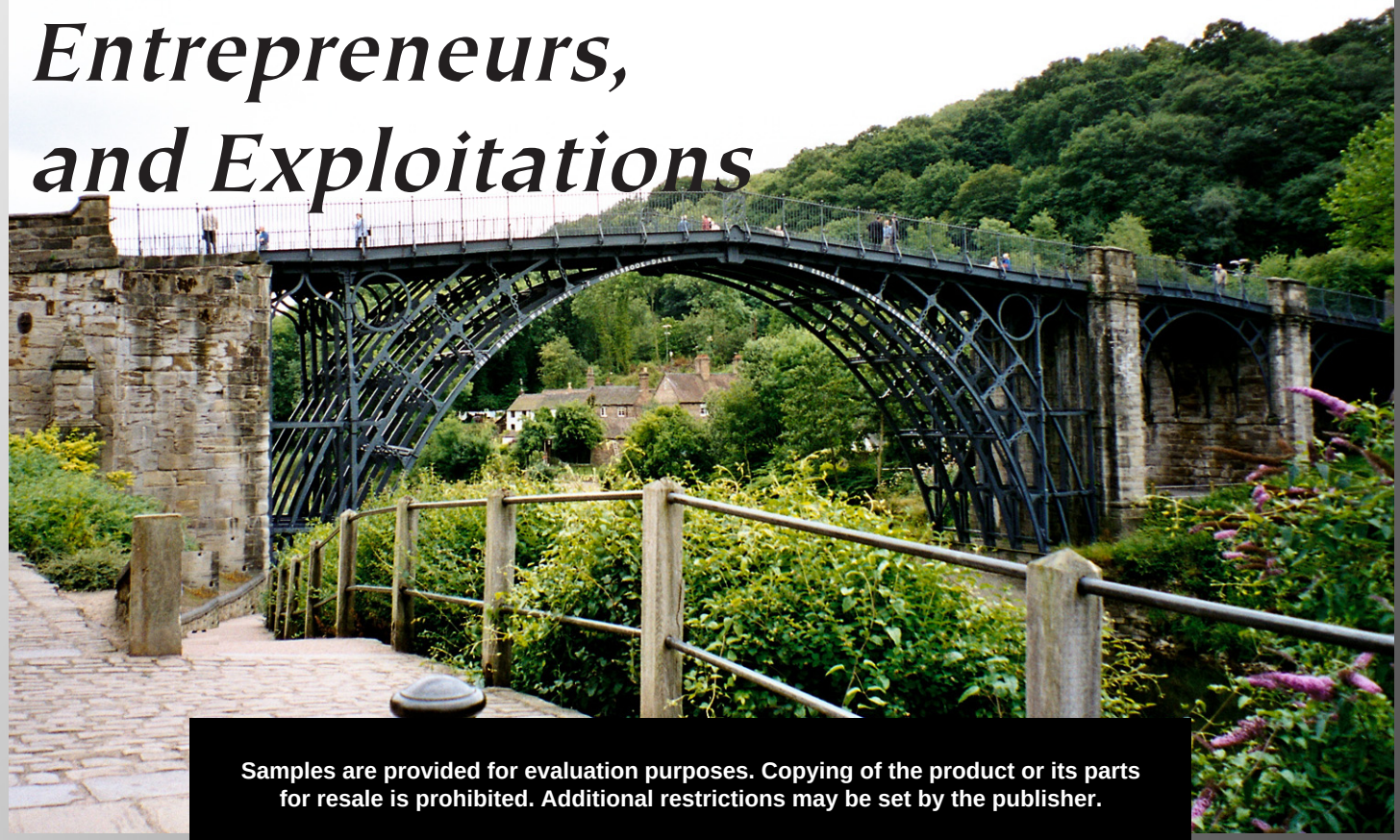
The Industrial Revolution:

Enterprises, Entrepreneurs, and Exploitations

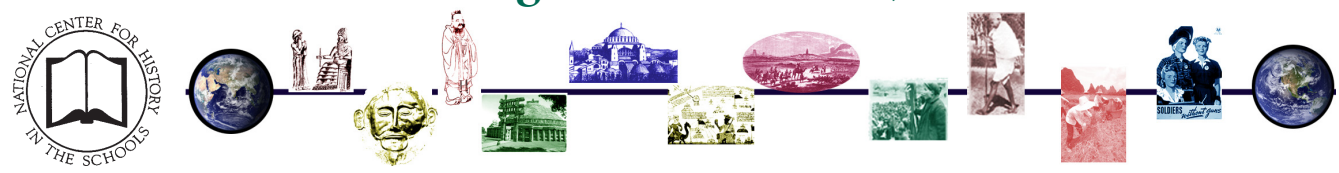


A Unit of Study for Grades 9–12

Linda Miller

World History

Era Seven: An Age of Revolutions, 1750–1914



National Center for History in the Schools
University of California, Los Angeles

THE INDUSTRIAL REVOLUTION:

Enterprises, Entrepreneurs, and Exploitations

NATIONAL CENTER FOR HISTORY IN THE SCHOOLS
UNIVERSITY OF CALIFORNIA, LOS ANGELES

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Teacher Background Materials

I. Unit Overview

Trade and industry changed dramatically during the great event known as the Industrial Revolution. New machines and the growth of factories altered the working ways of most people. The movement toward industrialization represented a big shift in the way people lived, not only in England but around the world. The process of industrialization continues today in China, Southeast Asia, Latin America, and other lands. Although the beginnings of industrialization can only be well understood within the framework of the harnessing of fossil fuels, international trade, financial trends, and technological innovation and borrowing around the world, this unit focuses on developments that occurred mainly in England.

