

Impact of Technology

This lesson is designed to be used while teaching a unit on the Industrial Revolution. It asks students to examine the impact of technological advances on the lifestyles of people living in the 19th century and the present.

For much of the world, everyday existence now requires far less physical energy because modes of transportation and food gathering have generally improved. Similarly, new technologies, such as TV, computers, and VCRs, encourage inactive leisure time interests. Physical fitness now requires people to set aside time for physical pursuits. An understanding of the historical developments in technology generates an awareness of this phenomenon.

Behavioral Objectives

For students to be more physically active.

Learning Objectives

Students will be able to:

1. List several important inventions (and the inventor) that led to the Industrial Revolution and describe why they were important.
2. Discuss the influence of technology and inventions on society (the economy, geography, transportation, education, communication, medicine, politics, food production, social changes) and daily life in the United States during the Industrial Revolution and the present.
3. Discuss the effects of technology on the availability and uses of free time.
4. Give examples of inventions that have brought world advances, but resulted in unintended health consequences.
5. Discuss the importance of making time for physical activity.

Materials

- Student Activity 1: *Invention and Discoveries*
- Homework Activity: *Relating the Past to the Present*
- Social Studies textbook

Teacher Resources

General Background Materials:

In preparing for this lesson, you may want to refer to the following resources in Appendix A:

- *Centers for Disease Control and Prevention Fact Sheets on Physical Activity*. These provide information on physical activity levels among youth and list the health benefits of physical activity.
- *Physical Activity Guidelines for Adolescents: Consensus Statement*. This statement reviews the literature and provides insightful rationales and recommendations for physical activity among adolescents.

Specific Background Materials:

Why is it important for adolescents to understand the changing lifestyles of the world?

Technology is greatly affecting the play and leisure interests of youth, and many studies have shown that they are less active today than ever before. If they become aware that their parents' and grandparents' lives were probably very different in their youth, then they may be more likely to appreciate the need for activity. Their inactivity is dangerous to their health. It increases their risk of developing cardiovascular disease, diabetes, colon cancer, obesity, and osteoporosis.

How have leisure pursuits changed so much?

Studies suggest that there is a difference between playtime now and in the past. Today, television and computers hold great fascination and interest for most children. Currently, 43% of adolescents watch five or more hours of TV daily. These new technologies, along with a rise in crime, a dramatic decline in the number of park keepers, parents' changing work patterns, more single parents, and an erosion of the sense of community, have all been cited as reasons for a decline in outdoor play, something that has been a part of growing up since the beginning of time. Children are less active now than in the past. Those that are active spend more of their activity time in supervised, structured, school and community programs.

What has been the progression of occupations and lifestyles?

When hunting, gathering and farming were required for food, activity was a central part of life. Adults and even children were required to work 12-16 hour days during certain times of the year. Before motorized transportation people also expended more energy walking and running from place to place. Even early factory, mill, and mining jobs required long hours of moderate to vigorous activity. Twelve to 13.5 hour days, six days a week (72-81 hr/wk) were common place for even women and children in New England mills in the early 1800's. At that time, there was a movement in England and the United States to reduce the length of the workday. However, many of the workers were not in favor of these early legislative efforts because they reduced wages. In 1840, a 10 hour work week was approved for government employees (Davidson and Batchelor, 1986). "In 1903, Macmillan and Company published a revised edition of Volume 9 of Charles Booth's *Life and Labour of the People in London* (1897). Investigators reported that, of the 206 occupations surveyed, 6% required 48 (or fewer) hr/week, 25% required 48-54 hr, 41% required 54-60 hr, and 14% required of those employed over 72 hr/wk (Park, 1992)." See the table below for comparative daily energy expenditures, which rise with increasing intensity of labor.

