

Communication Systems

Sections

- 9.1 Introducing Communication Technology
- 9.2 Modes of Communication
- 9.3 Impacts of Communication Technology

What You'll Learn

- **Apply** the systems model to communication.
- **Identify** communication subsystems.
- **Discuss** different forms of communication.
- **Describe** the different modes of communication.
- **Explain** how communication technology has affected modes of communication.
- **Identify** the positive impacts of communication technology.
- **Identify** the negative impacts of communication technology.

Explore the Photo



Convergence Cell phones like the iPhone combine an iPod, camera, e-mail, IM, and Internet access. This combining is called "convergence." *What technology tool do you use the most? Why?*





Launch the TECHNOLOGY LAB

Create an Ad

At the end of this chapter, you will be asked to create an advertisement for a brand new communication device, such as a cell phone, plasma TV, or video game. Get a head start by using this checklist to prepare for the Technology Lab.

PROJECT CHECKLIST

- ✓ Begin Internet research to learn about inventions.
- ✓ Find images of interesting communication inventions.
- ✓ Gather ads for current devices in magazines and newspapers.

Introducing Communication Technology

Reading Guide

Before You Read

Connect How do you use technology for communicating?

Content Vocabulary

- communication technology
- graphic communication
- sound waves
- electromagnetic carrier wave
- telecommunication

Academic Vocabulary

You will see these words in your reading and on your tests. Find their meanings at the back of this book.

- technology
- factor

Graphic Organizer

Draw the section diagram. Use it to organize and write down information as you read.

Forms of Communication

Biological Communication			
Speaking			

 Go to glencoe.com to this book's OLC for a downloadable graphic organizer and more.

TECHNOLOGY STANDARDS

- STL 2** Core Concepts of Technology
- STL 17** Information & Communication Technologies

ACADEMIC STANDARDS

English Language Arts

- NCTE 4** Use written language to communicate effectively.
- NCTE 12** Use language to accomplish individual purposes.

- STL** *National Standards for Technological Literacy*
- NCTM** *National Council of Teachers of Mathematics*
- NCTE** *National Council of Teachers of English*
- NSES** *National Science Education Standards*
- NCCS** *National Council for the Social Studies*

Communication and Technology

What are some examples of communication technology?

Imagine you are standing in the hallway at school talking to your friends. Are you using communication? Yes. Communication is sending, receiving, and responding to messages. Are you using communication **technology**? No. When you are talking face-to-face, you are not using communication technology.

However, if you communicate by using a written note, Instant Messaging (IM), or a cell phone, then you are using communication technology. **Communication technology** is the transfer of messages (information) among people and/or machines through the use of technology. This processing of information can help people make decisions, solve problems, and control machines.

As You Read

Predict Think of different ways to send and receive messages.

The knowledge, skills, and tools that were the foundation of past and current communication technology are also the foundation for new technologies and improved ones.

The Systems Model

How does communication fit the systems model?

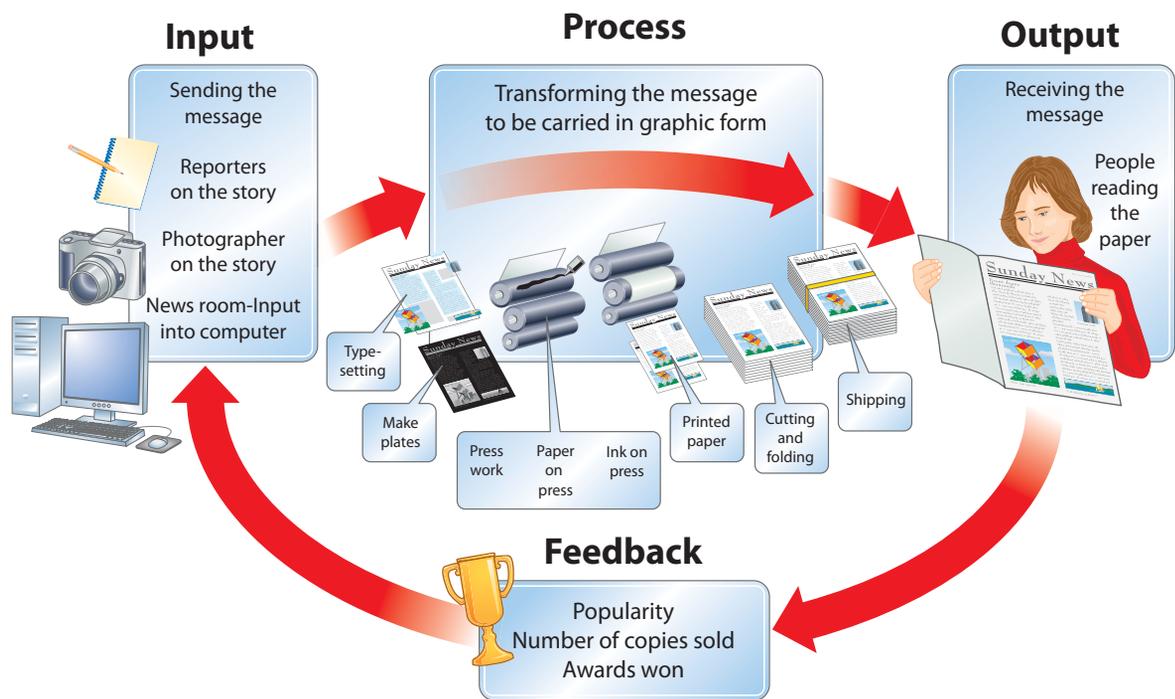
As you know, systems can be charted on a diagram. **Figure 9.1** breaks systems into input, process, output, and feedback. This is the systems model.