Scholars continue to research the history of industrialization, originating new theories of how and why the process occurred. It is clear that the new technology altered the organization of work and changed how people lived. But historians continue to debate the effects on standards of living.

Many types of evidence can be studied to understand industrialization in the eighteenth and nineteenth centuries. These include testimony before the British Parliament, literary works, and statistical information, as well as records of the careers of major inventors, business leaders, and government reformers. This unit presents various elements of this evidence. Lesson One investigates major inventors and the impact of their inventions, as well as business leaders and reformers. Lessons Two and Three examine social conditions for women and children through analysis and interpretation of testimony from British parliamentary hearings and present evidence for reforming the system. It was not, however, only factory conditions that were deplorable. The home scene was also less than desirable, contributing to disease and death. Housing and public health are the subjects of Lesson Four.

In 2002, Linda Miller, the author of this unit, was privileged to participate in a National Endowment for the Humanities summer seminar titled "Historical Interpretations of the Industrial Revolution in England." The meeting took place at the University of Nottingham, England. The participants not only saw the sights of the Industrial Revolution but also heard the deafening sounds of factory machines and steam engines. The group uncovered new interpretations of industrialization and realized that much of what they had been teaching in their schools needed correction and revision. This unit is an outgrowth of that experience, travels and discussions with Professor Peter Thomas emeritus, University of Wales Aberystwyth, as well as extensive reading of recent scholarship.

II. Unit Context

This unit should be coordinated with a study of the Industrial Revolution in world history, focusing on the period from 1750 to 1850. The lessons provide insight into the enterprises and entrepreneurs that had an impact on industrialization as well as the consequences of it for ordinary people. In addition, the unit reflects on why industrialization took a giant leap in England, why ordinary people paid a social and economic price for this development, and how social reform of the factory system and public health came about. Teachers may consider using this unit, which focuses on Britain, in conjunction with *Industrialism as a World-Wide Revolution*, a publication of the NCHS that offers a simulation approach to industrialization as a global event.

III. Correlation with the National Standards for World History

Era Seven
An Age of Revolutions, 1750–1914

Standard 2A

The student understands early industrialization and the importance of developments in England

Standard 2B

The student understands how industrial economies expanded and societies experienced transformations in Europe and the Atlantic basin.

IV. Unit Objectives

- To analyze primary source documents to understand events and issues as people experienced them in the eighteenth and nineteenth centuries.
- To practice active learning by role-playing and by listening to first-person testimonies.
- To analyze the impact of individuals and the industrial machines they invented.
- To analyze the causes and consequences of industrialization.
- To evaluate the impact of technology on society.

V. Historical Background

The Industrial Revolution was an international event, and it did not happen overnight. Historians and economists debate the speed and extent of the changes that occurred in connection with industrialization. Some think that it occurred rapidly between 1750 and 1850, while others argued that economic growth rates were incremental and that technical change and high productivity took place only in certain economic sectors such as cotton production. These gradualists argue against the date of 1750 as the approximate start of industrialization, contending that the process was much longer, occurring over several centuries and continuing into the twentieth century. Some of these historians reject term "revolution" to describe what happened. They argue that families in England had for a long time engaged in spinning and weaving using novel machinery, engaging in what they term "proto-industrialization;" that is, home-based production that first made peasants into a cheap and plentiful labor supply before factories even appeared. As real wages declined in the later eighteenth century, families sent more and more women and children into manufacturing. By this view, industrialization was a slow and uneven process. However, other economic historians such as Pat Hudson, argue that gradualists have oversimplified national data and that regional data for England reveals a "revolutionary" event.

The world historian William McNeill states that the Industrial Revolution was the single most important development in breaking human society loose from constraints on food supply and economic output. He claims that a unified global web helped make the Industrial Revolution happen. Europe became linked to Africa and Asia through colonization and to Latin America for markets. One important dimension of industrialization was that more people migrated abroad, including workers and peasants who could not make a decent living in their homelands.

Industrialization involved fundamental changes in machinery and organization of labor. Radical innovations in technology occurred in key manufacturing sectors and in agriculture. People were brought out of their "cottage industries" into factories, or centralized work

places that used machines for mass production. Technologies of coal and steam led to labor savings, but these new power sources also often replaced human workers. Some scholars speak of the "Fossil Fuel Revolution." The new power sources of coal and oil produced huge amounts of productive energy and were the dominant force of the Industrial Revolution. Virtually everything was altered: relationships between parents and children, between wives and husbands, and even between countries. Once industrialization became established in Britain, other parts of the world began to experiment with new technology and factory production. Historian Peter Stearns has proposed a three-phase periodization for the Industrial Revolution:

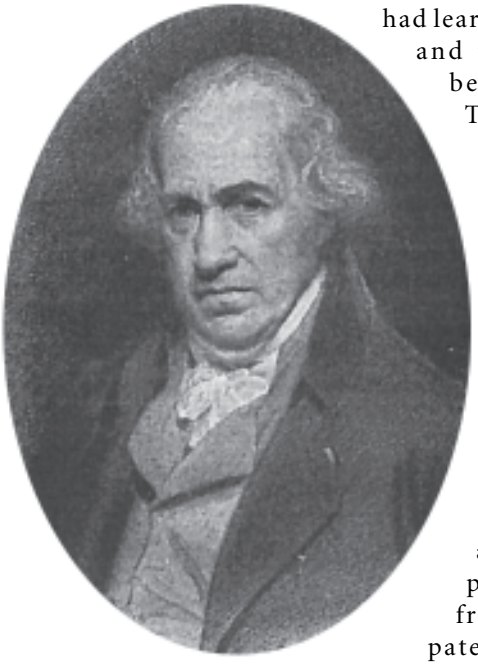
Phase 1: 1760–1880.
Western Europe and North America

