CHAPTER 12

Technology in the Workplace

12.1 Computer Hardware and Software

12.2 Other Technologies

12.3 Workplace Safety and Ergonomics
Outdated Agency

Martha Rodriguez is a real estate agent who has been working for Coleman Real Estate for several months. At one time, Coleman Real Estate had a reputation as one of the best agencies in town. However, in the past few years, it has been losing a lot of business to other agencies.

To Martha, the reasons for lost business are clear. The eight agents, a receptionist, and a secretary are using woefully outdated technology. The office has four aged desktop computers, a black and white printer, and a fax machine. The agency does not have access to the Internet and does not have a Web site. Voice mail is also not available. However, four of the eight agents that work for the company have cell phones.

Walt Coleman, the owner, is a very conservative businessman. He is not computer literate and has been hesitant to invest in a computer system. However, he knows that he needs to do something to regain the business his company has lost. Since Martha's previous job was at a very successful agency, he has asked for her ideas on how to update the company.

Questions

1. What updated technology could Martha recommend for the company?
2. How would the new technology allow the company to serve its customers better than it presently does?
3. What training for company employees could Martha recommend?
Technology at Work

Technology is the application of scientific knowledge to practical tasks. The word technology also refers to tools, machines, and other inventions that make work faster, easier, or safer. Technology saves time and effort. For example, a dishwashing machine makes cleaning dirty dishes easy. Using a router makes building a set of kitchen cabinets faster. For employers, technology can save money and improve the quality of products. It allows people to accomplish more work in less time.

Being able to use technology in your work and to learn and adapt to new technologies are useful skills. This chapter provides an overview of common workplace technologies.

Computer Hardware

A computer is a machine that processes data according to a set of instructions in order to perform tasks. Computers range in size from supercomputers, which may take up several rooms, to computers that fit in the palm of your hand. A personal computer (PC) is a small, relatively inexpensive computer designed for an individual user. Personal computers are also called microcomputers. PCs may be linked together to form networks. A network is a group of devices, such as computers and printers, connected in order to share data and/or tasks.

The physical parts of a computer and related devices are called hardware. The part of a computer that does the actual computing is the microprocessor. A microprocessor is a silicon chip the size of a fingernail. Microprocessors provide the computing power for many products that people use every day. Cell phones, music players, microwave ovens, TVs, and cars use microprocessors.

A typical computer workstation consists of a computer, monitor, keyboard, and mouse (and desk and chair). A workstation also may include a printer, scanner, or fax machine. Often, though, that equipment is placed in a central location for use by a group of workers. The computer usually is connected to other computers in a network. The network allows users to communicate and share resources such as printers and data.

To keep computer hardware working properly, protect the computer from dust, heat, static electricity, and moisture. Remove the dust from your computer with a small vacuum. To protect the computer from heat, use it...
only in a well-ventilated area. Use a surge suppressor to protect the computer from power spikes that may cause damage. Keep liquids that may be accidentally spilled away from the computer.

**Desktop Computers**

A desktop computer is a personal computer that fits on a desk but is too large to carry easily from place to place. It is designed for use in an office or at home. On a desktop computer, you can accomplish many different kinds of tasks. You can send and receive e-mail and instant messages. You can also access networks and the Internet.

**Laptop Computers**

A laptop computer is a portable personal computer—small enough, as the name *laptop* implies, to sit on your lap. Laptops typically weigh from 2 to 7 pounds and also are known as *notebooks*. They have the same uses as a desktop computer. Laptops can be plugged into any standard electrical outlet. They can also run on batteries that are recharged by simply plugging in the computer. A laptop can have all of the features of a full-sized computer, including CD and DVD drives and e-mail and Internet access.

Laptops are useful for employees who travel or who work away from a desk. Because of their size, laptops have a smaller keyboard than a desktop computer. They have a trackball or other pointing device that allows you to move the cursor instead of a mouse. Many laptops have a small touch pad. You move your finger on the touch pad to move the cursor on the screen and press or tap to select items. Most laptops allow you to attach a conventional keyboard or mouse for use with the laptop.
Tablet Computers

A tablet computer is a portable personal computer that allows users to enter text by keying or handwriting. Depending on the model, you use your finger or a special digital pen to “handwrite” text. You also use your finger or a digital pen in place of a mouse to navigate the screen, select items, and give commands. Otherwise, tablets offer the same features as other personal computers.

A tablet is smaller and lighter than a laptop, about the size of a legal pad and roughly an inch or two thick. The screen rotates and folds down over the keyboard or detaches from it. When detached, the computer screen is sometimes called a slate. Tablets are useful for taking notes when you are at a meeting or away from the office. They also are useful for writing in situations where using a laptop is awkward. Nurses, for example, can use a tablet in place of a pen and paper medical chart to make notes. Tablets are useful for people who prefer handwriting to keying. Because they can be held easily, tablets can make reading on the computer comfortable.

Handheld Computers

A handheld computer, also called a palmtop, is a personal computer that weighs a pound or less and fits in the palm of your hand. The most common type of handheld is the personal digital assistant, or PDA, which serves as a personal organizer. PDAs and other handhelds may be loaded with software for various uses. PDAs generally include a date book, an address book, a task list, a memo pad, e-mail, and a calculator. As on a tablet, you use a digital pen or your finger to navigate or make selections; and you can handwrite data.
Handheld computer users can also key data using the unit’s small keyboard. The keyboard may be on-screen or a physical part of the unit. With some handheld computers, users can connect a standard full-size keyboard or a folding keyboard. Folding keyboards are flexible, full-sized keyboards that can be folded into a small unit for travel or storage.

Handheld computers allow users to synchronize data with other computers. This process allows the computers to update one another. For example, a legal secretary can schedule appointments for an attorney on a desktop computer. The attorney can synchronize his PDA with the computer to keep his schedule up to date. Figure 12-1 shows a screen from Microsoft ActiveSync®, a program used to update computers.

Handheld computers permit you to beam (transmit) data to another nearby handheld computer or to a printer. The data is sent through a wireless connection. For example, you can beam a list of contacts to another handheld computer. You may also be able to synchronize a handheld with another computer using a wireless connection. The receiving computer must be equipped to receive data in this way.

Handhelds are inexpensive compared to larger computers. They are popular among students, professionals, and others who need to take notes, store and access information, and manage schedules. A few popular features of handhelds are word processing and spreadsheet software, e-mail, and Internet access. Many other features are available.

Figure 12-1 Data can be updated by synchronizing a handheld computer with a desktop computer.

Key Point

Users can synchronize data between a handheld and another computer to keep both up to date.
If you are thinking of buying a handheld computer, consider questions such as these in addition to the cost:

■ Is the computer comfortable to carry around?
■ Is it easy to use? Try the keyboard, for example, and see whether you can use it easily.
■ How will you use it? Does it need to be compatible with other users’ computers? Make sure the model you buy has the features you need.
■ Can it synchronize with your desktop or laptop computer?
■ What is the battery life?

1. In general, how does technology benefit workers? Give two examples of how technology benefits workers.

2. List and briefly describe four types of personal computers.
   Check your answers in Appendix C.

Computer Software

A computer processes data according to a set of instructions to perform a specific task. Without instructions, a computer cannot do anything. It gets some of the instructions from you, through the keyboard and mouse; but it gets most of them from software. Computer software, also called programs, consists of step-by-step written instructions. Programs are written in special languages a computer can understand. Software can be grouped into three types: operating system software, applications software, and utility software.

Operating System Software

The operating system is software that performs the computer’s most basic operations. For instance, it handles the transfer of data and files. It controls equipment such as the keyboard, monitor, and printer. It also manages and allows you to use all the other software on the computer.

The operating system provides the interface of the desktop, windows, and other features that make working with the computer easy. You use the operating system when you add, remove, open, and close programs; switch from one program to another; and move, copy, or delete files. Microsoft Windows®, Mac OS®, and Linux® are operating systems.
Application Software

Application software is used to perform work tasks. For example, word processing software is used to create letters, reports, and other documents. Microsoft Word is an example of a word processing program. Database software is another type of application program. It allows users to store data, such as customers’ names and addresses. The data can be searched, retrieved, and organized in useful ways. Some examples of database programs are Microsoft Access®, dBase™ Plus, and FileMaker® Pro.

Spreadsheet software is an application program used to work with numbers. Users can perform calculations, sort data, and create charts with ease. It is one of the most popular types of business software. Some examples of spreadsheet programs are Microsoft Excel®, Lotus® 1-2-3, and Corel Quattro Pro®. E-mail and IM software (discussed in Chapter 7) are also types of application programs.

Utility Software

Utility software is used to manage and secure data on a computer. For example, virus protection software, which is used to block, detect, and remove viruses, is a popular utility program. Backup software can be used to make a copy of the data on a computer hard drive. The backup copy can be used to restore files that are damaged or accidentally deleted. Norton 360™, shown in Figure 12-2, is a program that provides scanning, backup, and other features. Some utility programs come with the operating system software. For example, the Windows Vista operating system includes utility programs that allow users to set the computer’s security status, uninstall programs, optimize the display, change the time zone for the computer, and complete other tasks.

Figure 12-2 Norton 360 is a popular utility program.
Using Software

If you use a computer at work, you will use some of the software discussed in this section. Knowing how to use specific software and being ready and willing to learn new software are valuable assets for many jobs. Whatever software you need to use, you may find the following tips helpful.