Communication systems include all the inputs, processes, outputs, and feedback associated with sending and receiving messages (information). The message is the input. How the message is moved is the process. The reception of the message at the other end is the output. Feedback may relate to static or clarity.

Real-World Systems

Suppose you write an article for the school newspaper about the computer lab. Your words, pictures, time you spend, and the computer you use are inputs. Putting the newspaper together and printing it are parts of the process. The primary output is the newspaper.

Figure 9.1 Communication System: A Newspaper Process



 **A System** The process of making a traditional newspaper is an example of a communication system. *Give some examples of inputs.*

When you read a book or listen to an MP3 player, you are on the output end of the communication system, receiving the message. When you use a telephone, a computer, or a video camera, you are controlling both the input and output of the system. What parts of a system are you involved with when you play a video game, watch television, or type an e-mail or IM? Computers, iPods, and video recorders are communication systems that may contain the input, process, and output devices all in one unit.



Reading Check

Define What is an input and an output?

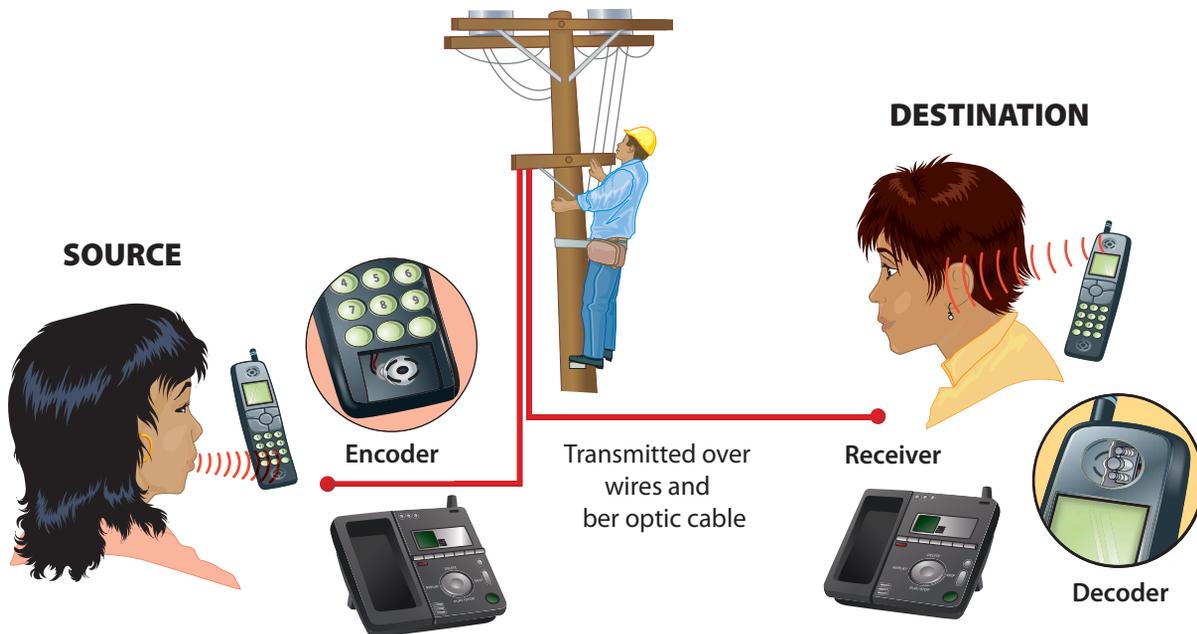
Communication Subsystems

How would you use a decoder?

Communication systems usually include several subsystems that help transmit information. See **Figure 9.2**. The subsystems are made up of these elements: a source, an encoder, a transmitter, a receiver, a decoder, and a destination.

The source is the sender, which could be a person or a machine with a message to send. The encoder changes the message so that it can be transmitted. When you write a note, type on a computer keyboard, or talk into a telephone, you are encoding your message. Your message could be written on paper or be sent as an electronic signal.

Figure 9.2 Systems and Subsystems



 **Systems within a System** Most communication systems have several subsystems. *What are some examples of a destination?*

Tech Stars

Tim Berners-Lee

Inventor of the World Wide Web

When Tim Berners-Lee was a teenager in England, he built a computer using a soldering iron and an old television. Later, he worked as a computer programmer at CERN, a physics laboratory in Geneva, Switzerland. There, he wrote a program with Robert Cailliau for storing information by using “random associations.” This idea led to “hyperlinking,” which is how the World Wide Web works.