Phase 2: 1880–1950
Russia, Japan, eastern and southern Europe, Canada, Australia, New Zealand, and South Africa

Phase 3: 1950s–1990s
The Pacific Rim countries of Asia, Israel, Mexico, Brazil, Turkey, and in some measure in several other countries

The Entrepreneurs

Early industrial entrepreneurs were usually active in family-owned business enterprises. They changed the traditional methods they had learned from their parents, however, and developed new inventions and forms of organization. These dynamic family businesses became the driving force behind the Industrial Revolution. The inventions of Thomas Newcomen, James Watt, and Abraham Darby helped introduce steam or other sources of power to the production process. Watt, a Scotsman, invented a way of using steam engines to power factory machines by improving on Newcomen's earlier steam machine. In 1787, Watt patented a rotary engine that burned coal to heat water and turn it into steam, which in turn drove a series of cogs that powered a driving belt. This innovation allowed for more efficiency in coal and iron mining. Cotton and textile factory owners liked steam-powered machines because they saved time and money and could turn out more goods.

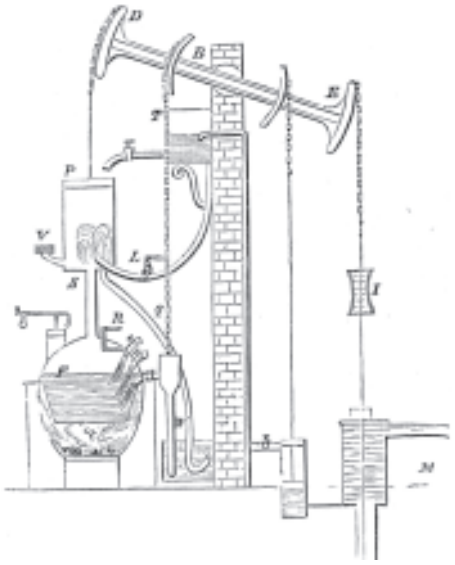


H.F. Helmolt, ed. *History of the World.* New York: Dodd, Mead and Company, 1902.

James Watt

In 1733, the Englishman James Kay invented the flying shuttle, a new kind of loom for weaving cloth. Activated by a foot pedal, it automatically moved thread horizontally through a frame, doing the work of two adults. In 1767, James Hargreaves patented a more efficient spinning machine that soon came into wide use. A rapid succession of inventions and patents included Richard Arkwright's water frame (which changed the methods of spinning cotton in textile manufacture) in 1769, Samuel Crompton's "mule" (for drawing out and twisting thread) in 1779, and Edmund Cartwright's power loom in 1785.

Abraham Darby, a Quaker ironmaster, founded a company in Coalbrookdale, England. There, in 1709, he successfully smelted iron ore using coke, a hot-burning fuel of nearly pure carbon derived by heating coal. The use of coke, which burned much more efficiently than charcoal derived from wood, made large-scale production of high quality iron possible. Charcoal only produced small quantities of poor, brittle quality iron. Other factors combined with his new iron production methods combined to make Darby's company a major force



Newcomen Steam Engine
D. Kinnear Clark, *An Elementary Treatise on Steam and the Steam-Engine* (London: Lockwood, 1875), 32.

in the new industrial age. Deposits of coal and iron ore were to be found in the region, providing an easy supply. Coalbrookdale was also near the Severn River, an ideal channel for transporting goods to markets and a nearby brook provided water power.

Early on, Darby produced domestic cooking vessels. In 1723 the company made the first cast iron cylinders for the Newcomen steam engine, which furthered its development. In 1750, Darby's son, also named Abraham (II), smelted pig iron with coke and produced wrought iron. In 1767, the company pioneered the use of iron rails. The first iron bridge in Europe was overseen by Abraham Darby III. (Chinese engineers had built them many centuries earlier.) Unfortunately, Abraham Darby I did not live to see its construction. The bridge still stands today.

Canals and rivers were the arteries of the Industrial Revolution. The Scotsman Thomas Telford consulted with the Coalbrookdale Company to develop his project to build a cast iron aqueduct to carry canal boats across valleys in Wales. Early canal builders achieved outstanding feats of civil engineering, all without the mechanical assistance available to engineers today.

Early in the nineteenth century, Richard Trevithick, who was from Cornwall in southwestern England, developed an engine that used steam at five times the pressure of Watt's machines. He went to Coalbrookdale to ask for cooperation in constructing a locomotive on rails. He thought that his first steam road carriage would work more efficiently on rails because of his direct piston-rod to crankshaft design. Trevithick ran his carriage in London in 1808 on a circular line with a radius of thirty meters (98.4 feet). The first fare-paying passengers traveled at a speed of 10 miles per hour. His technology was later applied to boats, and within a few decades both railroads and paddle steamers were carrying travelers and migrants across continents and oceans.

