

Technology Handbook Module 1

Computers in Your Life

Key Terms

computer
technology

What Is a Computer?

A **computer** is an electronic device that processes data and converts it into information that people can use. Whether they know it or not, people use computers every day. Chances are you cannot imagine a world without computers!

Computers are everywhere—in ATMs, drive-up windows, and cars. Computers are more common than ever before—almost every office desk in the country has a computer of some sort, and most schools have them in classrooms. The number of computers in the home is growing every day, too.

Learning about how computers work can make your life a little easier. That is because computers have completely transformed the way we work, play, and live.



Some computer-created games are so realistic that you can see, hear, and sometimes even feel the action around you! Pilots even use computer simulations to learn how to fly. Games, of course, provide hours of entertainment to people of all ages.

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The information in this *Technology Handbook* will help you better understand how computers work and how to make them work for you!

Common conveniences such as fast food restaurants and ATMs use computers to provide quick, easy service to business and personal customers.

Heart monitors, full-body scanners, and other devices are all run by computers. Doctors use computers to identify problems before them become untreatable.

E-mail and cell phones make it easy to contact friends and family—even if they live on the other side of the world! Computer cameras allow us to see people thousands of miles away and even feel like we are in the same room with our friends and family.

The term **technology** refers to the practical application of an art or skill. Computers are the product of many different advancements in technology. Nearly every corner of the globe has been touched by technology.

✓ Tech Check

Answer the questions on a separate piece of paper.

- 1. Identify** What aspects of your life do not involve computers?
- 2. Make Predictions** What would life be like without computers? How would your life change if computers suddenly disappeared from the world?
- 3. Interview** Talk to someone who is older than you, such as a parent or a grandparent. Did they use computers when they were young? How was their life different from the way you live now?

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Moore's Law

The First Computers

Some of the first computers were built during World War II (WWII). They were built to perform the many calculations necessary to break codes.

The first American computer built during WWII was called the ENIAC. The ENIAC filled a 30-by-50-foot room and had 18,000 vacuum tubes and 6,000 switches. At 5,000 calculations per second, the ENIAC was much faster than any computer before it. However, it had to be rewired for each new calculation. In 1944, Howard Aiken introduced the first fully functional computer: the Harvard Mark I.

The Harvard Mark I was 55 feet long and 8 feet high. It was slower than the ENIAC, but it did not have to be rewired for new calculations.

Computers were mostly used by large businesses and by the government until the mid-1970s, when personal computers were first built. However, in 1965 Gordon Moore made a prediction that became known as **Moore's Law**. Moore predicted that the number of transistors in computer circuits would double every couple of years. As it turns out, his prediction has been fairly accurate.

The increase in the number of transistors made it possible for computers to become much smaller than the ENIAC and the Harvard Mark I. Compared to the room-filling ENIAC, today's laptops are about the size of a coffee table book. And they are far more powerful. An average laptop today is about 300,000 times faster than the ENIAC.

The first "personal computer" was the Altair 880. It became available for commercial purchase in 1975 and cost about \$400. The Altair 880 came in a kit that the user had to assemble.

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Your cellular phone, with all of its many different capabilities, is part of a huge wireless network system.

The Apple II came out in 1977. It came fully assembled with a built-in keyboard. However, users had to plug the computer into their television sets to use the monitor.

The World Wide Web was created in 1989 by Sir Tim Berners-Lee at a physics lab in Geneva, Switzerland. It was originally intended for use by scientific researchers.

A personal digital assistant called the Pilot was released in 1996. It was extremely popular because of its capabilities and ease of use.

2005 saw more advances in wireless networking, making accessing the Internet with handheld computers using wireless connections a primary focus.



✓ Tech Check

Answer the questions on a separate piece of paper.

1. **Reproduce** What is Moore's Law?
2. **Summarize** Write a paragraph that summarizes the invention and development of computers.
3. **Analyze** Why do you think it might be difficult for computer buyers to keep up with emerging technology?