Tim said the World Wide Web should be like a “global hypertext project.” It should help people work together through a “web” of documents. The documents could be opened from anywhere on the Web.

The WC3 In 1994, Tim set up the World Wide Web Consortium (WC3) at the Massachusetts Institute of Technology (MIT). The group manages Web development around the world. Of course, the WC3 has its own Web site at w3.org.

English Language Arts/Writing Write an article for your school newspaper about spam and how it affects using the Web.



Go to glencoe.com to this book’s OLC to learn about young innovators in technology.



The receiver of the message at the final destination could be a person or a machine. The message is then decoded, which means symbols on paper must be read or electronic impulses must be turned into information that a person or machine can understand.

Multiple Subsystems

Some communication systems have two subsystems designed to store and retrieve information. A telephone answering machine, an iPod, and a DVD burner are all parts of communication systems that can store and retrieve information for later use.

Video Games and Subsystems

When you play a video game, the controller encodes and transmits your moves to the machine’s central processing unit. The machine determines its own moves and encodes this information so it can be displayed on the screen. You and the machine take turns being the source of information and the final destination for information until one of you wins the game. As you play, you are using the tools of communication to process information, solve problems, and make informed decisions.



Reading Check

Identify Name the six elements of communication subsystems.

Imagine This...

Computers You Can Wear

Imagine wearing a computer that is a light-weight, voice-activated box with a headset and eyepiece. When you look into the eyepiece, you see a computer screen that appears as if it is a few feet away. Researchers at NASA are working on a model called a “Wearable Augmented Reality Prototype (WARP)” for astronauts to wear so their hands are free for other tasks. *How might wearing your computer help you in everyday communication?*

 Go to glencoe.com to this book’s OLC for answers and to learn more about NASA and technology.

Message Design

What factors are important when designing a message?

If you were to create a Web page for a social networking Web site, you would probably think about the people who might view your site. You would want to share things that would interest them. The design of any message is influenced by the intended audience, or receiver of the message.

Other Factors of Message Design

The medium used—in this case, a social networking Web site—is another **factor**. Your message must be designed to match the selected communication medium. Other media might include:

- Print newspapers
- Billboards
- TV commercials

The nature of the message would also affect the design of the message. A story about the school computer lab would be set up differently than instructions for building the computer lab.

Also, the language used to express the ideas is important when designing a message. The language you use for writing or speaking, such as English, is one example. Symbols, measurements, and drawings are other kinds of languages people can use to communicate clearly. Do you and your friends have your own language that you use when you write instant messages or e-mails?

For example, instructions to workers for building a computer lab would include drawings (graphic images), measurements, symbols, and special vocabularies (construction terms) that the workers would understand. Ideas would be expressed in a common language of the construction industry for clear communication.

The Purpose of a Message

Every message has a purpose. That purpose may be to inform, persuade, entertain, control, manage, or educate. For example, a set of building plans is a type of message that is absolutely necessary for a building project. Can you read a floor plan? The purposes of a floor plan might be to control, manage, and educate.

An article about the school computer lab would probably inform and educate the people who read your school newspaper. Perhaps the writer thinks more students should use the computer lab after school. In that case, the article would be designed to persuade. If the article warns students not to play computer games, the article’s purpose would be to control or manage. If the article included a funny story about a homework-eating computer, it could be meant to entertain. All the ways to communicate, including graphic and electronic means, can be used for these purposes.

Forms of Communication

What is one way to identify or group communication systems?

Although the different forms of communication may overlap, communication systems can be grouped by the way they carry messages. Let's look at some different ways that you can transmit a message, including biological communication, graphic communication, wave communication, and telecommunication.

Biological Communication

Ordinary biological communication is not part of technology. You will study it in depth in science courses. However, it is important for you to know that communication can take place without technology and that most living things communicate.

Biological communication includes all forms of communication that use natural methods, such as the voice, ears, arms, and hands, to transmit and receive messages. Examples include speaking (language), facial expressions, and hand signals.

Graphic Communication

Graphic communication includes all forms of communication that send and receive messages visually through the use of drawn or printed pictures and symbols. Printing is the most common example. Magazines, newspapers, messages on clothing, billboards, road signs, and computer images are all forms of graphic communication. In this form of communication, people send and receive information through reading, writing, drawing, and painting.

Wave Communication

Wave communication refers to all forms of communication that move through air, water, outer space, or some other medium in waves. They use the newest and oldest technological inventions.