Workers	Intensity	Type	Hr/Day
Benedictine Monks ca. 600 A.D.	light to moderate	cerebral - light muscular	5.25 (winter), 6.5 (lent), 9 (summer)
Medieval Knights ca. 1100-1400	moderate to heavy	muscular and endurance	2-6??
Medieval Peasants	moderate to very heavy	muscular and endurance	15-16 hr (harvest) 10-14 hr (winter)
Lincolnshire Farm Laborers mid-1800s	heavy to very heavy moderate to heavy	muscular and endurance	15-16hr (harvest) 10-14hr (winter)
Cotton mill workers 1830s (men & women)	moderate	more endurance than muscular	12-16 hr
Female in coal mining 1840s	heavy to very heavy	muscular and endurance	11-18 hr
Victorian middle class females	none to light	sewing, needlework, walking at slow pace	NA
American college women (1985 survey)	light to moderate	very limited muscular and/or endurance	> .5-1 hr/day
1960-75 survey of 16-29 year olds	light to moderate	cerebral, moderate to moderately heavy	8-10 (professional; clerical, skilled/semi-skilled; service labor) hr 12 hr (managerial)

(Park, 1992)

As we developed machinery and technology, occupational work, house-work, and transportation have required less overall physical activity. Jobs that used to require moving around now can be accomplished by sitting in front of a computer. Even many construction and farming jobs have become less active, because machinery is available that achieves higher rates of production and efficiency than manual labor. Children likewise spend less time in physical activity, particularly in urban areas where there are often limited facilities for recreation.

“Even when the average number of [hours per] week spent in voluntary participation in sports, exercise, and other active leisure pursuits is added to those consumed in an ‘average’ work week of 40 hours, very few individuals in the United States or other industrialized countries today can approach the daily energy expenditure levels of medieval or 19th century farmers, ‘pit brow lasses’, or the men, women, and children who toiled up to 16 hours per day in the cotton mills or the Caribbean sugar industry. In many non-industrialized societies, however, daily work patterns differ little from those of labor intensive occupations in past eras.” (Park, 1992)

How have these changes affected lifestyle and health in the U.S.?

Jobs and leisure time activities have both become less active. Inactivity in adolescents and adults has increased, and as a result, obesity is on the rise in both groups. For many people being physically fit means making an effort each day to be active and moving. The gymnasium and fitness boom has led many adolescents to misunderstand the requirements of fitness and health. Many have been discouraged from exercising because they think they need to be athletes to be fit. Excessive exercise is not required to maintain good health — merely regular movement and muscular use is sufficient. Of course, higher levels of fitness will only result from more rigorous training.

Planet Health’s Activity Message: Adolescents should be active every day or nearly every day as part of play, games, sports, work, transportation, work, or planned exercise. They should aim

for at least three sessions per week of moderate to vigorous physical activity lasting 20 minutes or more. (See Consensus Statement, Appendix A.)

What are the recreational opportunities for adolescents in urban settings?

Seemingly, there are never enough. Funding for recreation both in schools and towns may be inadequate. The expense of joining or using many facilities is also a hindrance to participation for many. Youth clubs, sports clubs and gyms however, are great ways for children to get regular activity. Local parks are under-used for recreation, as are swimming pools and the seaside.

How do we encourage adolescents to be active?

Organized sports teams and recreation help some adolescents become involved in physical activity. Moderating television viewing to a maximum of two hours a day, as recommended by the American Academy of Pediatrics, will encourage other more physically active use of their free time. Moving televisions out of the main activity areas and/or bedrooms helps children forget about the TV. If students are surrounded by educators and families who are active themselves, they will also develop an understanding of the benefits of movement and fitness, and seek ways to be active. Role modeling at school and home are both important to students.

“Providing opportunity and encouragement for unstructured play outside, where possible, is also important. Psychologists and others say unstructured outdoor play fosters a deep appreciation for nature and a sense of independence, creativity, and serenity. According to Robin C. Moore-professor of landscape architecture and president of the International Association for Children’s Right to Play- neighborhoods, schools, and governments must also take a role in providing adequate outdoor play space for children. She has examined how improving the physical diversity of schoolyards can encourage a broader range of activities among children. In England, it has become popular to break up portions of blacktop with planted areas, streams or other types of water, and creating areas appropriate for small groups.” (van Dam, 1997).

Additional facts about technology development in the 20th century.

