

◀ Michael Dell with one of his computers

WITNESS HISTORY  AUDIO

A Young Entrepreneur

In 1980, a Texas teenager named Michael Dell bought his first computer. He immediately took the computer apart to see if he could rebuild it. Though Dell entered college intending to become a doctor, his real interest lay in the computer company he started from his college dorm room. By 2003, that small company had grown into a global corporation called Dell Inc.—the most profitable company in the computer industry.

“There were obviously no classes on learning how to start and run a business in my high school, so I clearly had a lot to learn. And learn I did, mostly by experimenting and making a bunch of mistakes.”

—Michael Dell, 1999

The Computer and Technology Revolutions

Objectives

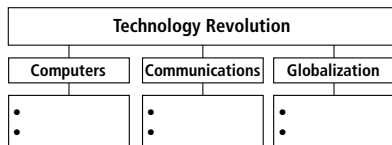
- Describe the development of the computer and its impact on business and industry.
- Analyze the impact of new technology on communications.
- Explain how globalization and the rise of the service sector affected the American economy.

Terms

personal computer	globalization
biotechnology	multinational corporation
satellite	service economy
Internet	

NoteTaking

Reading Skill: Categorize As you read, fill in a flowchart like this one to help you categorize technological changes and their impact.



Why It Matters During the twentieth century, the rate of technological change sped up dramatically. New technology touched every aspect of life, including how Americans worked, played, and communicated. At the same time, globalization transformed the American economy, bringing both new challenges and new opportunities. **Section Focus Question:** How have technological changes and globalization transformed the American economy?

Technology Changes American Life

The 1900s was a century of unparalleled change. In 1903, Orville Wright flew the first airplane. Less than 70 years later, astronaut Neil Armstrong walked on the moon. During that same span of time, television went from a novelty at a World's Fair to a standard household possession, and sophisticated microscopes and telescopes unveiled previously hidden worlds. One of the most important innovations was the development of the computer.


Developing the Modern Computer Intense rivalry between enemies during World War II brought about a life-and-death race to develop new technologies, such as the computer. The U.S. government funded research that led to the creation of the first modern computer in 1946. This huge machine occupied the entire basement of the research lab. It calculated artillery ranges and performed computations for the atomic bomb.

Soon after World War II, universities and corporations joined government agencies to develop smaller, faster, more powerful computers that could perform a range of functions. The IBM company developed one of the first commercially successful computers in 1954. In the 1960s, a few companies located south of San Francisco, California, focused on developing improved technology for running the computer. Their efforts led to the microchip, a tiny fragment of silicon containing complex circuits, and the microprocessor, a silicon chip that held a central processing unit. These chips made possible the development of small computers, called **personal computers**.

Transforming Business and Industry At first, personal computers were a novelty item, used mainly by hobbyists. But by the 1980s, computers were transforming industries, research labs, and businesses. Personal computers could perform many different tasks but were small and simple enough for the average person to use. The technology that created them eventually spread to many other industries. Video games, cellular telephones, and other electronics all depended on microchips and microprocessors. Entrepreneurs played a large role in accelerating the use of personal computers. Steve Jobs's Apple Computers and Bill Gates's Microsoft made computers and software affordable for millions of Americans. Jeff Bezos's Amazon.com ushered in buying and selling products by computer. Like Andrew Carnegie and John D. Rockefeller a century before, these men amassed great fortunes by pioneering new technologies.

Revolutions in Science and Agriculture Medical science also moved ahead by gigantic leaps in the twentieth century, often aided by computer technology. Scientists developed drugs that extended patients' lives, reduced pain, and battled a huge number of diseases. They made artificial hearts and learned how to successfully transplant body organs. Such advancements, along with **biotechnology**, or the use of living organisms in the development of new products, have produced a level of healthcare unknown to any previous generation.

Advances in agricultural technology, including improved machinery, irrigation techniques, and growing methods, have brought profound changes to American society. While farms have grown larger and more productive, fewer people are needed to work them. In 1900, 50 percent of the labor force worked on farms. At the end of the century, only 2 percent did.