◼ Many programs used in the workplace have a similar look and operate in a similar way, which helps when you are learning to use a new program. They use menus, toolbars, and icons—sometimes the same ones in several programs—and many of the same basic features.

◼ Many programs have a Help feature that you can use to learn how to perform tasks. The Help feature, which often includes an online manual, provides valuable information about the software.

◼ Some programs offer tutorials for common tasks. One type of tutorial, called a wizard, takes users step-by-step through a process. For example, writing a letter, creating a legal pleading, or doing a simple query may be covered in a tutorial.

◼ Software designers work hard to make your work easy. Word processing software, for example, includes features that check spelling and grammar and correct common keying errors. Get to know the user-friendly features of your software.

◼ When selecting software programs for purchase, make sure you have the computer hardware, memory, and storage needed to run the program. Also, make sure that the program works with your computer’s operating system and version.

Programs designed to work together easily are often grouped together in a software suite. For example, Microsoft Office Professional Edition has word processing, spreadsheet, database, presentation, personal information management, and desktop publishing software. Integrated software packages have several advantages. The programs have the same look and operate in a similar way. Programs in suites are designed to work well together, and information from one program often can be readily used in another.

Key Point
Software tutorials and the Help feature can be used to learn how to complete tasks with the software.

1. List and briefly describe three general types of computer software.
2. Which of the three types of software is required so that the other two types can be used?
   Check your answers in Appendix C.
File Storage and Management

When you save computer files, you generally save them on an internal hard drive on your computer. Besides saving your files there, you need to back them up. To back up files means to make a copy of them on a secondary storage disk or device. Backing up files provides you with a copy of the file that you can use if the file stored on the hard drive is destroyed or deleted.

At many companies, copies of files are routinely saved to a computer on the company network or to another device. This backup may happen automatically when users log off the network. If your company does not follow this practice, you are responsible for backing up the files you create. You would be wise to back up at the end of each workday any files you created or modified that day.

Storage Options

Your company may have a shared network drive to which employees can back up files. As an alternative, your company may provide you with an external hard drive that plugs into your computer. External hard drives are a good choice for backing up files. As with an internal hard drive, they can hold large amounts of data. Files can be organized into folders and can be deleted, copied, or moved as needed. Some drives come with software that makes backing up files quick and easy. Other storage options include compact disks (CDs), digital video disks (DVDs), and flash memory.

Key Point

Backing up files provides you with a copy of the file that you can use if the file stored on the hard drive is destroyed or deleted.

CDs and DVDs can be used to save copies of computer files.
**Compact Disks**

A **compact disk (CD)** is a thin platter that can have computer data recorded on it in optical form. CDs can hold about 700 megabytes (MB) of data. A megabyte of storage can hold, for example, about 15 to 20 image files or 500 double-spaced text pages. CDs are a popular media for backing up files. **CD-R** stands for *compact disk—recordable*. You can write files only once to a CD-R. You cannot erase the disk and reuse it or copy revised versions of files to it. **CD-RW** stands for *compact disk—rewritable*. You can reuse a CD-RW, saving files to it many times.

To use CD-Rs and CD-RWs, your computer must have a special drive used to read and save data to CDs. The required software is often included with computers that have the drives. A CD-RW drive lets you use both CD-Rs and CD-RWs.

CDs should be stored in a sleeve or case to prevent damage from scratches or spilled liquids. CDs should be labeled to indicate the data they hold and arranged in a logical order to aid in retrieving the data.

**Digital Video Disks**

A **digital video disk (DVD)** is a thin platter that can be used to store large amounts of computer data in optical form. A DVD is the same physical size as a CD, but it can hold much more data. A single-layer DVD can store 4.7 gigabytes (GB) of data. A dual-layer disk can store 8.5 GB. One gigabyte is equal to 1,000 megabytes. You will need a special drive to store data on a **digital video disk—rewritable** (DVD-RW). Many rewritable DVD drives can be used to create CDs as well. As with CDs, DVDs should be labeled and stored properly.

**Flash Memory**

Flash memory is a type of storage where data can be electronically saved, retrieved, and erased. A flash memory device can keep stored information without needing a power source. Flash memory devices, such as flash cards and drives, have no moving parts. This makes them resistant to shocks and vibrations that can cause problems with other storage devices.

Flash memory devices offer the advantage of small size (from postage stamp to credit card size). The devices have a storage capacity of 128 MB to 16 GB or more. Flash drives that can be used with the USB port of a computer are popular for transferring and backing up data. They allow fast access to stored data. Files can be organized into folders and can be moved, copied, or deleted as needed.

Flash memory cards and drives are durable and operate with different kinds of devices. For example, flash memory serves as the “film” in a digital camera. If the batteries run down, the images inside the camera remain. Flash memory is used in a variety of other appliances, including cell phones, video games, music players, and video cameras.
File Compression

File compression software can be used to reduce the size of a file. The smaller size file can be sent to other users more quickly, for example, as an e-mail attachment. Smaller files also allow you to fit more files onto a storage medium. You must use the compression software again to restore the files to their original size before the files can be opened and used.

File compression software is quick and easy to use. Some computers come with this software. It also can be purchased or obtained for free. WinZip® is a popular compression software. In addition to compressing a single file, this program allows you to create one zipped (compressed) file that contains the data for several files. For example, suppose you have a Word file that contains a report, a PowerPoint file that contains a related presentation, and an Excel file that contains a related spreadsheet. With WinZip you can create one zipped file that contains compressed versions of all three files. You can then e-mail the zipped file to a coworker. The coworker would use WinZip to unzip the files to their original format. Sending the zipped file would be faster than sending the three separate files.

File Management

Many companies have a system for naming and organizing computer files for employees to follow. If your company does not, create your own logical system to help you find files quickly and easily.

The operating system of a computer has its own system for organizing the computer’s files. You can use that system to organize your files, too. Using folders is a good way to keep files organized. Suppose you want to organize your files for school. You might create a folder for each of your classes. You could create more folders within the class folders. For example,
your *Business Communication* folder could contain three folders: one for class notes, one for essays, and one for journal entries.

Use meaningful names for your files and be consistent in how you name files. For example, class notes for Business Communication might be named *BC Notes May 1*, *BC Notes May 2*, etc.

A logical folder arrangement is shown in Figure 12-3. Folders for five classes are in the *School Work* folder. Three folders are in the *Business Communication* folder. Three documents are shown in the *Notes* folder.

You can move, copy, and delete folders and files. You can arrange and view your files in alphabetic order, by most recent date, and in other ways. You can use the Search feature to find files by name, type, date created, text within the file, and other ways. The Search feature can be very helpful when you cannot remember the exact name of a file. Use the tutorials or Help information that comes with the software if you need help working with files or folders.

**Key Point**
The Search feature can be very helpful when you cannot remember the exact name of a file. You can use the Search feature to find files by type, date created, text within the file, and other ways.

1. List four options (media or devices) for storing computer files.
2. Briefly describe how to organize your files saved on a computer or storage device.

Check your answers in Appendix C.
Peripherals

Peripherals are devices that work with your computer to help you accomplish tasks. Printers, scanners, and fax machines are common computer peripherals.

Printers

After you have prepared a document, you can select an option in the software to send the document to a printer. Some printers print in black and white only; others print in color. A document displayed in color on your screen will not print in color unless you have a color printer.

Two types of printers are used in the workplace: inkjet and laser. Each printer produces a printed page in a different way. With an inkjet printer, liquid ink is sprayed onto the paper. With a laser printer, a laser “draws” the page on a drum, which is coated with a dry ink called toner. As the paper passes under the rolling drum, it picks up the toner. Both printers generate high-quality documents. Quality is measured in terms of resolution, or the number of dots per inch (dpi) the printer is capable of producing. The higher the resolution, the better the page looks.

Ethics

Often, several people in an office share a printer or fax machine. Ethical behavior requires that you do not read printed or faxed documents that are not yours or addressed to you.

Inkjet printers are popular peripherals for home and office use.
You need to know how to do some basic tasks related to printers. Some of these tasks are listed below. You can learn to do those things from another employee or from the printer manual.

- Load paper into the paper trays
- Change paper trays if you are printing on a different size paper
- Clear paper jams
- Change the ink or toner cartridge

Be courteous when sharing a printer. If you run out of paper, load the machine for the next user. If you select any special print features, such as a larger tray, restore the normal settings when you are finished. If you need to print a very long document, check first with other employees about their printing needs.

**Scanners**

A scanner is a machine that creates a computer file from a paper copy. Sheets of paper and pages in books, newspapers, and magazines are examples of items that can be scanned. Some scanners also create images of photos, slides, film, and transparencies. Figure 12-4 shows options for one scanner.

A scanner is a tool for getting text and images into a computer file so you can work with them. Some scanners simply make a picture of the page. The image can be placed in a document, but text on the page cannot be edited. Some scanners work with optical character recognition software (OCR) to “read” the scanned page. These scanned documents can be opened in a word processing program and edited. Scanning text in this way is easier and faster than keying it.
Another purpose for scanning is document storage. Some businesses scan paper documents to create computer files, which require less storage space than paper files.

Many companies use desktop scanners, which come in two types—flatbed and sheetfed. With a flatbed scanner, you place the item to be scanned on the glass plate surface of the scanner and close the cover. The scanning mechanism moves across the document. This process works well for pages in a book. The other type is the sheetfed scanner. You feed the paper sheet into the scanner. The scanning mechanism is stationary.