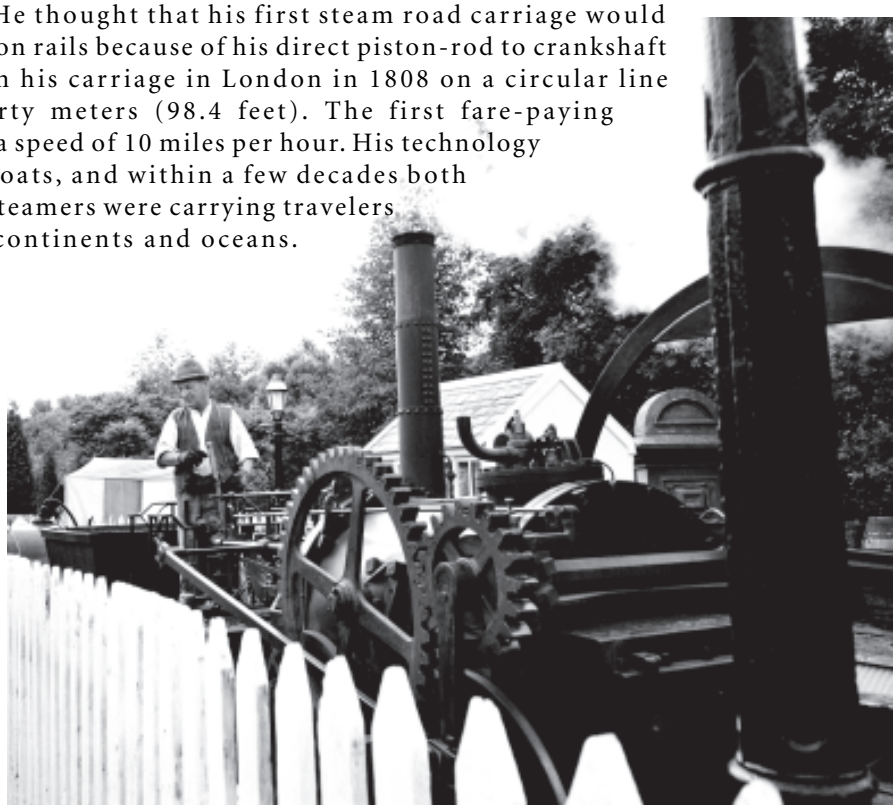


Photo by Linda Miller

Replica of early locomotive.
The steam-engine rail train was both a result of industrial changes and an instrument of further change.

Enterprises

By the 1730s, a series of new inventions was transforming the British cotton manufacturing business and giving rise to a new form of production, the factory system. The tremendous expansion of cotton manufacturing was of special significance. The cotton industry commanded the central role in Britain's early industry as world demand for cotton textiles was high, inviting new technologies to produce the cloth in quantity. The cotton industry eventually developed into a highly mechanized factory industry. Although some workers were displaced indirectly by the rise of cotton as traditional production declined, the following one hundred years would see the industry employ more than a half million people, twice as many as any other manufacturing industry. Cotton provided work for more than one tenth of the population in Manchester alone. That city in north central England became known as the "capital of cotton." It grew into a population of a million people, making Greater Manchester the largest urban region in Britain and the biggest manufacturing center in the world. Unfortunately, Britain's cotton industry was fueled with raw material grown and harvested partly by slaves working on plantations in the southern United States.

In his book *Sweetness and Power: The Place of Sugar in Modern History,* Stanley Minz discusses the impact of the sugar industry on industrialization. In the Middle Ages, a sugar industry thrived in the Mediterranean Sea region, in both Christian and Muslim lands. Europeans carried sugar plants, as well as the whole technology of growing and processing cane sugar, to the Americas at the end of the fifteenth century. African slaves became the main work force in the sugar fields and mills that boomed in Brazil and the Caribbean islands. In the seventeenth century, sugar became the cornerstone of African slavery in the British West Indies. In Europe, sugar consumption rose to the point where this product became a necessity rather than luxury, the first mass-produced exotic necessity of the working class. By 1800, sugar had become a necessity in the diet of every English man and woman. By 1900, it supplied nearly one-fifth of the calories in the English diet (Mintz, 6). The addition of sugar to the diet signaled the linkage between the consumption habits of every man, woman, and child in England and global patterns of trade especially between Britain and its colonies. Also, the basic clothing needs of hundreds of thousands of slaves in the Americas created a market there for cheap cotton textiles. When sugar prices decreased, higher consumption followed. Tea, imported from South and East Asia, was laced with sugar, and this beverage became popular with all classes in England. (Chinese tea drinkers used bowls without handles, but English consumers had to have tea cups with handles because the water had to be very hot to dissolve the sugar!)

Why Britain?

According to William McNeill, conditions necessary for industrialization in Britain included its internal deposits of coal and iron; the political climate after the Glorious Revolution of 1688, which favored private accumulation and investment of capital; the thickening of the web of roads and canals; and the worldwide growth of international trade and colonial exploitation. For the Industrial Revolution to occur, great investment of funds in machines was required. Government interest in supporting economic innovations was important, as was a sufficient population to provide an inexpensive labor force.

Several basic enabling factors also were present in other areas of Northwest Europe in the eighteenth century. A large seam of coal ran from Britain through Northern France and Belgium to the Ruhr Valley in Germany. Early industrialization in both Britain and the European continent developed along these seams. (In China, by contrast, the main urban and manufacturing region was the lower Yangtze River valley, which was hundreds of miles from rich sources of coal.) Iron ore deposits were also plentiful in Europe. Without them, early industrialization would have been impossible. Western Europe also had abundant wool to help clothe a growing work force, and its overseas trade provided access to cotton grown in the Americas and Old World countries such as Egypt.