 **Biological Conversation** One type of biological communication is "signing." American Sign Language (ASL) helps people with hearing disabilities communicate. *What other forms of communication might aid people with disabilities?*





Satellite's Eye View Satellites can send and receive signals for radio and TV stations and send photos to Earth. This photo was taken by the QuickBird satellite nearly 300 miles above the earth. *Can you identify the objects in the photo? If so, make a list of the objects.*

Sound Waves

Sound waves are vibrations traveling through air, water, or some other medium that can be perceived by the human ear. Our early ancestors used hollow logs as drums to send coded messages. Banging on the logs caused the air to vibrate with sound waves that reached people far away. Musical instruments and face-to-face communication depend on sound waves.

Electromagnetic Carrier Waves

Our radio and TV programs are converted into electrical signals. These signals are carried by **electromagnetic carrier waves**, which are waves of electromagnetic energy that carry signals.

Large antennas and dishes receive the signals. The audio part of a TV signal and the full broadcast of a radio transmission are converted into sound waves, which you hear through speakers.

Light Waves

If your telephone company uses fiber optic cables, the signal is transmitted through the cable as waves of light. When you use a camera to take a picture, light waves from your subject bring the image to your eyes and to the camera lens.



List What are four ways to transmit a message?

Telecommunication

Communication over a distance is **telecommunication**. Today most telecommunication systems use electronic or optoelectronic devices. Have you ever used a telecommunication machine or device? You have if you have used a phone, television, or radio.

Satellites and Telecommunication

Satellites are also telecommunication devices. Satellites placed 22,300 miles above the earth and traveling at the same speed that Earth spins are in a “geosynchronous orbit.” This means that the satellite always stays above the same part of the earth. Its lack of movement in relation to the ground could give the impression that the satellite was attached to Earth with a very long pole. When a satellite is in a geosynchronous orbit, it seems to move with the objects on the ground.

Uses of Satellites

Satellites can help produce maps, provide climate information, track weather patterns, and even observe what people are building in other parts of the world. The United States has many spy satellites looking down on other countries as the satellites circle the earth. Some of these spy satellites can take detailed photos by using equipment similar to that used on the Hubble Space Telescope. It is possible for some satellites to see the details of an object that is smaller than a golf cart.

Academic Connections Science

Now Hear This! You have your own built-in sound receivers—your ears. Sound waves striking your eardrums make them vibrate.

Apply Find an illustration of the ear in an encyclopedia at school. Make a drawing showing the main parts of the ear. Label the parts and functions.



section

9.1

assessment

After You Read Self-Check

1. Name the factors involved in message design.
2. List the six purposes of a message.
3. Define telecommunication.

Think

4. Explain why smoke signals would be classified as a form of telecommunication.

Practice Academic Skills

English Language Arts/Writing

5. Until the late 1950s, many people shared telephone lines, or party lines. Only one party could use the phone at a time, because you might hear another person talking. Write a paragraph comparing today's social networking technologies to ones your parents used at your age.

STEM Mathematics

6. Shanda wants to create an Internet ad for China and Thailand and has to calculate the combined population of the two countries. If China has 1.306 billion people and Thailand has 65 million, what is the total population?

Math Concept Representing Large Numbers When you add larger numbers, make sure that they are expressed in the same form.

1. Express the number for China's population, 1.306 billion, as 1,306 million.
2. Add 1,306 million to 65 million to find the total combined population.



For help, go to glencoe.com to this book's OLC and find the Math Handbook.

Modes of Communication

Reading Guide

Before You Read

Preview Why might new modes of communication be necessary?

Content Vocabulary

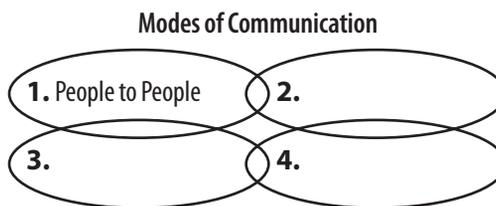
- mode
- machine-to-machine communication

Academic Vocabulary

- response
- process

Graphic Organizer

Draw the section diagram. Use it to organize and write down information as you read.



Go to glencoe.com to this book's OLC for a downloadable graphic organizer and more.

TECHNOLOGY STANDARDS

- STL 1** Characteristics & Scope of Technology
- STL 2** Core Concepts of Technology
- STL 11** Design Process
- STL 17** Information & Communication Technologies

ACADEMIC STANDARDS

English Language Arts

- NCTE 4** Use written language to communicate effectively.
- NCTE 12** Use language to accomplish individual purposes.

- STL** *National Standards for Technological Literacy*
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Evolving Modes of Communication

What progress have people made in their ability to communicate with each other?

Technology has given us new modes of communication. A **mode** is a way of doing something. Originally, “people-to-people” communication was the only mode. It is still the most basic mode of communication. Over time people have learned to create new and more powerful modes of communication. They gained the knowledge and skills needed to build complex communication devices and used the mode called “people-to-machines” communication. People also created graphic communication systems to transmit their messages using the printed word, which uses the mode

As You Read

Connect Do you communicate with machines? Which ones?

called “machines-to-people” communication. Finally, people developed communication based on electrical signals that are sometimes used for the mode called “machines-to-machines” communication.