Pen scanners are gaining in popularity with students, business travelers, and others that take notes from written materials. Most pen scanners are the size of a large marker. You move the scanner slowly across the page as if you were using a highlighter. The scanner may have a small screen that displays the scanned text. Scanned files can be transferred to a computer. Some pen scanners translate or pronounce and define words as they scan.

Scanned files can be large. If size is an issue (for example, if you are e-mailing the file) and you do not need the whole page, you can use the scanner’s preview feature to select the part you want. You also can experiment to see whether a lower-resolution scan will meet your needs. The lower the resolution, the smaller the file size will be.

The file format in which you save the scanned image can also affect the file size. Different file formats, such as GIF, JPEG, and PNG, use different compression methods. The file size for an image (at the same size and resolution) can vary in different file formats. You should determine which file formats will be appropriate for the intended uses of the scanned image.
The quality of the copy to be scanned can affect the quality of the scanned text or image. Unusual fonts, small text, or broken characters yield occasional text errors. A smudged image may scan poorly.

**Fax Machines**

A **fax machine** is a device that sends and receives electronic documents over a phone line. It consists of a scanner, which creates an electronic version of the document, and a printer, which prints documents that are received. A telephone connection is required for sending a document by fax machine.

Several other options exist for sending faxes. Your computer may have a fax modem. This device interacts with fax machines and other fax modems to send and receive documents. Your company may have a fax server, a computer that handles all outgoing and incoming faxes via one or more fax modems.

Internet or Web faxing is offered by a number of online service providers. This service provides delivery and receipt of fax messages over the Internet. **Microsoft Word** provides a menu option for sending a document by Internet fax, as shown in Figure 12-5.

Depending on the service, you can send faxes in several ways. One way is to use fax software provided by the service. A second method of Internet faxing is to send an e-mail, attaching the document you want faxed. The service provider turns the attachment into a fax. A third method is to access a Web site and send your fax from there. An advantage of this method is that you can send a fax from any computer. For all methods except fax machine, you will need a scanner if you want to send a printed document.

**Figure 12-5** Microsoft Word provides easy access to Internet fax service.

![Microsoft Word Internet Fax Menu](image-url)
Internet faxes can be received on fax machines or on a computer with a fax modem and software. They can also be received as e-mail attachments and on a Web site provided by a fax service. With some online services, you can call a number and get a list of the faxes you have received. You can then route the documents to a fax machine. Your company’s Web site may be set up to send and receive faxes.

Always include a cover sheet with a fax. A fax cover sheet is shown in Figure 12-6. The cover sheet should include the following information:

- Date the fax is being sent
- Name, fax number, and phone number of the sender
- Name, fax number, and phone number of the recipient
- Number of pages in the fax

A fax cover sheet that provides contact information for the sender and recipient should be included with every fax.

1. What are two types of printers commonly used at work?
2. What is the purpose of a scanner? What are three types of scanners commonly used at home or work?
3. What is the purpose of a fax machine? What other methods (besides a fax machine) can be used to send a fax?

Check your answers in Appendix C.

**Figure 12-6 A fax cover sheet should accompany each fax.**

**FAX**

To: Mr. Juan Alvarez  
From: Ms. Alma Park

Fax: 606-555-0124  
Fax: 606-555-0046

Phone: 606-555-0124  
Phone: 606-555-0045

Re: Project Bid  
Pages: 3

Date: June 26, 20--

- [ ] Urgent  
- [x] For Review  
- [ ] Please Comment  
- [ ] Please Reply  
- [ ] Please Recycle

Comments:

Please review this updated bid, which reflects the changes we discussed.
Section 12.1 **Applications**

**A. Technology Inventory**
You probably use technology in many ways in your personal, school, or work activities. Take an inventory of the technology items that affect your activities.

1. Make a list of the technology items you or your family have or use at home. List each item and give a brief description of it. Tell how the item makes completing tasks faster, easier, or safer. If the item is used for entertainment, explain how it is used.

2. Make a list of the computers, peripherals, and other technology items you use at school. Include items such as computers that you may use in the library, as well as items you use in classes. Consider sports, music, drama, and other extra-curricular activities as you look for technology items.

**B. Software Inventory**
When you use a computer, you use the operating system software and application programs. You may also use utility programs.

1. Make a list of the software programs you use at home, school, or other places.

2. For each program, tell whether it is operating system software, application software, or utility software. (Games are considered to be application software.)

3. For application and utility programs, tell the main purpose of the program.

**C. Software Tutorial**

1. Use the Help feature of a computer program, a wizard, or a tutorial to do something in the software that you did not know how to do. For example, you might use the Search feature of your operating system software to search for a file.

2. Write a set of instructions for completing the task.
The Connected World

Technology allows people to be connected to others around the world. Over half of American households have Internet access. Homes, schools, neighborhoods, businesses, and even entire cities run wireless networks. Makers of all kinds of devices, from PDAs to cell phones to headsets to printers, are building in wireless technology.

As you learned in Section 12.1, a network is a group of devices, such as computers and printers, connected together in order to share data and/or tasks. The devices may be linked physically by wires or cables. Instead, they may be linked through wireless connections. The parts of a network also have in common a language or set of rules that allows them to exchange data. For example, hypertext transfer protocol (HTTP) is the set of rules that enables computers to read Web pages.

In a local area network (LAN), the computers are physically close together. They may be in the same building or group of buildings. In a wide area network (WAN), the computers are farther apart. A company might have LANs for each office in Boston, New York, and Tokyo and a WAN that connects the LANs. When a LAN works like the Internet, it is called an intranet.

A third type of network is a personal area network (PAN). PANs span even shorter distances than LANs, up to about 30 feet. They can be used to access a larger network. They can also enable computers, cell phones, and other electronic devices within a person's general area to interact.

Bluetooth is a popular technology for PANs. Devices that use Bluetooth send data via radio waves. They have their own set of rules for communicating. You will find Bluetooth technology in some computers, cell phones, music players, scanners, and other products. With Bluetooth, you can send a document from your handheld to a printer. You can transfer files from your handheld to your desktop PC. You can also connect to the Internet so you can send e-mail on your PDA—all without wires.

You probably have seen people using laptops at schools, libraries, bookstores, or other public places without physically connecting their computers to a phone jack. Perhaps you have done so yourself. A popular technology that makes that possible is Wi-Fi. Like Bluetooth, Wi-Fi uses radio waves and its

**OBJECTIVES**

After completing Section 12.2, you should be able to:

1. Identify different types of computer networks.
2. Discuss how the Internet is used by workers.
3. Discuss security threats and solutions for computers and networks.
4. Identify options for transmitting documents.
5. Describe how to use voice mail, VoIP, and digital devices, such as cell phones and cameras, effectively.

**Key Point**

A LAN connects computers that are physically close together. A WAN connects computers that are far apart.
Bluetooth and Wi-Fi are used to connect computers and related devices wirelessly.

Bluetooth and Wi-Fi are used to connect computers and related devices wirelessly.

own set of standards. However, Wi-Fi works at greater distances—up to 1,000 feet. Wi-Fi is used for wireless LANs at work and home.

Wi-Fi is increasingly available in public places, including hotels, airports, and restaurants. Places that offer wireless Internet access are known as hotspots. Some places charge a fee for access; in others, access is free.

The Internet

The Internet is a vast network that connects millions of computers worldwide. Using the Internet, a student in Athens, Ohio, can do research at a library in Hamburg, Germany. An employee at a factory in West Monroe, Louisiana, can purchase parts from a supplier in Spokane, Washington. A worker in Brisbane, Australia, can e-mail a colleague in London.

Computers on the Internet communicate in different ways. On the World Wide Web, which is one part of the Internet, computers use hypertext transfer protocol. When you access a Web site, you are accessing a set of related Web pages stored on a server, or host computer. Web pages are documents written in a computer language called hypertext markup language (HTML). HTML permits the use of audio, video, and graphics. The Web is often called the graphical portion of the Internet. HTML also allows the use of hyperlinks: text or graphics that, when clicked, take the user to another location.

With a Web browser program, such as Internet Explorer® or Netscape Navigator, you can access the Internet and display Web pages. To visit a Web site, you key its address, which is known as a uniform resource locator (URL), in the browser. The URL for NASA, for example, is http://www.nasa.gov.

Places that offer wireless Internet access are known as hotspots.

Places that offer wireless Internet access are known as hotspots.
Many people use the Internet on the job for purposes such as the following:

- Send e-mail or instant messages
- Do research
- Purchase products or services
- Get help for using products
- Make travel reservations
- Take courses or classes

1. What do WANs, LANs, and PANs have in common? How are they different?
2. Give three examples of ways the Internet is used on the job.
   Check your answers in Appendix C.

Security

While the Internet offers useful services and information to users, it can also pose security threats to computers and networks. Computer viruses, worms, and Trojan horses can do serious damage. Companies and individuals can take steps to protect against these security threats.

Security Threats

A computer virus is a program that can infect data files or programs without the knowledge or permission of the user. It can destroy files or corrupt them so that they are no longer usable. Some viruses can steal data and transmit the data to another computer. Viruses may reach a computer or network when files are retrieved from storage devices or shared via a network, such as the Internet.

A worm is a program that is designed to damage programs or networks. A worm can make copies of itself and send those copies to computers on a network. Some worms are designed to be attached to e-mail messages. Other worms can be acquired through instant messaging programs, chat rooms, and shared network folders. Worms can delete files, transmit data, overload storage, or create an entrance to a network.