Computers

- 1890 First punch card tabulator developed by Hollerith (his company becomes IBM).
- 1941 First programmable computer designed to solve complex engineering equations.
- 1946 First high speed electronics digital computer (ENIAC).
- 1950's Mainframes first available commercially.
- 1975 First mini-computer retailed for \$397. It had to be assembled by owner and manually programmed.
- 1983 First machine with a mouse and a graphical user interface.

Internet - initiated for military defense reasons.

- 1965 First computers linked.
- 1969 Four host computers connected (University and Military).
- 1976 First e-mail sent.
- 1992 Term "surfing the Internet" coined by Jean Armour Polly.
- 1997 19,540,000 host computers linked.

"Walkman"

- 1980 Introduced by Sony.

DNA finger printing

- "A lab technique that compares the patterns of bands of analogous DNA fragments from two or more separate individuals; this is done to find out how closely related DNA are to each other" (BioTech Life Science Dictionary, 1995-97.)
- This technique can be used to compare a suspect's DNA with evidence left at the scene of a crime.

Cloning

- "The process of asexually producing a group of cells (clones), all genetically identical, from a single ancestor" (BioTech Life Science Dictionary, 1995-97). If an organism is cloned, the clone is genetically identical to the organism it was cloned from.

Selected Answers to Student Activity Sheet

Table 1

The answers for Table 1 will vary, but should be available in most social studies textbooks.

Choose two types of people listed below, and explain how one of the inventions or industries listed in Table 1 impacted the lives of these individuals. (*Answers will vary*)

Cotton gin's influence on southern planters: They were able to supply more cotton to Northern factories which resulted in great economic success for these individuals. They bought more land and slaves to meet the increasing Northern factory demands. As a result, Southern plantations stretched as far west as Texas, the number of slaves in the United States increased sharply in the 1800's, and the planters depended on the North and Europe for finished goods. Many plantation owners felt they were enslaved to the products of Northern industry.

Cotton gin's influence on Southern slaves: It reduced the number of slaves that were needed to clean the cotton (One person could do the work of 1000 people). However, most slaves continued to do back-breaking labor in the fields.

Steam-powered engine, sewing machine, cotton gin, and new transportation vehicles influence on mill owner: All of these inventions resulted in an expansion of industry in the North. Mill owners built bigger factories, hired more workers, and grew wealthy.

Advances in textile finishing machinery and transportation influenced the homemaker: Finished textile products became more readily available to the homemaker.

Growth of the mills and factories: Increased the number of jobs available to **young women, children, urban lower class, and recent immigrants.** Entire families worked in factories. They needed all their earnings to pay for food and housing. Young women did most of the work in textile mills. Children cleaned debris out of machines and changed spindles. The hours were long, the wages were poor, and the working conditions were unsafe.

Steel plow influence on farmers: Made farming the prairie practical. Its sharp blades easily cut through prairie grass roots. Before this technology, farmers depended on huge, unwieldy iron and wooden plows which had to be pulled by six oxen and guided by three men. One man and two horses could operate the steel plow. In 1833, there were no farms in Iowa. By 1860, the steel plow had made it possible for farmers to produce 42,411,000 bushels of corn in Iowa.

Imagine what life was like for one of the two individuals. Describe a typical day's physical activity for the person. What did they do? How many hours a day did they work? Did it change as a result of the invention/industry? How much free time did they have, and what did they do with it?

Factory workers of all ages: Work began at 4 a.m. and ended at 7:30 p.m. Workers took a break for breakfast at 7:30 a.m. and again at noon for lunch. The work was tedious and dangerous (poor ventilation and lighting, unsafe machinery). Any free time they had would have been spent maintaining their home and resting.

Slaves: Most did hard labor in the fields. "Teenagers worked alongside adults in the field. Children pulled weeds, picked insects from crops and carried water to other workers" (Davidson and Bachelor, 1986). Some worked as many as 16 hours/day. Older slaves worked in the planter's house cooking, cleaning, and doing other chores. They did not have much free time.

Small Northern and Southern farmers: All members of their families would have spent 10-12 hour days planting and doing household and farm chores. The little free time that they had may have been spent going to church, relaxing, or for children in unstructured play.

