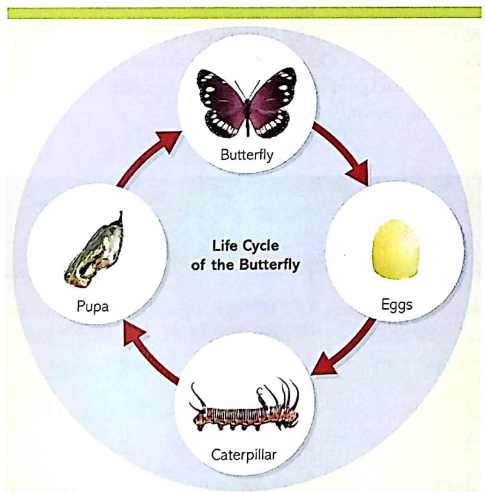


Figure 8.19
Color and Emphasis
The arrows direct the viewer's attention clockwise.

LEGIBILITY

A visual cannot do its job unless all viewers can see the words and images. It's surprising how often this simple rule is broken. Think of how many times you have heard a presenter say, "You may not be able to see what's on this, so let me describe (or read) it for you." To keep this from happening, make sure your visuals are large enough to be seen by all your audience members, even the most distant viewer. This applies to printed materials, projected visuals, and displays.

Legibility can be improved by increasing image size, type of font, and contrast among objects in a visual. Just as we discussed contrast in reference to color, contrast also applies to the total visual. Make sure the objects in your visual don't blur together. The goal of good visual design is to remove as many obstacles as possible that might impede interpretation of your message. Remember: If your students can't see it, they can't learn from it!

APPEAL

Your visual has no chance of having an effect unless it captures and holds the viewer's attention. There are several techniques to provide appeal: style, surprise, texture, and interaction.

Different audiences and different settings call for different design styles. Think about the simple, uncluttered,

primary color "look" of a children's television show compared with the complex imagery, busy scenes, and realistic color of an adult action drama. Likewise, you would not use the same stylistic treatment for a first-grade bulletin board as you would for a presentation to show at a teachers' professional development conference. Your choice of lettering and type of pictures should be consistent with each other and with the preferences of the audience.

Most visuals are two-dimensional. However, you can add a third dimension with texture or actual materials. As a characteristic of three-dimensional objects and materials, texture can convey a clearer idea of the subject to the viewer by involving the sense of touch—for example, touching samples of different cereal grains. Or texture can simply invite involvement—for example, using cotton balls to represent clouds or passing around book jackets to entice students to read a new book.

Viewers can be asked to respond to visual displays by manipulating the included materials, perhaps to answer questions raised in the display. Students can move answer cards to math facts into the correct position. Answers to geography questions can be hidden under movable flaps. The teacher or learners can move dials on a weather display to indicate the forecast for the day or the actual weather outside the classroom. For an example of an interactive format, see Figure 8.20.

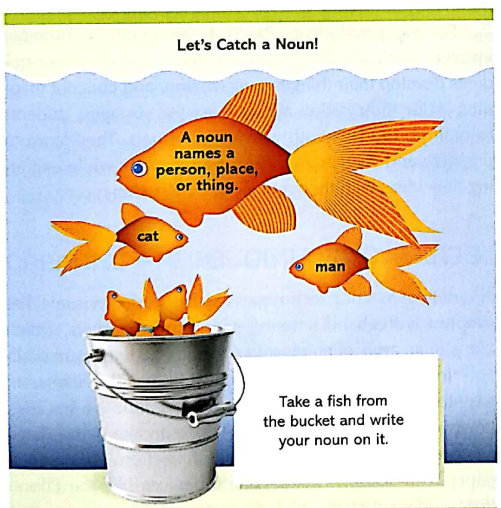


Figure 8.20
Interaction and the Appeal of a Display

UNIVERSAL DESIGN

When designing visuals, teachers need to use the principles of universal design to assist them in making the visuals useful to as many students as possible regardless of their age, ability, or subject area. Universal design accommodates students with a variety of learning levels, including disabilities and special talents. These principles promote simple, intuitive, equitable, and flexible use of visuals. All of the ideas in this section on visual design guidelines promote universal design.