A Trojan horse is damaging software designed to look like something useful. Trojan horses may appear to be useful or interesting programs, but they are harmful when run. They can erase, corrupt, or overwrite data and transfer files.
They can also log keystrokes for the purpose of stealing information. Stolen passwords or credit card numbers can be used for identity theft.

Unauthorized access to a computer or network is also a security threat. The threat may come from a person with no special expertise. For example, an employee may see a coworker enter a password or store a password on a slip of paper. The coworker's password may be stolen and used to gain entrance to confidential files.

The threat may come from a hacker. A hacker is a person who uses computer expertise to break into computer networks. A hacker may steal, delete, or alter files. For example, credit card numbers may be stolen and used to make purchases illegally. Hacking is a crime in the United States.

Unauthorized access may occur using spyware. Spyware is a program that runs without the user's permission. It gathers data, such as e-mail addresses or credit card numbers, or records places visited on the Internet. The data is sent in the background to someone who may use it for illegal purposes.

**Security Solutions**

Because so much information is created and stored on computer systems, it is important to protect the data. It is also important to prevent unauthorized access to computer systems.

Companies and individual computer users can take steps to protect against security threats. Some of these steps are described in the following list.

- Back up and carefully store important data. If the data is destroyed or deleted, the copy can be used to restore the data.
- Create and use effective passwords. Use different passwords for different programs or services. Use a combination of letters, numbers, and symbols in passwords. Do not use data as a password that would be easy for someone who knows you to guess. For example, do not use your name, birth date, or address or those of your family members as passwords. Change passwords periodically.
- Log off your computer or network when you leave your desk. This helps prevent others from using your computer to access information.
- Do not open a file or program received as an e-mail attachment unless the file is one you are expecting from a trusted source.
- Use software that checks incoming files for viruses, worms, Trojan horses, and spyware. Update the checking software regularly.
- Use software that scans the computer and removes viruses and other unwanted programs, such as spyware, regularly.
- Do not respond to an e-mail message that appears to be from a bank or other financial institution and requests your bank account numbers or other personal data. A legitimate business will not request your personal data in this way.
When buying online, make sure the site is secure and that your credit card data will be encrypted. Encrypted data is scrambled so that it will be unreadable to an unauthorized user.

Use a firewall to protect your computer or network. A firewall is hardware and/or software that restricts access to computers or networks. Firewalls can protect against computer viruses and other dangerous files. They also can control the Web sites network users may access and the information users can send outside the network. A firewall program and other security measures are included in Microsoft Windows, as shown in Figure 12-7.

In addition to using passwords, some companies use a security method called two-factor authentication. With this method, a password and another item are needed to gain access to a computer or network. For example, a user might be required to pass a security badge through a scanner or place a finger on a fingerprint scanner. Some systems use a retinal scan of the user’s eye to identify the user.

Anti-virus programs and anti-spyware programs can be used to remove viruses and other harmful or unwanted programs. Data recovery programs can be used to try to recover files that have been corrupted. The process is not always successful.

If you become aware that your credit card numbers or other vital data have been stolen, contact law enforcement agencies. You should also contact the

**Figure 12-7** Microsoft Windows includes a firewall program.
credit card providers. If your Social Security number is stolen, you should contact the Social Security Administration. The Federal Trade Commission (FTC) provides an ID Theft Hotline and an online ID Theft Complaint form. It also provides a Web site with up-to-date information about how to work with credit bureaus and law enforcement agencies to reclaim your identity.

Document Transmittal

At work, you may need to send letters, reports, or other documents to coworkers, supervisors, or customers. Traditional means of sending documents—hand delivery, interoffice mail, the U.S. Postal Service, and private carriers—are still widely used. You also can fax a document, send an e-mail attachment, or post a document on an internal network or company Web site.

Many office networks have a public directory where people can post documents for others to access. Posting provides quick access and prevents the need for repeat mailings. It also permits employees to update files easily, so everyone has access to current information. For similar reasons, documents may be posted on a company Web site for downloading by visitors.

When choosing how to send a document, consider the following factors:

- **Speed.** When does the recipient need the document?
- **Cost.** How much will this method of sending the document cost?
- **Need.** Consider the recipient’s preferences and needs. Does the recipient have easy access to a fax machine? Does she or he dislike e-mail or need a paper copy?
- **Security.** Fax and e-mail are less secure than other methods of transmittal. Does the recipient’s computer system have a firewall that blocks e-mail attachments?
- **Format.** Fax or physical delivery is a good choice when the format of the document must stay the same.

### Diversity

Consider the recipient and the delivery method that will be most acceptable to him or her when selecting a method for sending a document.

**Key Point**

The FTC provides a Web site with up-to-date information about how to work with credit bureaus and law enforcement agencies when you are the victim of identity theft.

**check point 6**

1. What are four types of programs that can pose a security threat to computers or networks?
2. What is the purpose of a firewall?

Check your answers in Appendix C.
Pagers

A pager is a handheld device that alerts receivers that they have a message. Pagers are small, suitable for slipping in a pocket, clipping on a belt, or stowing in a purse. Pagers are useful for people who are away from their office but who might need to be contacted.

Like telephones, pagers have numbers that distinguish them from other pagers. When placing a call to a person who has a pager, dial the number of the pager. When the connection is made, you simply enter the number the receiver is to call. You could also enter an agreed-on numeric code for a particular message (44 for “call the office,” for example). With some pagers, you also may include a brief text or voice message.

When you are using a pager and a message comes in, the pager will alert you by vibrating, beeping, or lighting up. Often you can choose the alert you want to use. The pager displays the number you are to call or the message code, and you can read or hear any message. Two-way pagers allow people to send as well as receive messages.

Key Point
Pagers are useful for people who are away from their office but who might need to be contacted.
Voice Mail

Voice mail is a computerized system that answers telephone calls. It allows a caller to leave a recorded message if the receiver is not available when the call comes in. Many organizations provide voice mail for their employees. It is also a common cell phone feature.

If your company uses voice mail, you may need to record a personal greeting that callers will hear in your absence. In some systems, you record only your name; the system supplies the rest of the greeting. In others, the entire greeting is automated. Systems may offer personal and automated options from which you can choose.

When you receive a message, the voice mail system notifies you. There may be a light blinking on your phone or a distinct dial tone that you hear the next time you pick up the receiver to let you know you have a message. You might also receive an alert on a pager or PDA or by e-mail. To retrieve messages, you call the voice mail access number and enter a code or password. You also may need to enter your voice mail box number. Many systems allow you to forward messages to another phone number or to check for messages remotely from a different phone.

With some systems, you can have messages forwarded to your e-mail inbox or to voice mail software that functions like e-mail. You also can retrieve messages from the voice mail system’s Web site. Messages may be delivered as audio files that you can hear, or they may be converted to text messages. You have the option of replying by e-mail.

You should answer your messages promptly and delete messages as soon as you have responded to them. You will learn about recording voice mail greetings and messages in Chapter 14.

Ethics

Voice mail should be used to answer calls when you are away from your desk—not to screen calls when you are at your desk.

1. What factors should you consider when choosing how to send a document?
2. What is the purpose of a pager?
3. What is the purpose of a voice mail system?
Check your answers in Appendix C.

Cell Phones

A cell phone is a portable, wireless telephone, which changes antenna connections during travel from one radio reception cell to another. Cell phones are a popular way to communicate for business and personal use. A cell
phone is basically a two-way radio. The name cell phone comes from the division of a service area into cells. Each cell has its own tower or antenna and radio equipment. When you place a call on your cell phone, the call travels through standard phone lines to the phone you are calling or to a long-distance carrier. When you are moving—driving, for example—your call is transferred from one cell to another.

Cell phones come in a variety of shapes and sizes. A candy bar phone is the size and shape of a candy bar. A flip phone or clamshell flips open so you can make calls. In a slider, the screen slides up to expose the keypad. In a swivel, the screen rotates 180 degrees to reveal a keypad.

Features

To use a cell phone, you need a carrier—a phone company that provides service. Basic features offered by most cell phones and carriers are shown in Figure 12-8.

Unethical Use of Computers and Networks

Most employees behave ethically in the use of computers and networks at work. However, abuses do occur. For example, some employees use their work computers for personal business or entertainment during working hours. Many companies and other employers have policies that prohibit unethical uses such as those listed below.

- Accessing confidential information
- Harassing other users
- Disrupting computing or network services
- Stealing computing or network services
- Transmitting obscene or pornographic material
- Copying or using copyrighted materials without authorization*

Ethical employees follow the rules set out by employers for the legal and proper use of their computers and networks.


Key Point

Cell phones come in a variety of shapes and sizes. They are a popular way to communicate for business and personal use.
In addition to the basic features described previously, some phones offer a variety of special features such as a headset, Internet access, and a camera that takes digital still or video pictures.

If you plan to buy a cell phone, read reviews from sources such as Consumer Reports. Talk to people at work, as well as family members, friends, and neighbors. How do they like their phone? Is their service reliable? Have they had other phones or services they did not like? Try different phones—your friends’, your coworkers’, and model phones at stores. If you cannot make a call, at least handle the phone and try some of the features. Doing so will help you assess the features and quality of the phone.