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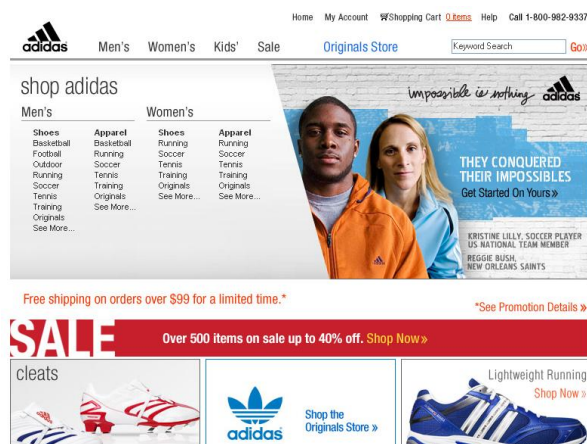
e-commerce
surveillance

The Impact of Computers on Society

Computers have transformed the world. They have changed everything from shopping to movies to the kinds of jobs that are available. Technologists believe that we have only begun to imagine the impact of computers on our society.

Overall, computers have made it easier for businesses to exchange information. E-mail and access to information, such as stock market information, has increased the speed of business. People who work together today do not have to do so at the same time or in the same place. Many services and information are available 24 hours per day.

E-commerce, or electronic commerce, is the buying and selling of products and services over the Internet. E-commerce enables businesses to make shopping easier for their customers. For example, consumers can shop for many products without even leaving home.



Computers can help people become more organized and can perform repetitive or tedious tasks such as drafting plans for a new car or dispensing money to bank customers.

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For more information about e-commerce, see Module 5 in this handbook.

The need to build new computers and maintain existing computers has introduced dozens of new types of jobs. Building computers is a complex process, and many people are needed to build one computer. Once a computer has been built, it must be maintained. Now there are dozens of jobs that help people keep computers running smoothly. People are also needed to create software for computers.

In addition to creating new jobs, computers have decreased the demand for other jobs. Computers have reduced the number of bank tellers, telephone operators, mail sorters, and loan interviewers.

Computers have made **surveillance**, monitoring and watching people, easier than ever. Privacy and security issues are being debated in courtrooms every day. Data is being collected on millions of people and sold to virtually all types of businesses.

These are just a few of the ways that computers have changed the world. What other ways can you think of?

✓ Tech Check

Answer the questions on a separate piece of paper.

1. **Define** What is e-commerce?
2. **Explain** What are possible negative outcomes of surveillance technology?
3. **Discuss** Write a paragraph that discusses the positive and negative impacts that computers have had on society.

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personal computer (PC)
desktop
laptop
personal digital assistant (PDA)
Macintosh
minicomputer
mainframe

Types of Computers and Computer Systems

In today's world, computers are everywhere. They come in different shapes and sizes and they serve different purposes. Computers can be grouped in several different ways: by size, by purpose, and by how many people use them.

- A **personal computer (PC)** is used by one person at a time. Desktop and laptop computers, MP3 players, and personal digital assistants (PDAs) are all examples of PCs, which are also called microcomputers. Personal computers come in all shapes and sizes to meet all our technology needs. A **desktop** computer is designed to remain in one location. A **laptop** computer is designed to be carried from place to place. A **personal digital assistant (PDA)** is a computer that is small enough to hold in one's hand. With PDAs, people can track appointments, store addresses, and keep notes. The PC and the **Macintosh** are very much alike. A company called Apple makes Macintosh computers. Several different companies make PCs.
- A **minicomputer** can be used by several people, even up to hundreds of people at once. These computers are used in small- to medium-sized organizations, such as schools, hospitals, hotel chains, banks, and churches.
- A **mainframe**, or supercomputer, is large enough to fill several rooms. These computers are used by thousands of people at the same time in organizations such as government agencies.

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Cell phones have become more and more like handheld computers, offering the same features as PDAs and more.

Computer companies are no longer racing just to make the most powerful computers; they are also seeking to make them as small as possible. Desktop computers and their screens fill up less workspace than in years past. Laptops are smaller and lighter than before. One wonders how small computers can get?

Today's PDAs are more powerful than many of the desktop computers were fifteen years ago.



✓ Tech Check

Answer the questions on a separate piece of paper.

- 1. Describe** What is the difference between a laptop and a desktop?
- 2. Predict** Would a laptop or a desktop be more useful for someone who travels a lot?
- 3. Explain** How are PCs and a mainframe different? Which type of computer might be used by a large company? Why?