CREATING VISUALS

Planning is an important component of creating visuals. Software tools provided in Inspiration and Kidspiration are excellent for using planning techniques such as storyboarding or concept mapping. It is also helpful to understand methods such as lettering techniques or how to create simple drawings, sketches, or cartoons. Techniques for creating presentation graphics and overhead transparencies are also important tools in producing visuals.

PLANNING TOOLS

If you or your students are designing a series of visuals—such as a series of computer screens, a set of PowerPoint slides, a video sequence, or several related overhead transparencies—**storyboarding** is a handy strategy for planning. This technique, borrowed from film and video production, allows you to creatively arrange and rearrange a whole sequence of thumbnail sketches or some other simple representations of the visuals and text you plan to use. Any narration would also be included on the storyboard, along with production notes that link the visuals to the narration. After developing a series of such cards, place them in rough sequence on a flat surface or storyboard holder (Figure 8.21).

Index cards are common materials for storyboarding because they are durable, inexpensive, and available in a variety of colors and sizes. You also may use small pieces of paper. Self-sticking removable notes have become popular because they will stick to anything—cardboard, desks, walls, whiteboards, bulletin boards, and so on.

Divide the individual storyboard cards into different sections to accommodate the text or narration and the production notes (Figure 8.22). The exact format of the storyboard card should fit your needs and purposes. Design a card that facilitates your work if the existing or recommended format

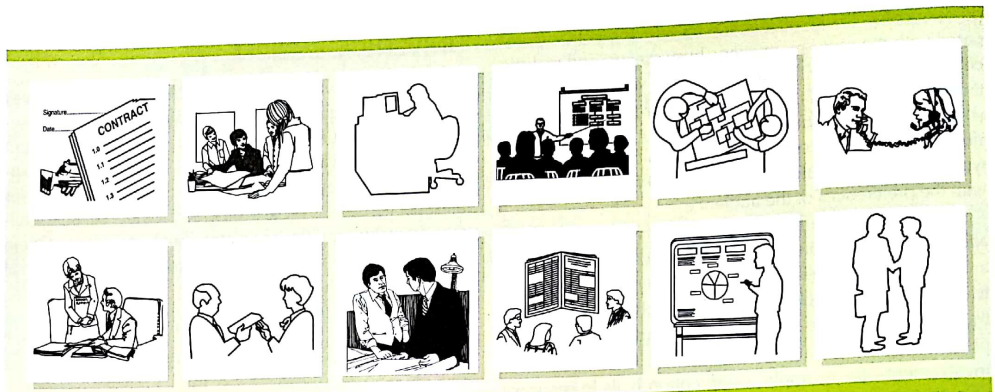


Figure 8.21
Storyboarding
Storyboards are useful for planning and presenting rough drafts of presentations.

is not suitable. You can make a simple sketch, write a short description of the desired visual on the card, or use digital photographs or visuals cut from magazines.

Inspiration, although not designed for storyboarding, may be used to help you and your students organize ideas. Inspiration is a software package that facilitates brainstorming, concept mapping, and planning. It creates a visual diagram of the ideas generated by an individual or group as a way to map concepts. Use the program to create overviews, presentation visuals, and flowcharts. Inspiration enables students to easily couple images with text and move ideas around the computer screen, getting information organized. Once the group's thoughts have been visualized, Inspiration easily converts from a concept map into a word processing outline.

For younger students (PK–5), Kidspiration can promote visual thinking and learning. Designed to help younger students develop their thinking, visualizing, and concept mapping skills, Kidspiration allows even the youngest students to brainstorm ideas with words and visuals. They learn to organize and categorize information visually while exploring new ideas with thought webs and visual mapping.

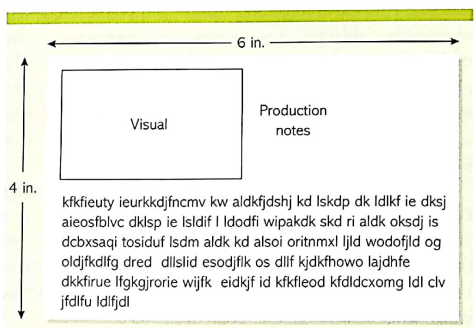


Figure 8.22
Storyboard Cards
The storyboard card contains places for the visual, production notes, and the narration.