Planters: “They entertained lavishly, dressing and behaving like the nobility of Europe... They had to make decisions about when to plant and harvest their crops... They devoted many hours to local and state politics [and]... hired overseers to run the plantation... Women were involved in overseeing the house slaves, raising the children and entertaining” (Davidson and Batchelor, 1986). Children in this group had time for education and much more time for socializing and unstructured play.

Table 2

The answers for table 2 will vary.

Impact of cloning adult sheep: Researchers want to extend the sheep-cloning method to cattle, pigs, and goats. Using these animals they hope to make billions of dollars producing proteins for drugs, tailor made tissues, clones of prize winning bulls and top milk producing cows. This technique will impact the economy and medical treatment. It also has stimulated ethical questions about the technique and calls for legislation to regulate its use.

How do the computer, TV, internet, and VCR affect the daily physical activity of children your age? *See Teacher Resources.*

Compare your **physical activity**(amount and type) to the physical activity of children (11-14 yrs. old) living in the early 1800s. How do you account for the difference?

In the 1800s most children were required to spend a large portion of their day doing chores or working in factories. They also had to walk long distances to school or work. Wealthy children had more time for leisure activities, and therefore engaged in less physical activity. Children today are required to do fewer chores and are frequently transported by car or bus. Most of their day is spent doing school work. They also engage in a lot of inactive leisure activities. Advances in technology and child labor laws, as well as interest in TV, have done much to decrease the physical activity of children.

Compare your **free time** (amount and uses of it) to the free time of children (11-14 yrs. old) living in the early 1800s. How do you account for the difference? Children have more free time now. *(See the answer above for a discussion of why.)*

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Social Studies 7 / Lifestyle Theme
Impact of Technology

van Dam, Laura. Wild in the Streets. Sanctuary. May/June 1997.
Zalton, R.H. Hobbes' Internet Timeline, 1993.

Procedure

1. Point out the goals of the activity:

- To discuss the influence of technology and inventions on society and daily life in the United States during the Industrial Revolution and the present.
- To discuss the effects of technology on the availability and uses of free time, and its unintended health consequences.
- To discuss the importance of making time for physical activity.

2. (5 minutes) To introduce the activity, ask students to think about and discuss the following:

- Compare your lifestyle to that of children living on farms in the early 1800s. Why do you need to MAKE time for physical activity, while they did not have to think about this?
(Possible answers: lack of machines for food and clothing production and transportation required the children in the 1800s to be more active.)

3. Put students into groups of 3.

4. Hand out the activity sheet to all students.

5. (5 minutes) Assign each group **one** of the seven inventions in part 1 of the activity. Make sure students understand that they are to discuss the invention: what it does; why it is/was important; and its impact on **ONLY one** of the many factors in society. Encourage them to use their textbook as a reference and any other available classroom resources.

6. (10 minutes) Ask one person in each group to report their findings orally or by writing them on the blackboard. The other individuals should record the information in their table. (See Teacher Resources for possible answers.)

7. (10 minutes) Have students work in their groups to complete the rest of part 1.

8. (20 minutes) Assign each group **one** of the inventions in part 2, and have the groups exchange information, **OR** (35 minutes) have each student complete activity 2 for homework.

9. (5-10 minutes) Summary discussion. This activity will likely generate a lot of discussion and many varied responses. You will want to direct the discussion to emphasize the impact of technology on our decreased physical activity during work and leisure time and its unintended health consequences. End by reminding students of Planet Health's Activity Message and encouraging them to reduce their TV watching. (See Teacher Resources)

Extension Activities

1. Imagine if you had no TV — how would your life be different? Explain.

2. Describe areas of the world that have the least and the most technology. Which countries often have insufficient money for education, health care, and food? Are the people in these countries less or more active than people in industrialized nations? Which countries have health problems related to eating too much and being too sedentary?
3. How much technology is there in your school and community? Make a list of the inventions that have helped your city, school, or home.
4. Write a story or essay explaining why technology has brought the world many advances, but has not necessarily been good for health. Give examples.

Homework Ideas

Complete the homework activity sheet. How is your lifestyle different than that of your grandparents when they were your age? Interview a grandparent, great aunt/uncle, neighbor or friend of the family who was 11-14 during the 1920's, 30's or 40's. What were their lives like as children? Ask them how they spent their free time? Did they spend more of it on self-improvement or amusement? What kind of jobs did they do?