 **Reading Check**

Identify What are the four modes of communication?

People to People

People-to-people communication is one mode, but it was not always the way it is today. At one time people had to communicate with each other within the limits of their own physical makeup (biological communication).

For example, a baby points, cries, grunts, stamps its feet, grabs what it wants, or speaks “baby talk” to be understood. Our earliest ancestors probably communicated in a similar way. They used simple sounds and gestures to get a **response**.

People to Machines

Until the development of electronic communication devices, people were talking only to other people. The machines they built could only carry the message, and this message could only be understood by other people. Today, however, people are communicating with the machines that they have created. Some examples of people communicating with machines include someone setting a digital video recorder (DVR or TiVo) to record a favorite television show; a computer programmer typing a program into a computer; and a person using a keyboard and a controller while playing a computer game.

Machines to People

Machines also send messages to people. A whistling teapot is a kind of machine that tells you the water is boiling. An alarm system tells you someone has entered a protected store or home. Also, a smoke/carbon monoxide detector can sense fire or carbon monoxide and warn you of the danger. Can you think of other examples of machines communicating with people?



Recreational Communication

Communication happens each time you play a computer game. *Why might this be considered people-to-machine communication?*



 **EcoTech**

Treeless Paper

Making paper from trees can use a lot of energy and toxic chemicals. But paper can also be made from hemp, bamboo, or kenaf—a plant that grows quickly and uses eco-friendly chemicals for production.

Try This To save paper, write on both sides of your paper, use scrap paper—and recycle it.

Machines to Machines

Machine-to-machine communication is the transfer of messages from one machine, such as a computer, to another machine. Machine-to-machine communication is also known as M2M. All types of machines can be adapted to send information to other machines. Many machines use wireless technology to do this. Machine-to-machine communication is quite common today, and there are many examples of this particular mode of communication. Besides transferring information, it is used by individuals and manufacturers for a variety of other **processes**.

Your computer gives instructions to your printer, telling it to print your report. In an automated factory, computers attached to sensors control the flow of raw materials and the operation of the machines. The assembly and finishing processes used to make a product are also controlled by machines communicating with other machines. Even the packaging of the finished product may be handled by machines, under the direction of still other machines. Many businesses and manufacturers depend on machine-to-machine communication to produce the products people buy and use around the world.

section

9.2

assessment



After You Read

Self-Check

1. Explain how a baby who cannot talk communicates.
2. Discuss how electronic devices have changed modes of communication.
3. Describe a mode.

Think

4. Identify the mode of communication in these examples: A computer program tells a robot how to paint a car; a computer spell-checker finds errors in a report; a friend passes a note.

Practice Academic Skills



English Language Arts/Writing

5. Use a computer graphics program, scanner, magazine pictures, and your words to create a Web page or a large poster. The theme of the project is: "Communication happens between people and machines."



Mathematics

6. There are different terms used to describe the amount of memory storage on a computer hard drive—byte, kilobyte, megabyte, and gigabyte. The smallest unit is the byte, the basis for the kilobyte, equaling 1,000 bytes. Most personal computers come with memory storage measured in gigabytes: 1,000 kilobytes = 1 megabyte. Using the same ratio of bytes to kilobytes, how many megabytes make up one gigabyte? One terabyte?



Numbers and Operations: Ratios A ratio compares two numbers.

1. Notice that 1 equals 1,000 in each ratio.
2. Substitute 1 megabyte for one kilobyte to find how many megabytes make up a gigabyte.
3. Substitute 1 megabyte for one gigabyte to find how many gigabytes make up a terabyte.



For help, go to glencoe.com to this book's OLC and find the Math Handbook.

Impacts of Communication Technology

Reading Guide

Before You Read

Connect How has communication technology changed the way people communicate?

Content Vocabulary

- personal privacy
- biometrics
- tolerance

Academic Vocabulary

- method
- invest

Graphic Organizer

Draw the section diagram. Use it to organize and write down information as you read.

Impacts of Communication Technology

	Technology #1	Technology #2
Positive		
Negative		

 Go to glencoe.com to this book's OLC for a downloadable graphic organizer and more.

TECHNOLOGY STANDARDS

STL 4 Cultural, Social, Economic & Political Effects

STL 5 Environmental Effects

ACADEMIC STANDARDS

English Language Arts

NCTE 1 Read texts to acquire new information.

Science

NSES Abilities necessary to do scientific inquiry.

STL *National Standards for Technological Literacy*

NCTM *National Council of Teachers of Mathematics*

NCTE *National Council of Teachers of English*

NSES *National Science Education Standards*

NCSS *National Council for the Social Studies*

The Impacts of Technology

How has communication technology affected the world?

When people say the world is getting smaller, they mean technology allows us to communicate instantly with almost anyone anywhere. Communication technology is neither good nor bad, but the use of its products and systems can have good and bad consequences. Political, social, cultural, economic, and environmental issues are influenced by communication technology.