Even with these key resources, however, the Industrial Revolution would not have been possible without the Scientific Revolution that occurred in western Europe in the seventeenth and eighteenth centuries and that was itself built on the longer-term borrowing and adaptation of mathematical and scientific ideas originating in China, India, and the Muslim lands. Research in Europe on gases and chemicals was especially relevant to industrialization. Well before 1750, England began to cultivate a scientific culture that involved increasing literacy and the spread of scientific societies, which encouraged investigation collective sharing of new knowledge. Other important factors included the establishment of the English national banking system; commercial experience, which included both growing trade and new technology related to shipbuilding; and an active slave trade between Africa and the Americas (until the early nineteenth century) to provide the forced labor necessary to grow large quantities of sugar and cotton cheaply. The British government had a policy encouraging cotton manufacture at home (partly by outlawing imports of finished textiles from India), concentrating the industry in the area. Also not to be forgotten is the rapid population growth after 1750 (linked partly to access in Britain to larger supplies of imported food). More people in Britain meant a more plentiful and cheaper supply of factory and farm labor.

Historians continue to debate whether these developments could really be called a "revolution." In his book *The Industrial Revolution, 1760–1830*, the historian, T. S. Ashton stated it this way:

> To the question of why the Industrial Revolution did not come earlier, many answers can be given. In the first half of the eighteenth century there was much ingenuity and contrivance, but time was needed for this to reach fruition. Some of the early inventions failed because of incomplete thought, others because the right material was not at hand, because of lack of skill or adaptability on the part of the workers, or because of social resistance to change. Industry had to await the coming of capital in quantities large enough and at a price low enough, to make possible the creation of the "infrastructure" of roads, bridges, harbors, docks, canals, waterworks and so on—which is a prerequisite of a large manufacturing community. . . . But such large considerations apart, in each of the major industries there was some obstacle—some bottle neck to use the current phrase—which had to be removed before expansion could go far. In agriculture it was the common rights and the lack of winter fodder; in mining the want of an efficient device to deal with flood water; in iron-making the shortage of suitable fuel; in the metal trades a consequent shortage of material and in textiles an inadequate supply of yarn. Transport, trade, and credit alike suffered from the dead hand of monopolistic organization, and the arrested development of these services had adverse effects on industry in general. Thus it was that, though there was growth in every field of human endeavor, change was never so rapid as to endanger the stability of existing institutions. In the period 1700–1760 Britain experienced no revolution, either in the technique of production, the structure of industry, or the economic and social life of the people. (Ashton, 47)

Exploitations: The Standard of Living Debate

Britain's early Industrial Revolution featured radically new technology and economic organization, which made possible a speed and volume of production unprecedented in world history. This development, however, came at a social and economic price.

For many years historians have argued over the question of standard of living in Britain in the early industrial period and whether the changes exploited or helped the poor. On one side is the contention that industrialization was a catastrophe for the laboring poor of England and other countries and that the standard of living declined. This pessimistic view was put forth in the nineteenth century by David Ricardo, Thomas Malthus, and Karl Marx. For example, Malthus wrote in 1798:

> The increasing wealth of the nation had little or no tendency to better the conditions of the laboring poor. They have not, I believe, a greater command of the necessities and conveniences of life; and a much greater proportion of them, than at the period of the Revolution, is employed in manufactories and crowded together in close and unwholesome rooms." (Thomas Malthus in Taylor, 37)

In his book *The Standard of Living Debate in Britain in the Industrial Revolution* Arthur J. Taylor has summarized arguments historians have made about the issue.

J. H. Clapham took an optimistic view on standard of living, relying on calculations of real wages that showed them rising from 1790–1850, in a period when historians thought that the poor were getting poorer. However, the figures for money wages are only for skilled artisans. Little is known about other workers or rates of unemployment. For unskilled laborers, almost no information is available.

According to Eric Hobsbaum, the evidence is too sketchy to prove that the laboring population whose conditions improved was larger than the population whose standard of living did not. About 40 per cent of the industrial working class lived at or below the poverty line. Hobsbaum argues that general mortality rates fell markedly from the 1780s to 1810 but rose again until the 1840s. Mortality rates did not improve drastically until the 1870s or 1880s. Unemployment in the 1840s made paupers of 10 per cent of the population. Vagrancy in England increased from the early nineteenth century to the 1830s. The standard of living improved in the 1780s but then declined in the following decade. The significant turning point did not come until the 1840s.

T. S. Ashton held the opposite view of the standard of living debate. He argued that conditions for laborers were becoming better at least after 1820 and that the spread of the factory played a part in this improvement. It offered significant employment and greater stability of consumption. Between 1790 and 1830, factory production increased rapidly, so a greater proportion of people benefited. The price of textiles fell, reducing the cost of clothing for ordinary people. After 1820 the prices of tea, coffee, and sugar also fell. The growth of trade unions, social organizations, savings banks, and schools all gave evidence of the existence of a larger class of people living at about the subsistence level.

Ashton does acknowledge that large groups of unskilled workers, such as seasonally employed agricultural workers and hand loom weavers, barely made a living. For them prices were high. He asserts, however, that the number of those sharing the benefits of economic progress was larger than the number of those who did not benefit. He believes that the pessimists focused too much on these unskilled or semi-skilled groups.

VI. Unit Lessons

Lesson One: People and Machines

Lesson Two: Working Women and Children in the Nineteenth Century

Lesson Three: Parliamentary Debates about Child Labor

Lesson Four: Consequences: Housing and Public Health

Lesson One
People and Machines

I. Objectives

- To analyze the impact of inventors and their machines on the Industrial Revolution.
- To compare and evaluate the contributions of these individuals.

II. Historical Background

The driving force behind the Industrial Revolution was the creativity and entrepreneurship of people of various backgrounds. Their work changed the face of England and had a profound effect on the world. The success of their inventions resulted both from their genius as inventors and from the foresight and energy of capitalists.

