

**Standard 5-3:** The student will demonstrate an understanding of major domestic and foreign developments that contributed to the United States' becoming a world power.

**5.3.1** Explain how the Industrial Revolution was furthered by new inventions and technologies, including new methods of mass production and transportation and the invention of the light bulb, the telegraph, and the telephone. (E, H)

**Taxonomy Level:** B 2 Understand /Conceptual Knowledge

**Previous/future knowledge:**

In 2<sup>nd</sup> grade, students identified the relationships between trade and resources both within and among communities, including natural, human, and capital resources (2-5.4).

In 3<sup>rd</sup> grade, students summarized the institution of slavery prior to the Civil War, including the invention of the cotton gin, subsequent expansion of slavery, and economic dependence on slavery(3-4.2). Students also summarized developments in industry and technology in South Carolina in the late nineteenth century and the twentieth centuries, including the rise of the textile industry, the expansion of the railroad and the growth of the towns (3-5.1).

In 4<sup>th</sup> grade, students explained the motives for the exploration in the West and the push for westward expansion, including economic opportunities in trade, and the availability of rich land (4-5.2). Students also compared the industrial North and the agricultural South prior to the Civil War, including the specific nature of the economy of each region, the geographic characteristics and boundaries of each region, and the basic way of life in each region (4-6.1).

In 7<sup>th</sup> grade, students will explain the impact of the new technology that emerged during the Industrial Revolution, including changes that promoted the industrialization of textile production in England and the impact of interchangeable parts and mass production (7-3.5).

In 8<sup>th</sup> grade, students will summarize the changes that occurred in South Carolina agriculture and industry during the late nineteenth century, including changes in crop production in various regions, and the growth of the textile industry in the Upcountry (8-5.3).

In United States history, students will summarize developments in business and industry, including the ascent of new industries, the rise of corporations through monopolies and corporate mergers, the role of industrial leaders such as John D. Rockefeller and Andrew Carnegie, the influence of business ideologies, and the increasing availability of consumer goods and the rising standard of living (USHC-5.1). Students will also summarize the factors that influenced the economic growth of the United States and its emergence as an industrial power, including the abundance of natural resources; government support and protection in the form of tariffs, labor policies, and subsidies; and the expansion of international markets associated with industrialization (USHC-5.2).

**It is essential for students to know:**

The post-Civil War Industrial Revolution was the continuation of changes in the United States economy that had started prior to the war. The fundamental change was from an economy based on agriculture and trade to one increasingly based on the production of manufactured goods. The manufacture of goods required raw materials, workers, capital equipment, and new ideas (technology) about how to use these factors to create goods. [Economists refer to these as the factors of production: land, labor, capital, and technology] It is important for students to understand that the term technology refers to new ideas about how to do something as well as the equipment needed to do it.

Government policies that encouraged westward movement such as the funding of the transcontinental railroad and the availability of free land to homesteaders encouraged the use of the abundant natural resources of the West. The **transportation system** provided by the transcontinental railroad shipped raw materials to cities where manufacturers changed the raw materials into consumer products and then shipped those products to people throughout the country. Grains shipped from farms on the Great Plains to giant mills became cereal for American breakfast tables. Hogs and cattle shipped to meat processing plants were served for dinner throughout the country. Iron ore was shipped to processing plants where it was converted to steel for the building of more railroads or the creation of steel girders for skyscrapers and bridges.

**New methods of mass production** were used to turn the raw materials into consumer products. Andrew Carnegie brought the Bessemer process, which converted iron into steel, to the United States. His company, Carnegie Steel, built huge steel foundries and created a monopoly on the production of steel. Meat packers developed a ‘dis-assembly’ line where the hogs and cattle were killed and then cut into steaks and chops and the leftovers were stuffed into sausages. One meat packer boasted that his plant could use every part of the pig but its squeal. Although manufacturers in the late 19<sup>th</sup> century produced goods on a large scale and used the system of interchangeable parts first introduced in the late 1700s by Eli Whitney, the assembly line was not introduced until the early twentieth century. Henry Ford first used the assembly line in the production of automobiles [in 1913].

**Inventions** also helped to promote industrial growth in the late 19<sup>th</sup> century. The **telegraph** was invented in the pre-Civil War period by Samuel Morse in order to help the railroads communicate, stay on schedule and prevent accidents. It was soon used to place orders for goods by means of the Morse code and to ensure that both raw materials and finished products were delivered to the right place at the right time. The telegraph thus promoted economic growth and the industrial revolution. The **telephone** was invented by Alexander Graham Bell [1876] and improved communication of the telegraph. Now businesses could communicate by telephone more quickly and easily. Soon homes of wealthy people had telephones and eventually almost every home would have a telephone. The telephone was easier to use because it did not require people to learn a new system of communication such as the Morse code.

The **light bulb** was not invented by Thomas Edison however it was significantly improved and made practical for use. Edison invented the *incandescent* light bulb [1879]. It promoted economic growth because it made it possible to light factories as well as homes more safely than kerosene lamps. The light bulb made the use of electricity popular and therefore electric generators [1881] were built and electric lines were strung in cities and towns. Electricity, in turn, provided a new way of powering the manufacturing plants that had been relying on water power from rivers or steam power produced by burning coal. The light bulb, therefore, contributed to the economic growth of the United States by encouraging the development of electric powered factories that could be located wherever electric lines could be strung. Electricity also contributed to the growth of transportation. Electric powered streetcars made it possible for people to move to the outskirts of the cities to live and commute to work by streetcar. The availability of electricity also led to the invention of many labor saving devices for the home that were run by electricity, such as the washing machine and the vacuum cleaner. These inventions made life easier for the women whose families could afford to buy them. The invention of the telephone provided new jobs for telephone operators, a job most often performed by women. The invention of the sewing machine and the typewriter also provided women with new job opportunities in clothing factories and offices.

**It is not essential for students to know:**

Students do not need to know about other inventions not specifically listed in this indicator. They don't need to know that Edwin Drake's invention of the oil drill helped to create a new industry or that oil was first used for lighting kerosene lamps. Students do not need to know that the development of the oil industry by John D. Rockefeller also led to the creation of a monopoly.

**Assessment guidelines:**

Appropriate assessments require students to **explain** how new inventions and technologies furthered the Industrial Revolution in the United States. Students should also be able to **summarize** how the invention of the telegraph, the telephone and the light bulb helped to further the industrial revolution and affected the lives of Americans. Students should be able to **compare** the telegraph and the telephone.