 **Checkpoint** What was the impact of the personal computer?

A Communications Revolution

Late in the twentieth century, commentators began to describe their times as the "information age." Access to information, they claimed, was access to power. Computers, cellphones, e-mails, and instant messaging became the tools of the information age. Entrepreneurs who could control these tools became wealthy—and powerful. For example, media executives who decide what gets on television can exert influence on political elections and controversial topics. But computer and communication technologies also have a democratic leveling effect. Anyone with access to a computer can acquire information that was once available only to a few, well-connected leaders.

A New Form of I.D.

A vet implants a tiny microchip (inset) into a puppy. If the dog is lost, a simple scan of the chip will reveal its name and its owner's address.



Satellite Technology Satellite technology increased the speed of global communications. **Satellites** are mechanical devices that orbit Earth in space, receiving and sending information-filled signals that are then relayed to televisions, telephones, and computers. Originally developed for military purposes during the Cold War, satellite technology was used in the 1970s by businessman Ted Turner to run the first “superstation,” broadcasting into cable-equipped households across the country. In 1980, Turner began the 24-hour-per-day, all-news Cable News Network (CNN). Cellular telephones used similar satellite technology, allowing people to communicate away from their homes.

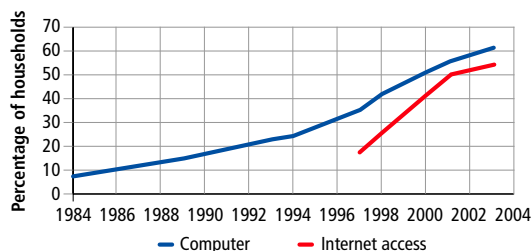
The Internet Is Born In the 1970s, various branches of the U.S. government along with groups in several American universities led efforts to link computer systems together via cables and satellites. By the 1980s, the **Internet**, or World Wide Web, had been born, reaching the general public in the 1990s. The Web made communication and access to information almost instantaneous. This breakthrough completely and profoundly transformed commerce, education, research, and entertainment. E-mail provided great advantages over the delays of postal mail and the expense of telephones. The impact has been especially great on people living in rural areas. The Internet’s immense storage capacity also changed the world of research. In the 1980s, scientists and scholars primarily used the Internet to share information. By the early 1990s, they were using it as a research tool and an online database.

 **Checkpoint** How did new technology revolutionize communications?

Vocabulary Builder

access — (AK sehhs) *n.* means of getting or using

Households With Computers and Internet Access



SOURCE: U.S. Census Bureau

Graph Skills The graph shows how Americans’ access to computers and the Internet has changed over the past two decades. Describe the change. Note that the data for Internet access do not begin until 1997. Why might this be so?

A Changing American Economy

All of these technological changes had a dramatic effect on the American economy. New technology influenced how and where people did their jobs. In this changing economy, one sector—the service industry—grew rapidly. A lower percentage of Americans than ever before worked on assembly lines or on farms. Instead, they provided services.

The Impact of Globalization New communications infrastructures—especially satellites and computers—have made it easier for companies to do global business. This has increased **globalization**, or the process by which national economies, politics, cultures, and societies become integrated with those of other nations around the world. **Multinational corporations** are one example. Such a corporation might have its financial headquarters in one country and manufacturing plants in several others, and may obtain its raw materials from many different places. The company then sells the products it makes to a worldwide market.

Globalization has made more products and services available to greater numbers of people, often at lower prices. It has hastened the development of some nations. But it has also had some drawbacks. Industrial nations have seen their manufacturing jobs flow out to less developed nations. Steel that was once manufactured in Pittsburgh, for example, might now be made in South Korea. In less developed nations, workers often do not enjoy the protections that workers have in industrial nations. Finally, the interconnection of world economies almost guarantees that economic problems in one region will be felt in others.

Computers Transform Workplaces Computer technology has also changed the nature of the American economy. Many workers have found that they need computer skills to get jobs. Banking, stockbroking, programming, and the many other occupations dependent on information and computers have added millions of jobs to the service economy. Many white-collar workers in the information economy have seen their jobs radically change. Professional workers are

INFOGRAPHIC

The Global Reach of E-commerce

Global communications, especially the Internet, have reshaped ways of doing business. Just 15 years ago, shoppers bought almost everything they needed at local stores, and most things they bought were made in the country where they lived. The Internet and e-commerce—electronic commerce, or business conducted over the Internet—have helped to change that. This illustration shows an example of e-commerce in progress.