LETTERING TECHNIQUES

A variety of lettering techniques can be used for visuals. The simplest is freehand lettering with felt-tip markers, which come in an array of colors and sizes. Precut letters are available in stationery and office supply stores. The letters are easy to use because most come with an adhesive backing; however, they are rather expensive. As an alternative, large letters or other shapes can be cut quickly from construction paper with scissors. Letter-cutting devices like the Ellison Prestige die cutter, in which die forms of letters are mounted into a cutter to produce copies from colored construction paper, are available in many schools or can be purchased in major hobby and scrapbook supply stores.

DRAWING, SKETCHING, AND CARTOONING

One often-overlooked source of visuals is *you*. You don't have to be an artist to draw. There are some basic guidelines and many how-to books that can help you communicate effectively using drawing, sketching, and cartooning. With a little practice, you may be surprised by how well you can draw. Simple drawings can enhance whiteboard presentations, class handouts, bulletin boards, and overhead transparencies.

CLIP ART

Clip art consists of prepared visual images (drawings and digital pictures) that can be inserted into a variety of digital documents and presentations. The size and placement of images can be modified to meet your needs. Recently there has been an explosion in copyright-free visuals available primarily through the Web and software collections.

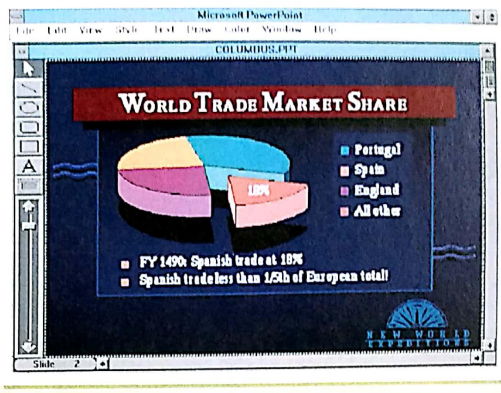


Figure 8.23
Presentation Software
Presentation graphics help you develop professional-looking visuals with text.

DESIGNING VISUALS WITH COMPUTERS

You and your students can use drawing programs for layout and design, as well as for drawing and illustrating. Most computer graphics programs such as KidPix, iWorks, Photoshop, and Adobe Illustrator come with hundreds or even thousands of typefaces and clip-art images and can manipulate visuals in every imaginable way

The visuals created with these programs can be projected using a computer and digital projector, printed directly onto transparency film, or produced on paper and used as a master to make transparencies.

CREATING PRESENTATION GRAPHICS

With presentation graphics software, such as Microsoft's PowerPoint and Apple's Keynote, even users without specialized graphics training can create attractive graphic displays in a form suitable for professional presentation. After selecting a visual style from a menu and specifying the desired type of layout (e.g., outline, bulleted list, graph, chart, or combination), you then just type in your message where directed by the program (Figure 8.23). You can control the features wanted or let the program automatically choose legible type fonts and sizes and organize the pictures and text into a clean visual layout. Keep the following guidelines in mind when using presentation graphics software:

- *Carefully select font type, size, and color.* Choose a typeface like Arial, which is a sans serif font that does not have "hands and feet" at the ends of letters and is easy to read (see Figure 8.24). A font size of 24 point or larger ensures readability. The text color should provide adequate contrast with the background color. Use upper- and lowercase letters where appropriate.

A sans serif typeface, such as Helvetica, is well suited to projected visuals.