Political Impacts

What is one way that communication technology affects politics?

Political decisions and world news are brought to you daily via 24/7 broadcasts, newspapers, magazines, and the Internet.

As You Read

Predict How might communication systems help people of different cultures get along with each other?

Building a Super Cell Phone

The newest wave of tech entrepreneurs is transforming our mobile phones into personal computers. “The most common digital device in the world is the cell phone,” says Motricity’s chief technology officer. Young entrepreneurs are looking to social networking, Internet video, and online photo-sharing. They extend those applications by putting them on cell phones.

Critical Thinking *What modes of communication would apply to a super cell phone? Why?*



Go to glencoe.com to this book’s OLC and read more about this news.

For the presidential nomination and the 2008 election, the candidates raised and spent more than \$1 billion to communicate their messages. With all this information, it is difficult to separate the best candidate from the one who has the most money.

Social and Cultural Impacts

How important is communication technology to you?

Experts sometimes refer to you and your friends as *Generation @*, or the *wired generation*. It is possible that your social network depends on communication technology. You may use different **methods** of communication, such as cell phones, e-mail, instant messaging, social networking, interactive gaming, blogging, and podcasting.

In addition, communication technology has affected other aspects of society and culture. Education, personal privacy, and tolerance for other cultures have all been influenced by communication technology.

Education

Knowledge was at one time passed on from one person to another by word of mouth. The key to the advancement of education and our technology was the development of communication technology. It helped us to learn from the achievements of people who lived far away or from people who lived and died long before we were born.

Before the invention of printing, only churches, royalty, and the very wealthy owned books. Printing made it possible for more people to own books. The growth of the printing industry was very important to education and the spread of technology.

As printing developed and literacy increased, people began to learn from other people. Today so much information is available that our era is called “The Information Age.”

Personal Privacy

It is becoming difficult to prevent invasion of **personal privacy**, which is the right of individuals to keep certain information from public view. Banking, stock market transactions, and credit card purchases are monitored by communication systems. Personal information about individuals is available through the Internet.

Biometrics is the science of measuring a person’s unique features, such as fingerprints, facial features, voice, and retina of the eye. A biometric reader converts your fingerprints or facial features into a mathematical image. It compares that image with

Ethics in Action

Misinformation on the Net

Mistakes, deliberate falsehoods, and personal opinion appear in newspapers, books, the Internet, and magazines everyday. This can lead to harassment. Both ethical and unethical people use communication media.

Just the Facts How can you protect yourself from misinformation? Stay informed using many sources. For example, during an election, consider what each side says.

English Language Arts/Writing

Comparing News Select a news event and compare the coverage that it receives in a newspaper, a TV news broadcast, and a news Web site.

1. Use a spreadsheet to chart and compare how each covers the story.
2. Write a paragraph summarizing your conclusions.

other images on file to identify you. Retina scans and voiceprints may become as common as fingerprints for identifying people. They may even replace keys and locks. Biometric security systems make it harder for thieves to take money from your bank account or use your credit card, but they may reduce privacy.

Tolerance

Our communication systems have made us more aware of the different cultures that share our planet. Through television and the Internet, you have been invited into the homes of families of different cultures, religions, and nationalities. They, in turn, have learned about us. The awareness of the customs and traditions of others can promote **tolerance**, which is an acceptance of others. Tolerance can reduce discrimination, which is most often negative selective treatment due to intolerant attitudes.

 **Global News** Television news reporters report and broadcast live from almost anywhere in the world. *Do you think technology has improved understanding of other cultures? Why or why not?*



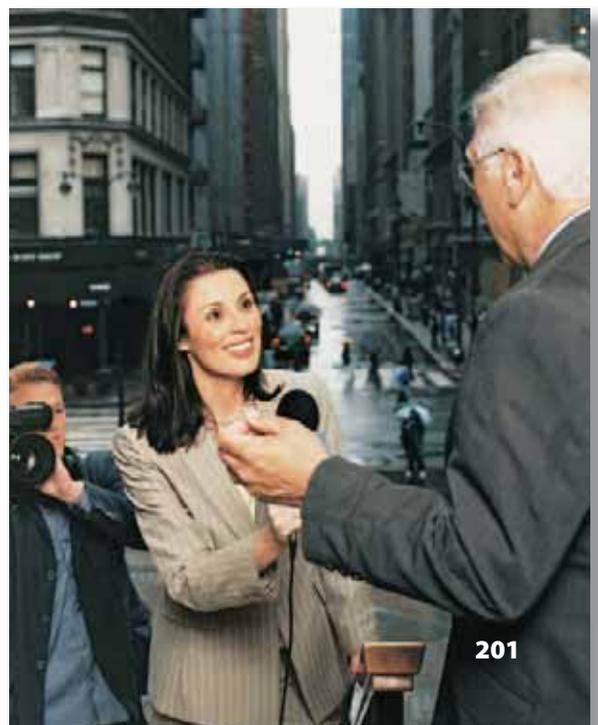
Reading Check

Examine What might be a positive effect of communication technology? Why?