The fifty years between 1775 and 1825 saw a dramatic change in the textile industry owing to the introduction of machinery that produced a better quality product at a faster speed. New machines, especially the steam engine, allowed the textile industry to move from the domestic spinning wheel to mills and factories that produced abundant amounts of power. Eventually, not only textile manufacturing but a whole range of industries were transformed by the harnessing of energy based on the revolution in the use of fossil fuels to drive engines.

Industrialization also gave impetus to a transformation in transportation. In the late eighteenth century, the main means of transportation were stagecoaches for travelers and the wagon and canals for the movement of goods. Over the next two hundred years the coming of the railway and the internal combustion engine would change this. Early in the nineteenth century, Manchester became an important center for canal communication, with waterways linking the town to all parts of the England and providing an inexpensive and efficient means of transport for raw materials, finished products, and food. The nineteenth century also saw the arrival of the railway network. The Liverpool-Manchester Railway in 1830 linked the two cities two hours travel time. Soon, a person could travel from Manchester to London in a day. In 1901, electric trams arrived on the streets of Manchester. Public transport also came in the nineteenth century with the first horse buses arriving in Manchester. In 1877 they were replaced by the horse trams and in 1901 by the electric tram.

III. Lesson Activities

1. Divide the class into groups and assign each group one of the inventors presented in **Student Handouts 1–6**. Using that information as well as the results of other research, write an application to have your inventor inducted as a Fellow, or member, of the Royal Society for their contributions to the Industrial Revolution. The Royal Society [www.royalsoc.ac.uk] was founded in Britain in 1660 to advance scientific research and achievement. Explain why your person should be invited to become a Fellow. Create and fill out a nomination form which contains the following information:

   a. Name of the inventor (try to find and include a picture)

   b. Background, economic status

   c. Inventions (try to find and include a picture or diagram of the invention)

   d. Economic and social impact of the inventions

Present the findings to the class. After all the candidates have been presented, have the class vote by secret ballot to determine which of the individuals should be admitted to the Royal Society.

2. Newspaper Headline Articles

Have students create, either individually or in groups, newspaper articles with the following headlines about the Industrial Revolution:

a. JOHN KAY INVENTS FLYING SHUTTLE

b. JAMES HARGREAVES INVENTS SPINNING JENNY

c. RICHARD ARKWRIGHT DEVELOPS THE WATER FRAME

d. SAMUEL CROMPTON INVENTS THE COTTON MULE

e. EDMUND CARTWRIGHT DEVELOPS THE POWER LOOM

f. JAMES WATT INVENTS THE STEAM ENGINE

g. SAMUEL SLATER LEAVES WITH MILL KNOWLEDGE

h. RICHARD ARKWRIGHT KNIGHTED BY GEORGE III

3. Art and the Industrial Revolution

Have students examine paintings by Joseph Mallord William Turner, John Constable, and Joseph Wright. Have students choose one or more painting to analyze using **Student Handout 7** (Image Analysis Worksheet). Use art books or Web sites:

Turner

http://www.ibiblio.org/wm/paint/auth/turner/

http://www.artcyclopedia.com/artists/turner_joseph_mallord_william.html

Constable

http://www.ibiblio.org/wm/paint/auth/constable/

http://www.artcyclopedia.com/artists/constable_john.html

Wright

http://www.ibiblio.org/wm/paint/auth/wright/

http://www.artcyclopedia.com/artists/wright_of_derby_joseph.html

Class Discussion

Have the students share their observations. How do these artists portray the Industrial Revolution with regards to people and machines?

James Hargreaves
1730(?)–1778

Before industrialization, spinning had always been done in houses and small workshops with spinning wheels worked by hand. This was a slow process and not enough yarn could be provided to keep pace with the knitters and weavers who made the yarn into garments and cloth. In 1767, James Hargreaves, an illiterate weaver from Lancaster, invented the "spinning jenny," a device that speeded up the production of yarn. This was a useful machine, but operating it was difficult and required skilled laborers. The spinning jenny allowed one person to turn eight spindles at once in order to spin eight threads. The threads were not strong enough, however, to make good yarn. Unfortunately, people who were left without work because of mechanization destroyed Hargreaves' original machine. He died in poverty in 1778.