---

**Figure 12-8  Cell Phone Basic Features**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone book</td>
<td>Lists phone numbers of contacts</td>
</tr>
<tr>
<td>Voice mail</td>
<td>Answers calls when you are not available</td>
</tr>
<tr>
<td>Speed dial</td>
<td>Lets you call a number by pressing a single key</td>
</tr>
<tr>
<td>Redial</td>
<td>Dials the last number you called</td>
</tr>
<tr>
<td>Voice dial</td>
<td>Lets you dial a number from your phone’s contact list by speaking the name</td>
</tr>
<tr>
<td>Call forwarding</td>
<td>Lets you forward calls to another number</td>
</tr>
<tr>
<td>Transfer</td>
<td>Sends your call to another phone</td>
</tr>
<tr>
<td>Call waiting</td>
<td>Informs you of incoming calls while you are on the phone</td>
</tr>
<tr>
<td>Call hold</td>
<td>Lets you put a call on hold to answer a second call</td>
</tr>
<tr>
<td>Caller ID</td>
<td>Displays the phone number of the caller</td>
</tr>
<tr>
<td>Multiparty calls</td>
<td>Allows you to converse with two or more other parties</td>
</tr>
<tr>
<td>Speakerphone</td>
<td>Lets you talk and hear at a distance from the phone</td>
</tr>
<tr>
<td>Text messaging</td>
<td>Allows you to send and receive short text messages</td>
</tr>
<tr>
<td>Voice messaging</td>
<td>Lets you send voice messages</td>
</tr>
<tr>
<td>Reminder</td>
<td>Lets you set an alarm to remind you of tasks</td>
</tr>
</tbody>
</table>

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**Key Point**

Cell phones may have special features such as a digital camera or Internet access.
Understand the terms of the contract when buying a phone or service plan. Many carriers require you to sign a contract for one or two years. There may be a sizable fee for canceling the service early. Consider a phone with a prepaid plan. You buy a phone and a certain number of minutes. More minutes can be added to the phone as needed. You can stop using the phone whenever you want without paying a penalty.

**Smart Phones**

A **smart phone** adds the features of a handheld computer to a cell phone. Smart phones are more expensive than other cell phones. They are popular with business users, however, and their sales are growing. In addition to the features described previously, smart phones include features such as:

- Address book, calendar, and tasks list
- Handwriting recognition
- High-speed data transfer
- A keyboard
- GPS device
- Software such as word processing and spreadsheet programs
- Voice record feature
- Synchronize feature
Text messaging is popular in many other parts of the world, including Europe, Central Asia, Australia, Iran, and Armenia.

Developing technology includes hybrid phones that switch from cell phone service to Wi-Fi. This change can save money and improve reception and data transfer.

Text messaging, also called short message service (SMS), is a method of sending brief written messages over cell phones or other devices. It is a quick, convenient, and low cost means of communicating. To compose a text message, you use the device’s keypad. Most services set a character limit on messages. As a result, senders often use abbreviations, such as the numeral 4 for the word for or G2G for Got to go.

Text messaging is useful for brief exchanges, such as sending short reminders. Text messaging also is useful in situations when the receiver finds it difficult to accept a phone call; in a meeting, for example. Text messaging is popular in many parts of the world, including Europe, Central Asia, Australia, Iran, and Armenia.  

**Cell Phone Courtesy and Safety**

The widespread use of cell phones and pagers means that people are almost always within reach, whether they are at the office or in other places. These technologies make you more accessible. If you carry a cell phone or pager while meeting with others, however, certain rules of etiquette apply.

If you have a cell phone, ask yourself whether you must receive calls while you are with other people. Consider how a customer you are meeting with will feel if you use his or her time to talk to someone else. Receiving a call while meeting with a customer sends the nonverbal message that the unknown caller is more important than your customer. Instead of taking calls while in a meeting or discussion, send calls to voice mail or turn off your phone. Do not accept a call unless it is urgent or pertains to the business you are presently conducting. If you must accept a call, politely excuse yourself. Take the call privately and make the conversation as brief as possible.

Exercise common sense and common courtesy in your cell phone conversations. Even if your business is not strictly private, avoid discussing it in public places. Choose a location where you will not be overheard or will not disturb the people or events around you. Speak in moderate tones. Use similar restraint when sending text messages on your cell phone. A meeting, conference, or social occasion is not the place for extended text-message exchanges.

Remember that cell phone conversations are not necessarily private. Think of cell phones as mobile radio telephones. Because the message travels via radio waves, other people may be able to pick up your conversations on various electronic devices.

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Be safety conscious when you use cell phones. Do not become so distracted when talking that you do not observe your surroundings. Do not use your cell phone when you are driving. If you need to make a call, find a place to stop the car safely and then make the call. Do not try to conduct business on the phone while you are driving. You need to attend to your driving. Also, the person with whom you are talking may feel (and rightly so) that he or she does not have your complete attention.

**VoIP**

Instead of a conventional telephone system, your company may use Internet telephony, or **VoIP** (voice over Internet protocol). With this digital phone service, calls go through a high-speed Internet connection rather than a conventional phone line. The main reason that companies choose VoIP is cost savings. VoIP is less expensive than traditional phone service. VoIP is also available for home users.

Most Internet phone services use a standard phone that is linked via an adapter box to an Internet connection. Making a phone call works just as it does with traditional phone service. You pick up the phone, hear a dial tone, and dial the number. You can call any phone number in any location.

For some Internet phone services, your computer serves as the phone. You dial by making menu selections. You talk using a microphone and the computer’s speakers or a headset. With some plans, you can place calls only to other PCs and only to people who use the same Internet phone service. With others, you can call any telephone number.
Digital Cameras

A digital camera works very much like a film camera. The main difference is that a digital camera records images in digital form, on a sensor chip instead of film. The images are stored on a reusable memory card in the camera. They can be uploaded to a computer or Web site, e-mailed, or printed. Images are available immediately; no film processing is required. Some companies give employees digital cameras to use in their work. Using digital cameras can save time, money, and effort.

- Graphic designers can work with digital images directly in graphics software, without developing or scanning pictures.
- Claims adjustors and appraisers can photograph property damage. They can upload photos directly to their laptop or to the company's Web site.
- Real estate agents can take pictures of a property. They can post them quickly and easily in the company's online listings. They can also create flyers using the images.
- Visiting nurses can send a digital photograph of a skin rash to a doctor, who can recommend a treatment.
- Landscapers can take pictures of a site and use them to develop a landscaping plan.

Global Positioning Systems

People who travel in their work often find a global positioning system (GPS) helpful. GPS is a worldwide navigation system consisting of satellites and ground stations. The system allows a GPS receiver to identify its location anywhere on Earth. GPS has been available for commercial use for several years. It is now available to individual users. With GPS, you can determine exactly where you are located. Usually, a GPS device includes software that displays the location on a map for the user's convenience.
A GPS system can plot the most efficient route for a trip and instantly update directions if you make a wrong turn. It can even provide detailed information, such as when to change lanes for a left exit and what side of the street an address is on. With a locator service, a GPS device can identify popular local spots. For example, restaurants, hotels, gas stations, and ATMs may be indicated.

GPS is used to track the delivery of goods and services and to manage vehicle fleets. It is used in cars, ships, boats, airplanes, helicopters, and construction equipment. It is used by business travelers, service technicians, truck drivers, police officers, firefighters, rescue workers, and many others.

GPS receivers are sold as dedicated (single-purpose) units, often the size of a small radio. GPS is also a feature of some handheld computers, cell phones, laptops, and cars.

**Checkpoint**

1. What are some advantages of using a digital camera over using a traditional film camera?
2. How can a GPS unit be helpful to users?

Check your answers in Appendix C.
Conference Technologies

A company’s employees may work in different offices, and some may work at home. Employees and customers may be in different parts of the country or around the world. It is sometimes not practical or too costly to bring people together in one place to discuss business matters. For this reason, remote conferences are popular. In such conferences, people can talk as if having a telephone call or face-to-face conversation.

A teleconference allows people at different locations to talk with one another by telephone. A date and time are planned for the conference. One person may begin the teleconference by calling each person and adding him or her to the conference call. In another method, participants may call a special telephone number to join the conference. Attendees can use a telephone or a speakerphone.

A video conference allows people at different locations to see and hear each other. Sound and images are sent over telephone lines or a computer network. Images are displayed on monitors or computer screens. A video broadcast may be followed by an audio question-and-answer session. If some people do not have access to video equipment, they may go to a videoconferencing center to use equipment there.

A Web conference takes place over an Internet connection. Web conferences may be handled in several different ways. The simplest is for the participants to key text messages in a chat room or use instant messaging. A teleconference using VoIP is a second option. Depending on the equipment used, attendees may be able to send video instant messages. They may be able to view parts of the conference and share documents being discussed.

Training Technologies

Many jobs require on-the-job training. Training is a major expense for some companies. Companies invest in training because it yields benefits. Training can increase worker productivity. It can help keep employees up to date with job skills and knowledge and help improve job performance.

Company supervisors, private consultants, training firms, government agencies, schools, colleges, and business associations all provide training. Training is provided in areas such as these:

- Certification
- Computer literacy
- Continuing education
- Cross-training
- Customer service
- Diversity awareness
Technology Vocabulary

Learning words and terms related to your work will help you improve your reading comprehension. Many special words and terms are related to computers, networks, storage devices, and software. Knowing these terms will be helpful in any job in which you use computers. The career area in which you work will likely have technology terms as well. For example, if you work in the health care field, you will need to learn terms related to medical equipment and tests. Knowing technology terms related to your chosen field will help you communicate clearly and understand materials you read.