Economic Impacts

How has communication technology affected the world economy?

Because communication technology is so fast today, news travels around the world at lightning speed. What happens to our stock market today affects global stock markets within hours instead of days. People may **invest** money in certain stocks and cause those stock prices to increase or decrease. Communication technology has changed how products are advertised or sold via Web sites.





Blending In The tree on the right is a cell tower with fake branches to make it look real. *Why might a cell phone company design this?*

Environmental Impacts

How has the environment changed due to communication technology?

You have already learned that systems consist of input, process, output, and feedback. Unfortunately, many processes produce what we want, but they may also harm our environment.

Many communication systems use paper, which is made out of trees. At one time trees were cut down to feed paper mills without concern for future needs. The computer, copy machine, and fax machine increased our demand for paper. Today paper manufacturers have replanting programs to replace trees.

Papermakers also must not pollute nearby rivers and streams with waste. Many chemicals, metals, and plastics are used to manufacture communication equipment. Our environment is harmed when equipment is not recycled or disposed of properly.

Power lines and transmitters that carry our communication signals affect the appearance of communities. The acronym NIMBY stands for Not In My Back Yard. This slogan is identified with local residents who wish to prevent construction of things they find unsightly or dangerous, such as cell towers and power lines.



Reading Check

Describe What is one disadvantage of communication technology?

Economics and the Environment

Cost and profit are important to businesses. Environmental and economic concerns may compete. People may not be aware of the dangers of a new system until it is used. Government agencies and consumer groups try to protect us from these dangers.

section

9.3

assessment



After You Read

Self-Check

1. Describe who owned books before printing.
2. Explain how communication technology has made our world smaller.
3. List two negative and two positive effects of communication technology.

Think

4. World events appear on TV as they happen. Discuss how this instant communication affects our world.

Practice Academic Skills



English Language Arts/Writing

5. In your words, write some definitions for the word *biometric*, its prefix, *bio*, and its base word, *metrics*.



Science

6. If something is biodegradable, living organisms can break it down into materials that do not harm the environment. Most packaging material is plastic. Some plastics can be recycled but are not biodegradable. Design a biodegradable package for a product.

Exploring Careers

in Technology

Michael Eisenberg

SOUND ENGINEER

Q: *What do you do?*

A: I am a freelance sound designer and engineer for theatrical and performing arts events. My typical day includes changing the sound engineering design to ensure that all elements of a production run smoothly and to make sure that the crew understands and executes my design.

Q: *What kind of training and education did you need to get this job?*

A: In high school and later in college, I took several courses in physics, calculus, and electrical engineering. I use math almost everyday to make decisions, like where to locate the sound equipment to achieve the most efficient sound design, while using the least number of microphones and preserving the sound quality.

Q: *What do you like most about your job?*

A: I enjoy being able to help enhance the performance experience of an audience. I am always curious about the audience's likes and dislikes, and I want them to hear something different.

Q: *How did you get interested in your job?*

A: I became extremely interested in sound design and mixing in high school. The theater teachers at my school sparked my interest and gave me opportunities and an outlet to do something that I felt I could call my own.



English Language Arts/Writing

Career Search Create a list of ten careers that require speaking and listening skills.

1. Using a spreadsheet program, make a chart of the different careers, including their characteristics.
2. Select the career that interests you the most.
3. Research the type of formal education you would need to pursue the career you chose.



Go to glencoe.com to this book's OLC to learn more about this career.

Real-World Skills

Speaking, listening, problem-solving

Academics and Education

Physics, mathematics, English language arts, music, electrical engineering

Career Outlook

Growth as fast as average for the next ten years

Source: *Occupational Outlook Handbook*

Chapter Summary

Section 9.1 The communication system includes input, which is the message; the process, or how the message moves; output, or receiving the message; and feedback, which includes information about clarity. Communication subsystems have a source, an encoder, a transmitter, a receiver, a decoder, and a destination. Biological, graphic, wave, and telecommunication are all forms of communication.

Section 9.2 The modes of communication include people to people, people to machines, machines to people, and machines to machines. Communication technology has made new modes of communication possible through graphic communication systems, print, and modes based on electrical signals.

Section 9.3 Positive impacts of communication technology are rapid mass communication systems that report news and politics. More information is available for making choices. People gain a better understanding of cultures. Technology may improve security systems. Negative impacts might be invasion of personal privacy. Using more paper for printouts, chemicals for manufacturing, and using electrical systems may be harmful.