A serifed typeface, such as Palatino, is recommended for printed text.

serifs

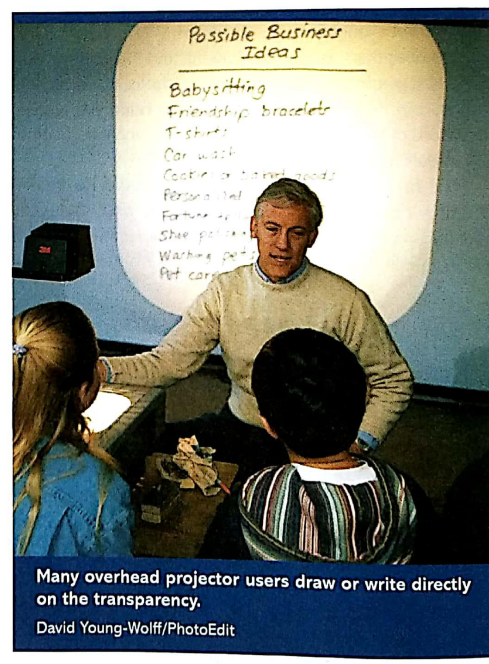
Figure 8.24
Font Types
Styles of type should be selected to suit their purpose.

- *Use a plain, light-colored background.* Busy "wallpaper" backgrounds can be distracting to your audience. Most people find that dark text on a light background is easier to read than light text on a dark background.
- *Center or left justify titles at the top of the slide.* To help your audience follow the organization of your presentation, add a descriptive title or subtitle at the top of each slide.
- *Use concise communication.* Keep the number of words on a slide to an absolute minimum. The "6 × 6 Rule" recommends no more than six words per line and no more than six lines. If you need more words, use a second slide.
- *Use a template to establish a consistent visual format.* If you want to create a presentation in which all slides show the same visual on the same background color, you can use a preformatted template or design a template to be used on all slides.
- *Use master slides to establish a consistent text format.* They allow you to place text from a specific font in the same position on every slide.
- *Minimize "bells and whistles."* You should create a presentation with substantive content rather than a lot of "pizzazz." The overuse of eye-catching features is distracting and often annoying to your audience. Don't use it just because PowerPoint has it!
- *Use appropriate graphics.* Avoid stock images that are inappropriate and irrelevant to your content. Select or create graphics that effectively communicate your message.
- *Use consistent transitions.* Transitions, the way one slide changes to the next, should be consistent throughout your presentation. Do not use random transitions and avoid "noise" (audio effects) with transitions.
- *Use simple "builds."* Build effects involve methods of introducing bulleted text or graphics within a single slide. Some build effects like "swirling" (where new text spins onto the slide) can divert your audience's attention. Watching the effect often takes longer than reading the new text.
- *Carefully use animation to support the instructional message rather than to add a dramatic element to your presentation.* For example, components of a model can be included as each is discussed, such as appending one layer at a time to the food pyramid or adding planets in order of their distance from the sun.
- *Minimize the use of sound.* Use sound only if it enhances your presentation. Screeching tires and cash register sounds quickly become distracting.
- *Use footers to identify slides.* Footers allow you to annotate the bottom of slides with your name and affiliation, the presentation topic, and date prepared or presented.

CREATING OVERHEAD TRANSPARENCIES

Despite the digital revolution, many PK–12 classrooms are still equipped with overhead projectors. Therefore we've included some helpful guidelines for creating overhead transparencies by looking closely at the processes most commonly used in the classroom. The most obvious way of quickly preparing a transparency is simply to draw directly on a transparent sheet with a marking pen. If you are doing freehand drawing and lettering, keep in mind that neatness counts, as does legibility. Your imperfections will be magnified by the size of the projection screen. Viewers can't learn from what they can't decipher!

Ordinary felt-tip pens with water-soluble ink generally will not adhere well to **acetate.** Look for a label saying "overhead projector pen," indicating it will adhere to acetate and project in color. You can erase such water-soluble ink with a damp tissue or wash the transparency completely clean and reuse it. On the other hand, virtually any permanent-ink felt-tip pen will adhere to acetate, but only those marked "overhead projector pen" are made to project in color. Most users choose permanent ink for hand-drawn transparencies prepared in advance, especially if they are going to be reused.



Many overhead projector users draw or write directly on the transparency.
David Young-Wolff/PhotoEdit

Computers have eased the task of creating overhead transparencies and similar types of visuals. With any word processing software you can prepare overhead masters incorporating visuals and text. You can print each screen directly onto transparency film specified as compatible with your printer or onto plain paper for use as a master.