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ergonomics
ergonomists

Ergonomics

Ergonomics is the study of the relationship between humans and the objects that we use. The term is derived from two Greek words: *ergon*, meaning “work,” and *nomoi*, meaning “natural laws.” **Ergonomists** are people who study human anatomy in order to determine how the objects that we use can be made safer, more comfortable, and more efficient.

For example, if you are going to be spending time in front of a computer, it is important that you minimize stress to your body. Here are some important things to keep in mind:

- Make sure you use a chair that provides strong back support. Be sure to keep your back straight while working, and keep your feet flat on the floor.
- Keep your wrists straight while you are typing. If your keyboard includes a “wrist rest,” be sure not to use it while typing. Resting your hands while keying causes the wrists to bend, which causes muscle fatigue and can put you at risk for injuries.
- Position the monitor so that it is just a little below eye level and about two feet away. This will prevent strain on your neck muscles.
- Make sure there is enough light in the room so that you can easily see the monitor without straining your eyes.
- Keep your monitor’s resolution set to a comfortable level. The highest possible resolution setting is not necessarily the best. Choose a resolution that displays images and text at a size that is comfortable to view.

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The body parts that are most vulnerable to cumulative-trauma are the back, hand, wrist, forearm, and neck.



Ergonomists do more than recommend how to sit at a computer. They are becoming increasingly involved in product design. Some ergonomists believe that product manufacturers are too far removed from the users of their products. In other words, these ergonomists believe that when manufacturers plan the design of their products, they often do not take into account the users' physical limitations or comfort.

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If you have ever sat on a chair that was uncomfortable or used a vacuum cleaner that required you to stoop constantly, then you have come across a product that perhaps was attractive or worked well, but that did not incorporate ergonomics into its design.

Ergonomists want to help manufacturers use product design that prevents discomfort and injury. Manufacturers of computer-related products have begun to offer a wide array of ergonomically designed accessories, including ergonomic computer chairs, mice, mouse pads, arm rests, foot rests, keyboards, and writing instruments. The design of all of these ergonomic products attempts to reduce the forces that act upon the body.

Why use ergonomics? Injuries that are related to poorly designed tools or work environments are not only painful, they are costly. According to the Bureau of Labor Statistics, nearly half of all worker-compensation costs each year are due to ergonomic-related injuries. Such injuries can lead to cumulative-trauma disorders, which occur because muscles are repeatedly stressed, nerves are pinched, or blood flow is restricted. Protecting the body against these injuries will not only help you avoid pain, but it might also help both you and your company avoid costly medical expenses.



Module 1 Assessment

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Key Term Review

Answer the following questions on a separate sheet of paper.

1. A(n) _____ is an electronic device that processes data and converts it into information that people can use.
2. _____ refers to the practical application of an art or skill.
3. _____ predicted that the number of transistors in computer circuits would double every couple of years.
4. Buying and selling products and services over the Internet is called _____, or electronic commerce.
5. Computers have made _____, monitoring and watching people, easier than ever.
6. A(n) _____ is a computer that is used by one person at a time.
7. A(n) _____ computer is designed to remain in one location.
8. A(n) _____ computer is designed to be carried from place to place.
9. A(n) _____ is a computer that is small enough to hold in one's hand.
10. A company called Apple makes _____ computers.
11. A(n) _____ can be used by up to hundreds of people at once.
12. A(n) _____, or supercomputer, is large enough to fill several rooms.
13. _____ is the study of the relationship between humans and the objects that we use.
14. A(n) _____ studies human anatomy in order to determine how the objects that we use can be made safer, more comfortable, and more efficient.

Module 1 Assessment

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Concept Review

Answer the following questions on a separate sheet of paper.

15. The first fully functional computer was called the _____.
16. The increase in the number of _____ made it possible for computers to become much smaller.
17. A mainframe is the best type of computer when there are _____ of users.
18. Surveillance technology has raised important issues concerning _____ and _____.
19. Ergonomics are incorporated into product design to help prevent discomfort and _____ when using a product.

Critical Thinking

Complete the following exercises to reinforce your understanding of the lesson.

20. **Defend** Is the computer a positive or negative influence on society? Write a short three-paragraph essay in which you argue that the computer is either a positive or negative influence on society.
21. **Develop** Create a diagram similar to the one below. Fill in the diagram with five events in the history of computers.