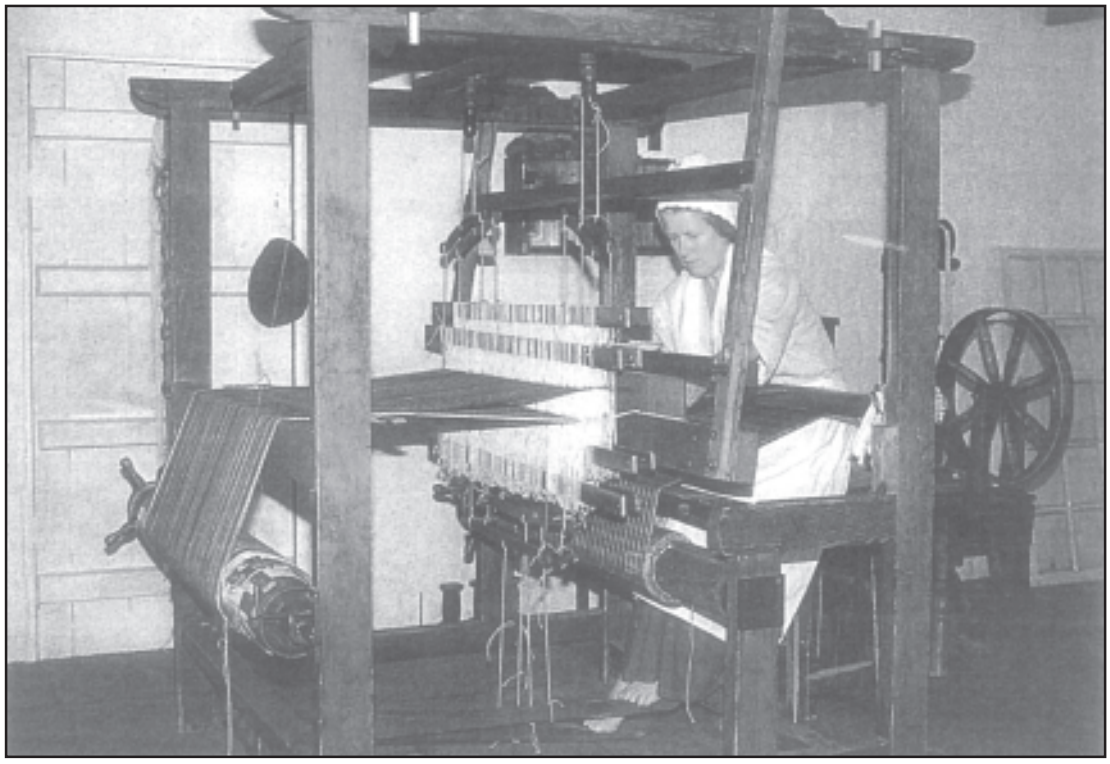


Photo by Linda Miller

Foot-powered spinning loom
The advent of a steam-powered spinning loom during the Industrial Revolution, greatly sped up weaving. The "spinning jenny" was a response to the resultant need for thread to be produced faster.

Abraham Darby
1678(?)–1717

In 1708, Abraham Darby I, whose family originally settled in the English Midlands, left Bristol to take up residence in Coalbrookdale. Originally a brass founder, he succeeded in 1709 in smelting iron with coke instead of expensive charcoal. He made cheap iron pots, which launched his family dynasty of iron founders. The introduction to Darby's patent in 1707 says:

> A new ways of casting iron bellied potts . . . in sand only, without loam or clay by which iron potts . . . may be cast fine . . . and with more ease and expedition and in regard to their cheapnesse may be of great advantage to the poore of this kingdome, who for the most part use such ware . . . and likewise may in time supply foreign markets with that manufacture of our own dominions.

For Darby, success came only after years of failure. He finally solved the method of utilizing coal for the production of iron. This was important because wood in England was becoming scarce. This scarcity drove up the price of wood, making iron smelting with charcoal too expensive. Darby's procedure made iron cheap. In the years following his death, the Coalbrookdale ironworks became well known. His son, Abraham II, worked on perfecting the forging of wrought-iron using coke, and he built more furnaces to cope with increasing demand.

Abraham III, grandson of Darby, built the iron bridge over the Severn River near the terminus of the Shropshire Canal. Darby's team of workmen raised the arches of the Iron Bridge in the summer of 1779 and opened it in 1781. Despite detailed records of the Darby family that survive, there is no detailed account of the bridge's actual construction. The bridge gave its name to the industrial town Ironbridge, and it is today a British national monument, one of the icons of the Industrial Revolution.

Coalport Factory
As appears in *Victorians at Work* (Coalbrookdale: Ironbridge Gorge Museum), 1997

Josiah Wedgwood
1730–1795

In 1765, Josiah Wedgwood founded a new manufacturing plant for pottery. He was the last born of twelve children in a family of four generations of potters. The outlook for a young master-potter might not have been promising, but steam power, turnpike roads, and canals began to make an impact on the industry. Demand grew for cheap, durable earthenware dishes, partly because polite society drank coffee and chocolate and most people drank tea. Prosperity was growing for most social classes. In 1759, Wedgwood opened a business in Staffordshire, and his most important product was cream-colored earthenware. A new standard of craftsmanship called "engine turning" was developed which made fluting and beading of ceramics easier to do. Wedgwood soon attained social prominence, and he was asked by his fellow potters to be their spokesman before Parliament in promoting construction of a new turnpike and the Grand Trunk Canal to their region to ship pottery to a larger market. Wedgwood married a distant cousin and was the master not only of a thriving business but a growing family.

In 1765, he received an unexpected order from Queen Charlotte for a tea service. After that, he added "potter to her majesty" to his bill heads. He later had several other royal clients, including Czarina Catherine of Russia. His growing business needed a new factory, so in 1769 he built one he called Etruria. This was a tribute to the widely held but mistaken belief that the pottery found around the excavations at Pompeii in Italy was Etruscan. He created a neo-classical style and reproduced ancient cameos. In 1770–72, he faced difficult times because his poorly managed factory suffered from workers embezzling funds. In 1772, he was faced with a labor strike. He now rethought his business and focused more on producing for the "middling class of people."

Library of Congress, LC-USZC4-5321

This image appeared on several medallions made by Josiah Wedgwood for the Society for the Suppression of the Slave Trade in England. In 1837, it subsequently appeared on a broadside publication of an antislavery poem by John Greenleaf Whittier.

In 1774, he invented Jasper ware. It did not need glazing and could be cut and polished on a wheel. He also invented a pyrometer, a thermometer capable of measuring high temperatures. In recognition of this achievement, he was elected a Fellow of the Royal Society in 1783. He was also instrumental in the formation of the General Chamber of Manufacturers, which helped maintain prices. In 1787, he became involved in the Society for the Suppression of the Slave Trade. In 1790, he turned his business over to his sons. He then devoted his time to reproducing the Portland Vase, an object that had been found near Rome in 1644 and that had belonged to a Roman killed in 235 CE. It took him four years to make a copy.