CAPTURING VISUALS

Digital imaging allows users to capture, edit, display, share, and network still and video images. The technology makes the process very easy for both teachers and students. Users may send images to other digital devices, store them in computers, or share them through the Internet.

Digital cameras make it easy to take photos to use in computer-based programs or on a website.

Shutterstock

PHOTOGRAPHY

Digital cameras convert light energy to digital data, which is stored in a small digital recorder such as a removable memory card that can hold hundreds of photos. Because no film is used, there is no waiting for developing and printing, and you can immediately view images on a small monitor on the back of the camera, which allows you to see the picture before you "take" it and after it has been "captured." You can delete images you don't want and reshoot on the spot until you get exactly what you want.

You can download images to a computer for manipulation and store them on a computer hard drive, flash drive, or a photo CD. The stored digital images never degrade in quality but can be lost if the storage mechanism fails.

It is important to recognize the need for caution when digitally editing or modifying images, as there are possibilities of misrepresentation. With the advanced capabilities of computer tools, a computer user could alter an image in a way that might distort reality and present a false message to the reader or that might violate a copyright holder's rights in regard to the original image.

Printing the digital images is quick and easy. You can use your computer to produce the images with a color printer or make copies directly from the data on the memory card with a photo printer.

Copyright Concerns

Visuals

The following guidelines address use of visuals by teachers and students.

You are permitted to use:

- One illustration per book, periodical, or newspaper
- One diagram, chart, or picture from a single source
- One visual per source for presentation visuals (PowerPoint slides, overhead transparencies, etc.)

You are *not* permitted to use:

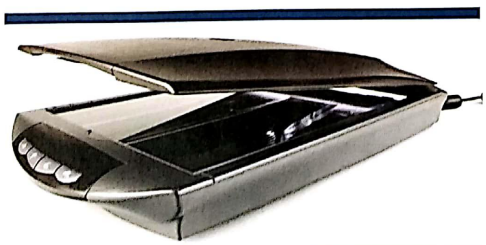
- The reproduction of copyrighted cartoon characters

Whether you are recording the things you see on a trip, creating a photo essay, shooting a historical subject, developing an instructional picture sequence, or simply taking pictures of family and friends, a few guidelines can make your photographs more effective.

- Include all elements that are helpful in communicating your ideas.
- Eliminate extraneous elements, such as distracting backgrounds.
- Include size indicators (e.g., a car, a person, a hand, a coin) in the picture if the size of the main object of interest is not apparent.
- Divide the picture area in thirds both vertically and horizontally. The center of interest should be near one of the intersections of the lines. This is called the "Rule of Thirds." Don't cramp the important part of the image near the edge of the picture.
- When making "how-to-do-it" pictures, take the picture from the viewpoint of the learner, not the observer.
- If a feeling of depth is important, use foreground objects (e.g., blossom-covered tree branches or moss-covered rocks) to frame the main subject.

SCANNERS

Scanners work with computers to transfer existing paper-based visual images, such as student drawings or photographs, into digitized computer graphic files. A flatbed scanner looks like the top of a photocopy machine. The user lifts the lid and places the image face down on the glass surface. Special software on a connected computer operates the scanner. As with digital photographs, students may quickly incorporate scanned images into a word processing file. They can enhance or modify them using the appropriate software. You can also easily incorporate images into your own presentations.



Scanning images is a simple task.
Shutterstock

MAKING THE CLASSROOM COME ALIVE WITH 3D IMAGES

Classrooms are coming alive with 3D images in lessons! The same technology used in movie theatres now is moving to the schools. Nothing captures the attention of students like 3D, which makes both still and moving images more compelling. The increasing use of 3D projectors in schools allows students to "walk" thorough famous architectural structures—past, present, or future. The projectors actually produce two images on the screen at the same time—one for the left eye and one for the right. The viewer wears 3D glasses that combine the two images and create an amazing 3D effect.