Open the Word file CH12 Reading from the student data files. Follow the directions in the exercise to build your technology vocabulary.

- Health and safety
- Interpersonal skills
- New methods and procedures
- New worker orientation
- Problem solving
- Production or equipment
- Supervisory skills
- Teamwork and leadership

Many formal employee training courses are presented in classrooms by instructors. However, some consist of online learning. Some companies use a blend of traditional methods and online instruction. As an employee, you may receive training that uses one or more of the following technologies:

- **Computer-based training.** Computer-based training is delivered via software, CDs, and DVDs. Often, this type of training is interactive. Employees work through materials on computers at their own pace or in a classroom setting with an instructor.

- **Mobile learning.** With mobile learning, training information is delivered via PDAs, smart phones, MP3 players, tablets, and laptops. Mobile learning usually takes place at the employee’s own pace whenever and wherever he or she chooses.

**Key Point**

Computer-based training and mobile learning often allow employees to work through materials at their own pace.
Online training. As the name implies, online training is delivered online through an organization's network or on the Internet. Online training can consist of working with software, sharing text messages, and watching video, CDs, or DVDs. Online training often is interactive.

Training videos. Training videos or DVDs are presented to groups of employees in a classroom setting.

Training conferences. The same technologies used for meetings with employees or customers also are used for training. An advantage of this type of training is that it helps employees focus on the training, away from normal work duties. Another advantage is that employers can be sure that employees in different locations receive the same training at the same time.

1. What do a teleconference and a video conference have in common? How do they differ?

2. List five technologies that may be used to deliver training to employees.

Check your answers in Appendix C.
Section 12.2 *Applications*

**A. Computer Networks**
For each situation described below, indicate the type computer network involved: WAN, LAN, or PAN.

1. The computers are physically close together in the same building or group of buildings.
2. The devices are linked physically by wires or cables.
3. The network connects devices in several cities.
4. The network works like the Internet and is also called an *intranet*.
5. Devices in the network use Bluetooth to send data via radio waves.

**B. Security Threats Article**

1. Access the Internet and use a search engine to find articles about computer or network security threats. Use search terms such as *computer virus*, *worm*, *Trojan horse*, *spyware*, or *identity theft*.
2. Select an article on which to report.
3. Give the article name and complete source information. Write a summary of the main points of the article.

**C. Document Transmittal Methods**
For each situation described below, indicate the factor that is most important to consider when selecting a method for transmitting the document.

1. A contract is needed at its destination the following day.
2. A project bid contains confidential information.
3. A promotional flyer should be sent by the most economical means.
4. A technical drawing must be delivered exactly as prepared by the designer.
5. The recipient wants to edit the document in a particular software program.
Workplace Safety

Workplace safety is a major concern for both employers and employees. Many accidents and injuries happen in the workplace. Knowing how to handle accidents and how to prevent them are both important.

Employers are responsible for providing a safe and healthy workplace for their employees. This duty is set out in the Occupational Safety and Health Act of 1970. The Occupational Safety & Health Administration (OSHA) is a U.S. government agency. Its role is to promote the safety and health of American workers. It provides education and sets standards that promote workplace safety and health.

The OSHA Web site provides information on safety standards and how to report safety concerns. It also provides advice for preventing injuries as shown in Figure 12-9.

FIGURE 12-9  OSHA PROVIDES SAFETY TIPS FOR WORKING WITH COMPUTERS.

Causes of Injuries in Offices

Although an office is a relatively safe place to work, accidents and injuries do happen. Because of new office technology and equipment, office workers are faced with more hazards than in the past.

Falls are the most common accident in offices. Improper use of stools and ladders leads to many falls. Unstable office chairs and improper use of office chairs also cause many falls. Other causes of accidents and injuries in offices include:

- Strains from heavy lifting and repetitive motion tasks
- Crushing injuries from being struck by objects or caught between objects, such as filing cabinets
- Burns from fires, spilled hot liquids, and toxic chemicals
- Shocks from electrical equipment
- Tripping over cables, cords, or open file drawers
- Eye strain from poor lighting
- Tension and stress from noise
- Respiratory problems due to noxious gases or fumes given off by machines (photocopying chemicals)
- Cuts or punctures from improper use of tools such as paper cutters, scissors, shredders, and electronic hole punches
- Injuries caused by irrational or malicious behavior of coworkers or others

Attitudes that Affect Safety

Employers have a duty to set in place reasonable safety rules and procedures. However, safety rules and procedures can be effective only if employees follow them. As an employee, your attitude toward safety will have a big effect on your safety in the workplace. The safety of those around you can also be affected by your actions.

A healthy attitude toward safety procedures is shown by how a worker behaves. Safety-conscious workers are alert to hazards and look for ways to make their work areas and tasks safer. A few examples of how to be safety-conscious at work are given in the following list.

- Read and follow all safety warnings and procedures related to work.
- Wear safety gear or clothing as required.
- Use tools and devices for approved purposes.

Key Point

Falls are the most common accident in offices.

Ethics

Employers have a duty to set in place reasonable safety rules and procedures for the workplace.

Key Point

Safety-conscious workers are alert to hazards and look for ways to make their work areas and tasks safer.

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Footnote:

Do not take shortcuts that may compromise safety to save time.

- Keep work areas free of scraps, trash, or other objects that may cause a hazard.
- Take precautions to see that clothing and jewelry worn at work do not become entangled in equipment.
- Know where fire extinguishers and first-aid kits are located.
- Know whom to call when an accident or emergency happens.
- Know where emergency plans are located and how to follow them.

Emergency Plans

Emergency plans are a vital part of the safety procedures of a company. An emergency plan typically includes information such as the following:

- Safe evacuation routes in case of fire, tornadoes, or other emergencies
- Safe places to take shelter in time of emergency
- Where first-aid kits and fire-fighting equipment are located
- People in charge of key activities, such as calling the fire department, giving first aid, using fire-fighting equipment, or handling a toxic spill

Ask your employer about emergency plans for your office if you are not told about them when you begin a new job.

Emergency procedures and evacuation routes should be posted in several languages, if needed, so that all employees can read them.

Diversity

Emergency plans for offices:

1. List five causes of work-related injuries in offices.
2. Describe five actions of a safety-conscious worker.

Check your answers in Appendix C.

Computer Use and Ergonomics

Ergonomics is the study of the relationship between people and their working environment. The aim of ergonomics is to make it easier and safer for people to use tools and other objects.

Lifting a patient the correct way and choosing a lightweight tool that fits your hand are examples of applying ergonomics. Applying ergonomic guidelines when performing a task can reduce the chance of certain illnesses or injuries.
**Repetitive Stress Injuries**

Keying on a computer can cause repetitive stress injuries (RSI), which are also called repetitive strain injuries. These terms refer to a group of conditions caused by placing too much stress on a joint. Repetitive stress injury happens when the same action is performed repeatedly.³

Symptoms of RSI include pain, numbness, a tingling sensation, swelling, and loss of flexibility or strength. RSI can cause damage to muscles, nerves, tendons, and other soft tissues. RSIs are common and costly conditions for Americans. They result in lost wages, lower productivity, and missed work time.

**Vision Problems**

Computer users also may experience eye strain and related vision problems, sometimes called computer vision syndrome (CVS). Some symptoms of CVS are given in the following list.

- Difficulty shifting focus from the computer screen to more distant objects
- Pain, discomfort, or fatigue in the eye area
- Blurred vision
- Dry, irritated, sore, or burning eyes
- Sensitivity to light
- Headaches, neck aches, backaches, and muscle spasms

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**Ergonomics and the Computer Workstation**

To work safely and comfortably at a desktop computer, arrange your work area properly. Do warm-up exercises and use the proper keyboarding position. Take frequent breaks to rest your body.

Arrange the Work Area

Follow these steps to arrange your work area comfortably. Figure 12-10 shows a properly arranged work area.

- Position the keyboard at elbow height directly in front of your chair. The front edge of the keyboard should be even with the edge of the desk.
- Place your mouse on the same level as the keyboard, as close to your body as possible.
- If you are keying from a document or book, place it near the monitor in a position where you can read and switch your gaze from the monitor to the printed page easily.
- Set your monitor at a distance that makes seeing and reading comfortable—about 18 to 30 inches. The top of the screen should be at or below eye level.
- Adjust lighting to reduce glare on your computer screen. Close blinds and use a desk light if needed.
- Adjust the contrast and brightness on your monitor so text is comfortable to read. Keep the screen free of dust.

Figure 12-10 A properly arranged work area helps users avoid injury.
**Do Warm-up Exercises**

Before you begin a keying session, spend a few minutes doing two or more of the following warm-up exercises:

- **Exercise 1.** Open your hands with the fingers wide and the muscles tense. Close your fingers into a tight fist with thumb on top. Relax your fingers as you straighten them. Repeat ten times.

- **Exercise 2.** Clench your fingers briefly and then extend them, relaxing the muscles. Repeat several times.

- **Exercise 3.** Place the fingers and thumb of one hand between two fingers of the other, and spread the fingers as much as possible. Repeat for all fingers of both hands.

- **Exercise 4.** Interlace the fingers of both hands together. Wring your hands, rubbing the heel of the palms vigorously.

- **Exercise 5.** Spread the fingers of both hands as much as possible, hold the position for a moment or two, and then relax the fingers and lightly fold them into the palm of the hand. Repeat slowly several times.