Another option would be to have students prepare their own interview questions.

Name:

Inventions and Discoveries: Activity

1

Part I. 1780-1890

The 1800s brought the industrial revolution to the United States. Inventions sparked the growth of new industries. Complete the table below by explaining why the new technologies were important, and how they affected two of the following: the economy, geography, politics, travel, environment **or** every day life of people living during that time.

Table 1

Invention or Industry	Inventor	Importance/ Impact on Society
cotton gin (1793)	Eli Whitney	
steel plow (1837)	John Deere	
mechanical reaper (1848)	Cyrus McCormick	
steam-powered: engine(1782) boat (1803) train engine (1829)	James Watt Robert Fulton G. Stephenson	
telegraph (1840)	Samuel F. B. Morse	
mills and factories (U.S. 1790)	Moses Brown	
clipper ships (1845)	John Griffith	

Choose two types of people listed below, and explain how one of the inventions or industries listed in table 1 impacted the lives of these individuals.

Southern planter

Northern farmer

urban poor

Southern slave

Northern mill owner

recent immigrant

20 year old female (city dweller)

12 year old northern city dweller

homemaker

Name:
1

Inventions and Discoveries: Activity

Imagine what life was like for one of the two individuals. Describe a typical day's physical activity for the person. What did they do? How many hours a day did they work? Did it change as a result of the invention/industry? How much free time did they have, and what did they do with it?

Part II: 1925-1997

Advances in technology, especially in computers, communication, and biotechnology, are currently taking place at a rapid pace. Complete the table below by explaining why the technologies are important, and how they are influencing **one** of the following: economy, politics, medicine, justice system, environment, education, communication or everyday life.

Table 2

Invention	Inventor	Importance/ Impact on Society
personal computers available to the general public (1977)	Apple Radio Shack	
television (1925)	John Logie Baird	
VCR available to the general public (1975)	Sony*	
internet access available to the general public (1995)	CompuServe* American Online Prodigy	
compact disks (1983)	Sony* Phillips	
genetic cloning of an adult sheep (1993)	Dr. Ian Wilmut	
DNA fingerprinting (1978-1980)	David Botstein** Kary Mallis	

*These inventions were the work of groups of scientists who built upon the ideas and inventions of earlier work in the field. They were marketed by the company listed.

**Several different laboratory techniques have been developed.

The rapid advances in technology at the beginning of the 1800s sparked the Industrial Revolution. Do you think that we are in the midst of another revolution? Explain.

Name:

Inventions and Discoveries: Activity

1

What do you think historians will call this revolution? _____

How do the computer, TV, internet, and VCR affect the daily physical activity of children your age?

Compare your **physical activity** (amount and type) to the physical activity of children (11-14 yrs. old) living in the early 1800s. Give several details to support your answer. How do you account for the difference?

Compare your **free time** (amount and uses of it) to the free time of children (11-14 yrs. old) living in the early 1800s. How do you account for the difference?

Name:

Relating the Past to the Present: Homework

Activity

How is your lifestyle different from that of your grandparents when they were your age?

*Interview a grandparent, great aunt/uncle, neighbor **or** friend of the family who was 11-14 during the 1920's, 30's or 40's. Ask them the questions listed below. Record their answers and your answers to the same questions in the table below.*

Question	Adult Response	Your Response
When you were 11-14 years old.... During what years were you this age?		
Did you walk to school? If yes how far did you walk?		
Did you walk home for lunch?		
What time did school get out?		
How much free time did you have?		
What did you do after school?		
What did you do for fun in the summer?		
What kind of chores did you have to do?		
Did your family own a car? How did you get around?		
Did school offer competitive sports? What kinds? Were there any competitive girls' teams?		
Did you have a job? What was it?		
What kinds of games did you play? Where did you play them?		
How old were you the first time you watched TV? Owned a TV?		
How much TV do you currently watch on a typical day?		

Compare your responses to those of the adult you interviewed. Which of you had (has) a more active lifestyle at 11-14 years old? How do you explain the differences?