SUMMARY

In this chapter we discussed the importance of visuals as an important tool for learning that should be used properly by both you and your students. We began with the concept of visual literacy, and presented the critical aspects of decoding and encoding visuals. We explained how students learn best when visuals are used in instruction. We discussed the types, purposes, and categories of visuals and provided guidelines for presentation software, digital visuals, document cameras, overhead projectors, and printed visuals. We looked at advantages and limitations and techniques for integrating and utilizing visuals in the classroom. The chapter concluded by presenting guidelines that will assist you and your students in planning, creating, and capturing visuals.

PEARSON myeducationkit™

To check your comprehension of the content covered in Chapter 8, go to the **MyEducationKit** for your book and complete the Study Plan for Chapter 8. Here you will be able to take a chapter quiz, receive feedback on your answers, and then access resources that will enhance your understanding of the chapter content.

ASSURE Lesson Plan

PEARSON myeducationkit

The following ASSURE Lesson Plan provides a detailed description and analysis of the lesson in the ASSURE Classroom Case Study and video at the beginning of the chapter. To review the video again, go to the MyEducationKit for your text and click on the ASSURE Video under Chapter 8. The video explores how Mrs. Roman, a third-grade teacher, and Mrs. Edlund, an art teacher, help students learn through the use of digital images and electronic portfolios.

Analyze Learners

General Characteristics. The audience consists of 23 third-graders who have recently completed state tests to assess their mathematics knowledge and skills. Because the school is new, they have not had many opportunities to know each other prior to this year. Some come from the same neighborhood, whereas others are from surrounding small communities. All of the students like to play at recess and enjoy movies and video games. Many of the boys are interested in sports, especially baseball. Most of the girls are interested in reading and watching television.

Entry Competencies. A number of the children have scored well on earlier tests in mathematics. A few struggle with some basic mathematics skills they have yet to master. The students have demonstrated difficulty in understanding the concepts of three-dimensional images shown on paper. As their recent test scores reflect, they have difficulty with conceptualizing how to visualize this type of image.

Learning Styles. The class members display a range of learning styles. Most of them have visual and spatial skills and good math ability. The children enjoy drawing and look forward to art classes as they find they can express their ideas with a variety of materials.

State Standards and Objectives

Curriculum Standards. National Council for Teachers of Mathematics 3—Geometry and spatial sense: Analyze characteristics and properties of two- and three-dimensional geometric objects. National Standards for Arts Education 5: Reflecting on and assessing the characteristics and merits of their work and the work of others.

Technology Standards. National Educational Technology Standards for Students 3—Technology productivity tools: Students use technology tools to enhance learning, increase productivity, and promote creativity.

Learning Objectives

1. Given art materials, the students will demonstrate their ability to build three-dimensional objects by cutting and shaping construction paper into three shapes: cylinder, cone, and box.
2. Given drawing materials, the students will draw on paper their three-dimensional objects, employing conventions learned in art class.

3. Given drawing materials, students will draw a picture of the playground, using the art conventions for showing dimension.
4. Given a digital camera and PowerPoint software, the students will create an e-portfolio of their art, reflecting on what they have learned.

Select Strategies, Technology, Media, and Materials

Select Strategies. Mrs. Roman decides to work with Mrs. Edlund, the art teacher, to find ways of enhancing her students' ability to make the connection between two-dimensional pictures and three-dimensional objects. She likes the idea of using e-portfolios as another way of demonstrating student learning, something Mrs. Edlund has been hoping to develop with her students. Together they decide to try several different approaches to instructing students. Mrs. Roman plans to combine direct instruction with some hands-on experiences using the math manipulatives that are available with the textbook.

Mrs. Edlund leads the children through a process of selecting their art for a portfolio, which because of the focus of the school on art and technology, is an electronic portfolio (e-portfolio). She demonstrates how to operate a digital camera, how to load their pictures into the computer, and how to use PowerPoint to create their e-portfolios. To help the children reflect about their art and its connections to their classroom knowledge, she guides them with thoughtful questions.