Review Content Vocabulary and Academic Vocabulary

1. On a sheet of paper, use each of these terms and words in a written sentence.

Content Vocabulary

- communication
- technology
- graphic communication
- sound waves
- electromagnetic carrier wave
- telecommunication

- mode
- machine-to-machine communication
- personal privacy
- biometrics
- tolerance

Academic Vocabulary

- technology
- factor
- response
- process
- method
- invest

Review Key Concepts

2. **Identify** the elements of a communication system.
3. **Define** personal privacy.
4. **Give** two examples of biometric scanning.
5. **Discuss** how biometric scanning leads to less personal privacy.
6. **Explain** sound waves.
7. **Explain** social networking Web sites.
8. **Describe** NIMBY.
9. **Explain** why this era is sometimes called “The Information Age.”
10. **List** uses for geosynchronous satellites.



Real-World Skills

- 11. Listen Actively** Practice active listening during a conversation with a classmate, friend, or family member. Pay close attention to body language, tone of voice, speed, and volume, and try to understand the message. Respond to the speaker with comments or questions. After the conversation, write a paragraph describing the experience.



Technology Skill

- 12. Buying a Bicycle** Many buyers use the Internet to find new and used products in certain price ranges.
- Use the Internet to find Web sites that offer new and used bikes for sale. Research information about the cost of a dirt bike, racing bike, or another kind of bike.
 - How much is the same model that is three years old and one that is five years old?



WINNING EVENTS

Graphic Designer

Situation You are preparing for a competition that applies communications technologies. Assume the role of a graphic designer and work creatively under constraints to design a solution to a problem.

Activity Design and produce several types of graphic communications that promote a TSA chapter's activities.

Evaluation You will be evaluated on how well you meet these performance indicators:

- Design and produce a newsletter.
- Design and produce an effective sponsor support request on chapter letterhead.
- Design and produce a business card for your chapter.



Go to glencoe.com to this book's OLC for information about TSA events.

Academic Skills



Social Studies

- 13.** Write a report about what your community is doing to recycle paper. Interview school, town, and civic leaders. Write a plan for a school-wide recycling program with their assistance.



Mathematics

- 14.** Create a pie chart with the following data for a presentation on your company's spending. 65 percent employee salaries, 15 percent rent, 10 percent utilities expenses, 8 percent maintenance, and 2 percent miscellaneous expenses.



Pie Charts A pie chart illustrates data as pieces of the whole. The size of a pie piece corresponds to the percentage of the whole that one piece of data represents. Hint: Draw a circle and divide it into the number of percentages listed.

Standardized Test Practice

Directions Choose the letter of the best answer. Write the letter on a separate piece of paper.

- What element is not part of a communication subsystem?
A decoder **C** transmitter
B encoder **D** retriever
- Electrical signals are the basis of a mode of communication.
T
F

Test-Taking Tip In a multiple-choice test, answers should be specific. Read the questions first, and then read all answer choices. Eliminate incorrect answers.

Create an Ad

For any invention to become important, people must know about it. They must also be convinced that they need it. If you wanted to tell everyone about a new invention, what mass communication system would you use? In this lab, you will get the chance to design an ad using the communication system of your choice.

Tools and Materials

- ✓ Markers, pens, pencils
- ✓ Posterboard
- ✓ Scissors
- ✓ Glue
- ✓ Magazines, books
- ✓ Computer and printer
- ✓ Presentation software
- ✓ Graphics software
- ✓ Scanner
- ✓ Copy machine
- ✓ Video camera

Set Your Goal

Your goal for this lab is to create an advertisement for a brand new communication device. Some examples might include an iPhone, plasma TV, iPod, or the latest video game. You can also advertise your own futuristic invention. Use the keywords *future* or *new communication* to search the Internet for more ideas.

Know the Criteria and Constraints

In this lab, you will:

1. Work in a group of two or three, but no more than four people.
2. Create an interesting print ad, a Web page, a PowerPoint presentation, or a short video advertisement.
3. Design an ad that is serious or funny!
4. Include this information in your ad:
 - The inventor of the device
 - When it was invented
 - What it does
 - Why it is important to the development of technology



Design Your Project

Follow these steps to design your project and complete this lab.

1. Choose the invention that your group wants to advertise.
2. Choose the communication method that you will use—print, Internet, presentation software, or video.
3. Brainstorm the theme of your ad. You can study advertisements that you have seen. Be creative and have fun!
4. Say in your ad who invented the device, when the invention was invented, what it does, and why it is important to the development of technology.
5. Produce your ad using the communication method you chose. You can:
 - Paste up your artwork and text for your graphic ad
 - Use a computer to make a Web page
 - Use PowerPoint presentation software, or
 - Use a video camera to shoot your commercial.
6. Share your advertisement with the class.



Evaluate Your Results

After you complete this lab, answer these questions on a separate piece of paper.

1. What do you think makes a new technological development successful?
2. What are the input, process, and output phases of the communication system that you used for your ad?
3. If you were to redo your ad, what would you do differently? Why?

Academic Skills Required to Complete Lab				
Tasks	English Language Arts	Math	Science	Social Studies
Research new and future communication devices.	✓		✓	✓
Gather sample advertisements.	✓		✓	✓
Write ad copy that communicates effectively.	✓			
Create presentation.	✓	✓		
Present ad to the class.	✓			