- **Exercise 6.** Rub your palms with your thumbs. Then rub your fingers, the back of the hands, and your wrists vigorously.

**Check Your Keying Position**

The following list describes the proper keying position, which is illustrated in Figure 12-11 on page 468.

- Keep your feet flat on the floor. If you cannot reach the floor, adjust your chair or use a footrest. If a proper footrest is not available, use a box, a telephone book, a backpack, or another suitable object.

- Keep your body erect. Sit back in the chair with your lower back supported. If the chair does not have a back support, use a small pillow, rolled towel, or piece of clothing. The support should fit the inward curve of your lower back.

- Keep your fingers curved and upright over the home keys—`a`, `s`, `d`, `f`, `j`, `k`, `l`, `;`

- Keep your wrists and forearms low but not touching any surface.

- Keep your forearms parallel to the keyboard.

- Keep your arms near the sides of your body in a relaxed position. Your shoulders should be relaxed.

If you have never taken a keyboarding class, consider enrolling in one. You will learn the proper keying position so you can key comfortably and reduce your risk of injury. You may also learn to key more quickly with fewer errors, a skill that is useful in many jobs.
Take Frequent Breaks

If you work on a computer for extended periods, take frequent breaks. A three- to five-minute break every 20 to 40 minutes is recommended. You can plan some breaks to coincide with established break times. For others, you can plan to accomplish work away from your computer. For example, walk to a printer to collect documents or to the central files to store documents.

Avoid Vision Problems

Arranging your workstation properly can help to prevent and ease vision problems. So will the following additional steps:

- Make a conscious effort to blink.
- Shift your gaze away from the screen from time to time.
- Take at least one break every two hours that takes you away from looking at the screen.
- If you wear glasses or contact lenses, keep your prescription current.

Figure 12-11 Using proper position at the keyboard helps users avoid injury.
Other Computers

Applying ergonomics to the use of laptop computers can be challenging. The laptop’s keyboard is not detachable and is very close to the monitor. Users frequently must hunch down or set the computer above lap level to see the monitor properly. The small keyboard and pointer device—often positioned at the front of the keyboard so people have to reach past it to key—also pose problems. With that set up, it is difficult to use good keyboarding techniques. It is especially hard to keep your arms at the right height and your wrists straight. Similar concerns arise with tablets, though to a lesser extent because of the option of alternating keying with handwriting.

If you have a laptop, consider investing in a docking station. A docking station allows you to use the laptop as a desktop computer. It includes a full-size keyboard, mouse, and monitor. Another alternative is to use the laptop screen with a full-sized keyboard and standard mouse that plug into your computer. As much as possible, ergonomically arrange the places where you work with your laptop. Take a break every 20 to 30 minutes.

Ergonomic Equipment

Padded wrist rests placed in front of the keyboard and mouse are a good investment if used properly. You should not rest your wrists on a wrist rest while keying or using the mouse. Doing so puts pressure on the wrist, which could lead to injury. The real purpose of a wrist rest is to help keep users from bending their wrists. A wrist rest also protects the wrists from the hard, sharp edge of the table or desk. Finally, a wrist rest is a good place to rest the heels or palms of your hands when you are not keying.

Ergonomic keyboards are designed to improve hand posture and make keying more comfortable. Generally, they have a split design with left and right banks of keys. Some people find them more comfortable than standard keyboards.

Key Point

If you have a laptop, consider using a full-sized keyboard and standard mouse that plug into your computer.

The Human Factors and Ergonomics Society (HFES) provides training and resources for educating people about ergonomics. Go to the HFES Web site. A link to the site is provided on the Web site for this book that is shown below.

1. Go to the Information for Students page. Students make up about what percentage of the HFES membership?
2. Go the Publications page. What three publications do members receive as benefits of membership?

www.cengage.com/school/bcomm/buscomm
The mouse is available in several different designs. Some are contoured to the shape of the hand. Other pointing devices are joysticks, digital pens, touch pads, and trackballs. Choose a mouse or other pointing device that you find comfortable to use.

An adjustable keyboard tray may help in getting the keyboard at the right height. If you buy a tray, make sure it is large enough to hold a mouse as well. An adjustable footrest is a good purchase if your workstation arrangement does not allow you to put your feet flat on the floor.

You may experience headaches, blurred vision, and other problems associated with using a computer monitor. If so, consider investing in a pair of glasses specifically designed for computer work.

Diversity

Arranging a computer workstation correctly for children or people who are shorter or taller than average height may be a challenge. Try to adjust the height of desks, chairs, keyboards, and monitors for comfortable and safe keying.

1. Describe briefly what you can do to work safely and comfortably at a desktop computer.
2. Describe one warm-up exercise you might do before a keying session.

Check your answers in Appendix C.
Section 12.3 Applications

A. Ergonomic Working Position
OSHA provides a checklist for evaluating working position and parts of a computer workstation. Use this form and work with another student to check each other’s keying position.

1. From the data files, open the Evaluation Checklist found in the Word file CH12 Checklist.
2. Print the checklist.
3. Ask a classmate to observe as you sit at the computer and key. Your classmate should then complete the first section of the checklist, Working Posture.
4. Observe your classmate as he or she sits at the computer and keys. Complete the first section of the checklist, Working Posture, for your classmate.
5. Write a paragraph that describes how you can improve your working position.

B. Ergonomic Workstation

1. Use the Evaluation Checklist found in the Word file CH12 Checklist, which you printed earlier.
2. Complete the remaining sections of the checklist to evaluate the seating, keyboard, monitor, work area, and accessories.
3. Write a summary detailing any parts of the workstation that need changes or improvement.

C. Material Safety Datasheet
Material safety datasheets are used in the workplace to inform employees and others about dangers related to handling substances. Datasheets are often posted on the manufacturer’s or distributor’s Web sites.

1. Use an Internet search engine to find sites that have material safety datasheets. Use material safety datasheet as the search term.
2. Find the material safety datasheet for one product or substance. Print the datasheet.
3. Write a paragraph that tells the name of the substance and the type of information found on the sheet. Include source information for the sheet.
Chapter Summary

12.1 Computer Hardware and Software

- Technology is tools, machines, and other inventions that make work faster, easier, or safer.
- A computer is a machine that processes data according to a set of instructions in order to perform tasks. Computer software, also called programs, consists of step-by-step written instructions that tell a computer how to operate.
- Users should create a logical system for naming and storing files that allows them to be found quickly and easily.
- Printers, scanners, and fax machines are common computer peripherals.

12.2 Other Technologies

- Technology allows people to be connected to others around the world. WANs, LANs, and PANs are types of computer networks. The Internet is a vast network that connects millions of computers worldwide.
- Computer viruses and other threats can do serious damage to computers and networks. Steps can be taken to protect against these security threats.
- Pagers, voice mail, cell phones, VoIP, digital cameras, and global positioning systems are other technologies related to communication.

12.3 Workplace Safety and Ergonomics

- Workplace safety is a major concern for both employers and employees.
- As an employee, your attitude toward safety will have a big effect on your safety in the workplace.
- Ergonomics is the study of the relationship between people and their working environment. The aim of ergonomics is to make it easier and safer for people to use tools and other objects.
Critical Thinking Questions

1. Why do employers value workers who can use technology in their work and can learn and adapt to new technologies?

2. Why do software developers provide extensive tutorials and Help features to teach users how to use features of a software program?

3. Do you think fax machines will become obsolete since Internet fax services are now available? Why or why not?

4. What rules of etiquette might participants in a teleconference follow?

5. Ergonomic equipment and guidelines have been developed for many different tasks. Yet people sometimes do not use them. Why do you think that is so?
Chapter Applications

A. Technology Article

1. Access the Internet and use a search engine to find a current article about one of the following devices:
   - Digital camera
   - Pager
   - Cell phone
   - Smart phone
   - GPS device
2. Select an article on which to report.
3. Give the article name and complete source information. Write a summary of the main points of the article.

B. Ergonomic Equipment

Falls from office chairs are a common accident in offices. Chairs also affect how comfortable and productive a worker at a computer station can be.

1. Use the Internet or other sources to find a current article about what to look for in a chair that is ergonomically correct.
2. Write a summary that describe the features a chair should have.
3. Search the Internet for suppliers of chairs. Find a chair that you think would be a good choice for use at a computer workstation.
4. Provide the name or model number of the chair and a source where it can be purchased. Describe the features that make this chair a good choice.

C. Cell Phones and Driving Safety

Many people talk on a cell phone while driving for business purposes. California has a law that requires drivers to use a hands-free device to talk on the phone while operating a vehicle. Drivers under the age of 18 may use an electronic device while driving only in emergency situations. Other states, such as Connecticut, New Jersey, New York, Utah, and Washington, and the District of Columbia have similar laws.4

Write a short position paper to give your thoughts on this communication and safety issue. In your paper, answer the following questions.

- Do you think state governments should require that drivers who talk on cell phones while driving use a hands-free device? Why or why not?
- Do you think a law such as the one described will improve traffic safety? Why or why not?
- Do you think employers should have a policy on the use of cell phones while driving on business? Why or why not? What points might be included in such a policy?

D. Home Emergency Plan

Schools, businesses, and other public facilities typically have an emergency plan as described earlier in this chapter. Although it may not need to be as long or detailed, your family should also have a plan for how to proceed in case of various emergencies.