Select Technology and Media. This lesson involves student use of computers, digital cameras, Photoshop, and PowerPoint software to create electronic portfolios. Mrs. Edlund chooses to use laptop computers from the portable laptop cart. She decides on PowerPoint as the software for the e-portfolio because it is available on the laptops as well as the classroom computers. She feels that the program provides enough flexibility for children to be able to build e-portfolios without having to learn a complex program. And she knows they will be able to keep adding to their portfolios as they progress through school because PowerPoint will be available to them through high school. She uses the following guidelines to assess the appropriateness of her technology and media selections:

- *Alignment with standards, outcomes, and objectives.* The digital cameras allow students to capture their art pieces for inclusion in their portfolios. Photoshop and PowerPoint software provide the necessary tools the students need to create the portfolios as described in the learning objectives.
- *Accurate and current information.* Students are working with art that they created, so it is current. Internet information is not used, so accuracy is not of concern for this lesson.
- *Age-appropriate language.* Photoshop and PowerPoint menus are written at a level that requires initial training for third-grade students and ongoing support during use.
- *Interest level and engagement.* Use of Photoshop and PowerPoint software with self-created artwork provides students the opportunity to produce personalized electronic portfolios that demonstrate their reflections and talents in a creative fashion.
- *Technical quality.* The digital camera, Photoshop, and PowerPoint software have superior technical quality.
- *Ease of use.* After basic skills training, the third-grade students are able to effectively use the digital camera in combination with Photoshop and PowerPoint software.
- *Bias free.* Photoshop and PowerPoint are bias free.
- *User guide and directions.* The online help features of Photoshop and PowerPoint are too sophisticated for use by third-grade students. Therefore, Mrs. Edlund provides ongoing support and directions to her students.

Select Materials. Mrs. Edlund decides to have students work with clay to create three-dimensional objects. Then she shows the students how to draw their clay objects on paper, demonstrating the art conventions that show depth. She determines whether they can apply that knowledge by taking the children out to the playground to draw the area. Mrs. Edlund decides that the children are making the connections between their art and their classroom experiences. She thinks that it would be best for the children to build art portfolios as a way to demonstrate their learning and to capture points in time with their art achievement.

Utilize Technology, Media, and Materials

Preview the Technology, Media, and Materials. Mrs. Edlund previews the digital camera features and the Photoshop and PowerPoint software to ensure they have the features needed for students to create electronic portfolios of their artwork.

Prepare the Technology, Media, and Materials. Mrs. Edlund examines the digital camera to ensure it is working and reserves the laptop cart. She gathers the student artwork folders and reviews the content to check that they are complete.

Prepare the Environment. Mrs. Edlund sets up the digital camera for still shots and ensures that the digital photos download from the camera to the computer. She tests all computers to ensure that Photoshop and PowerPoint are loaded and functional. She sets out the student collections of artwork.

Prepare the Learners. Students in Mrs. Edlund's class are shown how to take digital photos of their artwork, how to use Photoshop to crop the photos, and how to process their work with PowerPoint to create the electronic portfolios.

Provide the Learning Experience. Mrs. Edlund wants to make the process easy for the third-grade students, so she focuses on having them use traditional art materials first. By letting them create their images in art class, she can guide them in their thinking about the content associated with their classroom mathematics lessons as well as mastery of art. She wants to incorporate technology into their art and feels that the idea of an e-portfolio will accomplish that end.

Require Learner Participation

Student Practice Activities. The children use various art media to demonstrate their understanding of the concepts they are acquiring in both math and art classes. They operate the digital camera, making certain their photos are of high quality to ensure capturing the essence of their art in the picture. They learn how the computer uploads their pictures, how to crop and adjust the image on screen, and how to save their pictures to the school's server. The children apply the basics of PowerPoint and then begin to explore ways to use the software for demonstrating their achievements.

Feedback. Mrs. Edlund provides ongoing guidance while the children are writing their reflections into their e-portfolios. Through this feedback, the students are able to develop an understanding of how to reflect on their ideas and begin to separate those pieces of their art that represent their current views.