Wedgwood died in 1795 after having established not only a great firm but a great industry. His managerial efficiency, avoidance of waste, and use of cheap transport allowed him to undercut his competitors. He became a leader of popular tastes. He was also a sincere philanthropist and model employer. In 1863, William Ewart Gladstone, statesman and collector of Wedgewood Pottery, commended him for "uniting art with industry."

Richard Arkwright
1732–1792

In 1769, Richard Arkwright built a spinning machine that used water power. Called a water frame, it was too big to be used in cottages, so factories had to be built to house it. Arkwright and his partners signed a lease to land in Cromford, Derbyshire, where he built a cotton mill in 1771. This would become Europe's first successful water-powered cotton spinning mill. A second mill built in 1776–77 was powered by stream. Arkwright's mills are seen by historians as representing an essential first phase in the factory system. Derbyshire has even been described as the "cradle of the industrial revolution," and Arkwright's factories were copied by industrialists in England and abroad. His water frame made strong twisted yarn. Mill women operated it. He also had a carding engine, which cleaned raw cotton by brushing out all the bits of dirt. This machine was run by men. The advantage of Arkwright's machine over the spinning jenny was that young people with very little training could operate it. Arkwright's new process of roller spinning was also a major success because it enabled much larger quantities of cotton to be spun more quickly. Besides providing buildings, he had to find a labor force. Some came locally but other came from outside the region. Cromford village was built so that Arkwright could fulfill his commitment to provide housing for his workers. The mill at Cromford is currently being restored.

Photo by Linda Miller

Cromford Village
Many buildings still appear as they did when Arkwright lived there.

Samuel Greg
1758–1834

Samuel Greg was one of thirteen children. Unfortunately, his father's businesses often lost money. His uncle, however, ran a prosperous textile company in Manchester. This man had no children and offered to adopt Samuel. At the time Manchester was becoming a center of cotton production. Samuel's uncle imported cotton and sold finished cloth both in England and abroad. Samuel learned the business quickly. In 1780, he became a junior partner. When his uncle died, Samuel, at the young age of 24, owned one of the largest merchant-manufacturing businesses. After a few years, he built a mill at Styal. Many other entrepreneurs who started cotton spinning factories went bankrupt. But he succeeded because of technical expertise, contacts, and money. He started an Apprentice House for pauper children, who worked in the mill. Mrs. Greg wanted her children to share their knowledge and skills with less fortunate children, so on Sunday afternoons her daughter taught the apprentice girls to sew, read, and write. The Greg boys taught the apprentice lads reading, writing, and arithmetic. By 1834, Greg was worth 319,000 pounds. He died that year after being butted by a stag. His son took over the business, which had become one of the largest cotton firms in the country.

Photo by Linda Miller

The Apprentice House
Greg's Apprentice House still stands today and is open for tours.

Robert Owen
1771–1858

Robert Owen, socialist, entrepreneur, Utopian planner, trade unionist, and pioneer of the co-operative movement, became involved in manufacturing at the age of nineteen as a superintendent of a spinning mill. He was the first in England to use fine, long-fibred American sea-island cotton. He soon mastered the art of cotton spinning and earned a considerable reputation as a producer of fine textiles. His contacts eventually led him to Caroline Dale (daughter of his partner David Dale) and to partnership in mills at New Lanark in Lanarkshire, Scotland. Here he started a bold economic and social experiment for workers which became successful in New Lanark and was promoted abroad as a model. Owen's social reforms and organization extended to every aspect of village life in New Lanark. His single greatest legacy was his education institute. It was here in 1816 that the system of infant education in Britain began. Later, thousands of visitors from abroad passed through the village and their impressions home. He also established a "sick fund" to which the mill workers contributed a sixtieth part of their wages. The village shop was stocked with goods he bought wholesale and sold at almost cost. This benevolence prompted commercial efficiency. His employees made quality goods sold at reasonable prices. He also kept a check on the sale of whiskey and controlled drunkenness in the village. He said, "My intention was not merely to be a manager of cotton mills, but to change the conditions of the people who were surrounded by injurious influences upon the character of the entire population."

Owen traveled throughout Britain and Western Europe lobbying Parliament and the church on his reforms. In 1824, he headed to New Harmony, Indiana to establish an experimental co-operative community. His ideas for social reform were well received at first, but the community did not last long. He left New Harmony in the care of his son, but the experiment ended in the late 1820s in disaster at the cost of much of Owen's personal fortune. In the following years he provided trade unions with a political philosophy and strived to organize them. His efforts culminated in the founding of the Grand National Consolidated Trades Union in 1834. This idea was ahead of its time, however, and it collapsed within in a year. This was the end of Owen as an influential force.

Photo by Linda Miller

Robert Owen Memorial Museum
The museum is on the ground floor of the Town Council building in Newton, Wales. Many of the exhibits can be seen on the museum's Web site:
http://robert-owen.midwales.com/rowen

Image Analysis Worksheet

Step 1: Observation

A. Study the image (painting, drawing, photograph, etc.) for 2 minutes. Form an overall impression of the image and then examine individual items. Next, divide the image into quadrants (four parts) and study each section to see what new details become visible.

B. Use the chart below to list people, objects, and activities in the image.

People	Objects	Activities

Step 2. Inference

Based on what you have observed above, list three things you might infer from this image:

1.

2.

3.

Step 3. Questions

A. What questions does this photograph raise in your mind?

B. Where could you find answers to them?

Adaptation of "Photograph Analysis Worksheet," designed and developed by the Education Staff, National Archives and Records Administration, Washington, DC 20408