1. Identify the types of emergencies your family may face. For example, a fire or tornado may occur.

2. Write an emergency plan that could be used for the two or three most serious emergencies that may be likely to occur. In the plan, include information such as the following:
   - Ways to exit the house safely
   - Where to meet if the family must leave the house
   - The safest place to take shelter in case of bad weather
   - Emergency numbers to call for aid
   - Location of safety and first aid equipment
   - Who will be responsible for each small child or an adult who will need help in relocating or taking shelter

Editing Activity

Dan Viera is a middle school teacher. He is composing a rough draft of a committee report on whether the school should seek funding for tablet computers. When he traveled home to visit his parents last weekend, he lost the computer file. However, he has a printout of the file that he has scanned. Part of the scanned file appears below.

Open the Word file CH12 Editing from the student data files. Edit the text to make it clear and concise. Fix the occasional text errors that may have occurred in the scanning process. Add a topic sentence to the last paragraph.
Ergonomics in Action

Doris Roberts works as a customer service associate for a software company. She answers customer calls and provides help with using program features. Aside from two short breaks, Doris sits at her workstation all morning and all afternoon. Her chair is not the right height for comfortable keying, so she often slumps in her chair. Her keyboard is placed at an angle (not directly in front of her body) to make room for a mouse and pad on the keyboard tray. In order to key with both hands, Doris often holds the telephone receiver between her neck and shoulder as she speaks with customers. On many days, her job literally becomes a “pain in the neck.”

1. What problems might Doris have as a result of improper chair height and keyboard placement?

2. What injuries could be the result of keying most of the day with few breaks?

3. What changes to her workstation and work habits can Doris make to improve her productivity and her health?
Communication for Information Technology

Ray Xu moved to the United States four years ago. Because English is his second language, he has difficulty reading and speaking English. Presently, he owns six small stores that cater to tourists in the Orlando, Florida, area. These businesses are very successful, and, as a result, Ray needs to implement a computer system. This system will help keep an inventory of items that tourists purchase and help him with his accounting records. Ray is a little worried about buying a system because he knows very little about computers, much less a computer system.

Two weeks ago, Ray contacted Effective Computer Systems. He asked for a proposal on the computer system that he needs. Michelle Goodman is a sales supervisor for this company. Michelle’s job requires her to be very computer literate. She must keep up with new equipment and developments in the computer industry. She must also understand the needs of her customers. Her ability to meet the customers’ needs is critical to her job success.

Michelle has a proposal that a staff member has written for Ray and must deliver it to him tomorrow. The proposal includes a lot of technical language, computer jargon, and long, complex sentences.

1. If Michelle gives the proposal to Ray as it presently is, what would you expect his reaction to be?

2. What basic principle of audience analysis has the person who wrote the proposal violated?

3. What can Michelle do to improve the proposal for Ray?
Chapter 12 Answers

Checkpoint 1

1. In general, technology benefits workers by making work faster, easier, or safer. For example, a dishwashing machine makes cleaning dirty dishes easy. Using a router makes building a set of kitchen cabinets faster.

2. Four types of personal computers are listed below.
   • A desktop computer is a personal computer that fits on a desk but is too large to carry easily from place to place. It is designed for use in an office or at home.
   • A laptop computer is a portable personal computer that is small enough to sit on your lap. Laptops typically weigh from...
2 to 7 pounds and also are known as *notebooks*. They have the same uses as a desktop computer.

- A tablet is a portable personal computer that allows users to enter text by handwriting. Otherwise, tablets offer the same features as other personal computers.
- A handheld computer, also called a palmtop, weighs a pound or less and fits in the palm of your hand. As on a tablet, you use a digital pen or your finger to navigate or make selections; and you can handwrite data.

**Checkpoint 2**

1. Three general types of computer software are listed below.
   - Operating system software performs the computer’s most basic operations. It handles the transfer of data and files; controls equipment such as the keyboard, monitor, and printer; and manages other software on the computer.
   - Application software is used to perform work tasks. For example, word processing, database, and spreadsheet programs are application software.
   - Utility software is used to manage and secure data on a computer. For example, virus protection software and backup software are utility programs.
2. Operating system software manages and allows you to use all the other software on the computer.

**Checkpoint 3**

1. Computer files can be saved on an internal hard drive or on CDs, DVDs, and flash memory devices.
2. Using folders is a good way to keep files organized. You could create a folder for each topic to which your files relate. More folders can be created within the main folders to organize files further. You can use meaningful names for your files and be consistent in how you name files.

**Checkpoint 4**

1. Two types of printers commonly used at work are ink jet printers and laser printers.
2. The purpose of a scanner is to create an electronic image of a page or other printed item. Three types of scanners commonly used at home or work are flatbed scanners, sheetfed scanners, and pen scanners.
3. The purpose of a fax machine is to send or receive an electronic image of a document. A fax can also be sent using a computer with a fax modem or by using an Internet fax service.

**Checkpoint 5**

1. **WANs**, **LANs**, and **PANs** are all types of computer networks. They differ in the area covered. A **WAN** connects computers and devices that are great distances apart, such as in different cities. A **LAN** connects computers and devices that are closer together, such as in one city. A **PAN** connects computers and devices that are close together, such as in a home or other building.
2. Many people use the Internet on the job for purposes such as the following:
   - Send e-mail or instant messages
   - Do research
   - Purchase products or services
   - Get help for using products
   - Make travel reservations
   - Take courses or classes

**Checkpoint 6**

1. Four types of programs that can pose a security threat to computers or networks are computer viruses, worms, Trojan horses, and spyware.
2. A **firewall** is hardware and/or software that restricts access to a network by outsiders. Firewalls can protect against computer viruses and other dangers files.

**Checkpoint 7**

1. Factors should you consider when choosing how to send a document include:
   - Speed. When does the recipient need the document?
   - Cost. How much will this method of sending the document cost?
   - Need. Consider the recipient’s preferences and needs.
   - Security. Fax and e-mail are less secure than other methods of transmittal.
   - Format. Fax or physical delivery is a good choice when the format of the document must stay the same.
2. The purpose of a pager is to alert receivers that they have messages.
3. The purpose of a voice mail system is to allow a caller to leave a recorded message if the receiver is not available when the call comes in.

**Checkpoint 8**

1. A **smart phone adds** the features of a handheld computer to a cell phone. Smart phones are more expensive than other cell phones.
2. With **VoIP**, phone calls go through a high-speed Internet connection rather than a conventional phone line. VoIP is often less expensive than traditional phone service.

**Checkpoint 9**

1. Advantages of using a digital camera over using a traditional film camera include no film processing fee, images that are available for use instantly, and images that can be used in computer files.
2. A **GPS unit can be helpful to users by allowing them to:**
   - Determine exactly where they are located
   - Plot the most efficient route for a trip and instantly update directions
   - Identify popular local spots, such as restaurants, hotels, and gas stations
Checkpoint 10
1. A teleconference and a video conference both allow people at distant locations to meet electronically. In a teleconference, participants can hear one another. In a video conference, participants can hear and see one another.

2. Five technologies that may be used to deliver training to employees include:
   • Computer-based training
   • Mobile learning
   • Online training
   • Training videos
   • Training conferences

Checkpoint 11
1. Causes of work-related injuries in offices include:
   • Falls from improper use of stools and ladders and unstable office chairs
   • Strains from heavy lifting and repetitive motion tasks
   • Crushing injuries from being struck by objects or caught between objects such as filing cabinets
   • Burns from fires, spilled hot liquids, and toxic chemicals
   • Shocks from electrical equipment
   • Tripping over cables, cords, or open file drawers
   • Eye strain from poor lighting
   • Tension and stress from noise
   • Respiratory problems due to noxious gases or fumes given off by machines (photocopying chemicals)
   • Cuts or punctures from improper use of tools such as paper cutters, scissors, shredders, and electronic hole punches
   • Injuries caused by irrational or malicious behavior of coworkers or others

(Students are to list five causes.)

2. Actions of a safety-conscious worker include:
   • Read and follow all safety warnings and procedures related to work.
   • Wear safety gear or clothing as required.
   • Use tools and devices for approved purposes.
   • Do not take shortcuts that may compromise safety to save time.
   • Keep work areas free of scraps, trash, or other objects that may cause a hazard.
   • Take precautions to see that clothing and jewelry worn at work do not become entangled in equipment.
   • Know where fire extinguishers and first-aid kits are located.
   • Know whom to call when an accident or emergency happens.

(Students are to list five actions.)

Checkpoint 12
1. Ergonomics is the study of the relationship between people and their working environment. Its aim is to make it easier and safer for people to use tools and other objects.

2. Two health and safety issues associated with computer use are repetitive strain injuries and vision problems.
   • Repetitive stress injury happens when the same action is performed repeatedly. Symptoms of RSI include pain, numbness, swelling, and loss of flexibility or strength. RSI can cause damage to muscles, nerves, tendons, and other soft tissues.
   • Computer users may experience eye strain and related vision problems, sometimes called computer vision syndrome (CVS). Some symptoms of CVS are pain, discomfort, or fatigue in the eye area; blurred vision; and sensitivity to light. Headaches, neck aches, backaches, and muscle spasms may also occur.

Checkpoint 13
1. To work safely and comfortably at a desktop computer, arrange your work area properly. Do warm-up exercises and use the proper keyboarding position. Take frequent breaks to rest your body.

2. One warm-up exercise you might do is: Clench your fingers briefly and then extend them, relaxing the muscles. Repeat several times. (Exercise descriptions will vary.)

This page contains answers for this chapter only.