Evaluate and Revise

Assessment of Learner Achievement. Mrs. Edlund and Mrs. Roman meet to look at what the children have done in their artwork. They determine that the children are able to connect their classroom mathematics study with their art. Furthermore, the e-portfolio is a way for them to demonstrate their understanding of the concepts in a meaningful way. Both Mrs. Roman and Mrs. Edlund feel that the children have learned to be more reflective in their approach to learning.

Evaluation of Strategies, Technology, and Media. Both feel that the e-portfolio experience is valuable for the children and would be a viable assessment approach in the future.

Revision. Both teachers look at the approaches to the lessons they taught and consider ways to extend their collaboration between the classroom and the art room. They also explore ways to assess learning beyond traditional testing approaches.

CONTINUING MY PROFESSIONAL DEVELOPMENT

Demonstrating Professional Knowledge

1. What is visual literacy? Identify two general strategies that you may use to teach visual literacy.
2. Name six types of visuals. What is an example of each type?
3. What roles do visuals play in learning?
4. Describe four methods for viewing visuals in the classroom.
5. What are the advantages, limitations, and integration techniques for visuals?
6. What are the goals of good visual design?
7. Discuss four techniques for creating visuals.
8. Discuss two methods for capturing images.

Demonstrating Professional Skills

1. Design a series of instructional images. Attach a description of the audience, objectives, and features that help achieve the goals of your visual design. (ISTE NETS-T 2.A)
2. Locate six visuals (both nonprojected and projected) that you believe would be useful in your own teaching and evaluate them using the Selection Rubric: Visuals. (ISTE NETS 2.C)
3. Create one graph (line, bar, circle, or pictorial) and one chart (organization, classification, timeline, tabular, or flow) for a topic you might teach. Use the Selection Rubric: Visuals as a guideline. (ISTE NETS 3.C)

Building My Professional Portfolio

- *Creating My Lesson.* Using the ASSURE model, design a lesson for a scenario from the Lesson Scenario Chart appendix or use a scenario of your own design. Use the information from this chapter related to using visuals for learning. Be sure to include a description of the audience, the objectives, and all other elements of the ASSURE model. (ISTE NETS-T 2.A & 3.A)
- *Enhancing My Lesson.* Enhance the lesson you created in the previous activity by describing how you would meet the diverse needs of learners and how you would integrate different types of technology. Specifically, describe additional strategies you would include for students who already possess the knowledge and skills targeted in your lesson plan. Also describe strategies, technology, media, and materials you could integrate to assist students who have not met the lesson prerequisites. (ISTE NETS 2.D, 3.D, & 5.D)
- *Reflecting on My Lesson.* Reflect on the lesson you created and on how you enhanced the lesson. Also consider the process you used and what you have learned about matching audience, content, strategies, technology, media, and materials. What visuals were used? How can the visuals enhance the learning experiences of your students? If you were to redesign your lesson, what visuals would you select and why? (ISTE NETS 4.C & 6.B)

SUGGESTED RESOURCES

Print

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Web Links

To easily access these web links from your browser, go to the MyEducationKit for your text, then go to Chapter 8 and click on the web links.

Inspiration and Kidspiration

www.inspiration.com

Inspiration is a tool students can use to plan, research, and complete projects. With the integrated Diagram and Outline Views, they create graphic organizers and expand topics into writing. This combination encourages learning in multiple modes.

Kidspiration supports visual thinking techniques, enabling students to easily create and update graphic organizers, concept maps, idea maps, and other visuals.

Kodak

www.kodak.com

The Kodak website provides the user with information about digital cameras, printers, accessories, and more.

PowerPoint

http://office.microsoft.com/en-us/powerpoint

This site lets the user view full-featured presentations created in PowerPoint. This viewer also supports opening password-protected Microsoft PowerPoint presentations.

FREE & INEXPENSIVE

NASA

www.nasa.gov

Many organizations, including the government, provide free and inexpensive instructional materials. One example is NASA, which provides free informative posters showing beautiful images of planets, spacecraft, and eclipses. Informative drawings explain how an eclipse occurs. Visuals are available in printed format on CDs.

International Visual Literacy Association

www.ivla.org

The International Visual Literacy Association (IVLA) is a not-for-profit association of researchers, educators, and artists dedicated to the principles of visual literacy.