1



A woman in Minneapolis, MN, shops for a pair of snowshoes online. She has questions about a model she likes and requests to speak with customer service on the Web site.

2



A customer-service representative in Bangalore, India, types answers to her questions in real-time.

3



The customer's order is received and processed by a computer at the sporting-goods company in Stockholm, Sweden. The computer sends messages to two locations.

5



Another message to a factory in Shanghai, China, tells workers there to produce more snowshoes and ship them to Los Angeles, CA.

4



A message to the Swedish company's U.S. warehouse in Los Angeles, CA, tells workers there to ship the shopper a pair of snowshoes.

Thinking Critically
Synthesize Information Use the illustration above to describe the impact of globalization.

History Interactive★

For: More about e-commerce
Web Code: nep-2011

Occupations Predicted to Grow the Fastest, 2004–2014

- Home health aides
- Network systems analysts
- Medical assistants
- Computer software engineers
- Physical therapist assistants
- Dental hygienists

SOURCE: U.S. Department of Labor

Chart Skills Americans' occupations in the next few years will be dramatically different from what they were 100 years ago. *Which two fields are projected to grow the fastest in the next few years?*

linked by a network of computers, fax machines, television screens, and cell phones. They often telecommunicate, holding meetings that involve participants sitting in offices around the world.

The Service Sector Expands With the production of services increasing faster than the production of goods, some economists say that America now has a **service economy**. Jobs in the service sector vary widely. Lawyers, teachers, doctors, research analysts, police officers, professional athletes, and movie stars are all service workers, as are salespeople and the people behind fast-food counters. Service workers are among the lowest paid and the highest paid people in the United States.

The transition from an industry-based economy to a service-based one has created opportunities for entrepreneurs. For example, Californians Richard and Maurice McDonald opened their new restaurant in 1948. The brothers emphasized efficiency, low prices, high volume, and quick service. They did away with anything that slowed down the process, including plates, glasses, dishwashing, and tipping. In 1955, Ray Kroc began to franchise the McDonald's system and name. By the end of the century, McDonald's had become the most successful food service organization in history, and the name McDonald's came to stand for low-priced, standardized-quality food.

Other entrepreneurs' names also came to symbolize their businesses. For example, Wal-Mart, a discount merchandising business founded by Sam Walton, became one of the most successful businesses in the late twentieth century.

Organized Labor Declines The rise of the service economy and the decline in American coal mining, steelmaking, and automobile manufacturing has had a strong impact on organized labor. At its peak in 1945, about 35 percent of all American workers belonged to unions. In 2000, less than 15 percent of workers did. Blue-collar jobs, once the mainstay of American labor, declined dramatically in the second half of the twentieth century. As a result, the political power of labor unions, as well as farm organizations, has fallen. At the same time, workers' average wages—especially those of nonprofessional workers—have fallen.

 **Checkpoint** How has globalization affected the American economy?

SECTION

1 Assessment

Progress Monitoring Online

For: Self-test with vocabulary practice
Web Code: nea-2011

Comprehension

1. Terms and People For each term below, write a sentence explaining its effect on American society or the economy.

- personal computer
- biotechnology
- satellite
- Internet
- globalization
- multinational corporation
- service economy

2. NoteTaking Reading Skill:

Categorize Use your flowchart to answer the Section Focus Question: How have technological changes and globalization transformed the American economy?

Writing About History

3. Quick Write: Choose a Topic

Recall all the American issues you have studied in this course. Identify an issue that comes into play in this section, and explain how.

Critical Thinking

4. Draw Inferences Why are new technologies often developed as a result of waging war?

5. Recognize Cause and Effect How has the computer sped up the pace of globalization?

6. Test Conclusions Cite evidence to support or refute this statement: A service economy provides more opportunities to entrepreneurs than does an industrial economy.