

A. Introduction

The student has considered early Nineteenth-Century political and cultural developments which set the stage for the Industrial misnamed Revolution. The course goal for teaching about the Industrial Revolution is **to evaluate the impact of technology on civilization**. Technology commonly refers to all of those available means which may be used by people to convert scarce natural resources into forms which satisfy human needs. Technology transforms one type of energy into another.

B. Overview

Coal and iron summarize the first phase which focused in England before 1870. Coal and iron replaced wood as the basic material of industry. This type of technology which included railroads, cotton mills, and hundreds of other new or improved machines. The Great London Exposition of 1851 displayed and symbolized this technological transformation. The main building was the Crystal Palace: the first great iron framed building; the first in which the outer walls were entirely glass; the first with prefabricated structural units.

Technology was not new in Nineteenth-Century England. Thomas Newcomen had used coal to drive an engine as early as 1712; iron had been in use for three thousand years. Newcomen's engine had an efficiency of only one or two percent, but after three thousand years, such performance was enough to start the process of industrialization.

To connect this with the colonial experience of the United States, the first American steam engine was built in 1753 in New Jersey. Also of related interest is the fact that during the 1680's hard times brought about a transformation of the labor force from White indentured servants to African American slaves in the Chesapeake.¹

The Nineteenth Century change was the scale upon which coal and iron were used, as changes in scale expanded into changes in kind. The cheapness, uniformity, and above all the quantity of products far exceeded that produced by hand. Changes as in metallurgy or printing, and the rise of new occupations, like engineering and railroading, drove the new technology deep into both United States and British society by 1850.

C. Ramifications

1. Social Policy

By 1850, a few imaginative minds such as Saint-Simon, Comte, and Robert Owen foresaw the possibility of a future economy of abundance in which the massive application of inanimate power to industrial processes would put an end to human want. Several factors worked against more serious consideration of the work of these men. Many misguided Christians interpreted "the poor will always be with you,"² to mean that any increase in goods would be rapidly absorbed by an increase in mouths. Others lacked insight. Others were intellectually lazy. These early socialists, however, merited attention. Certainly population grew spectacularly in Nineteenth-Century Britain, rising from about nine or ten million in 1801 to 37 million in 1901.

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In 1700, about 80 percent of the British population made its living from agriculture. In 1800, about 40 percent of the British population were involved in agriculture. In 1900 that percentage was about six percent.³

Per capita income is one criteria of wealth. The condition of the environment is another. Interestingly enough, water quality during Nineteenth-Century London was determined more by politics than by scientific truths.⁴

Cholera epidemics furnished sufficient political counter-weight to private water companies to permit scientific truths to determine public health policies. Both political and scientific realities changed in tandem. During the Nineteenth Century, there was a gradual shift from chemical to bacteriological criteria of water purity. By the 1880s bacteriologists had isolated and identified the specific causative agents of cholera and typhoid fever. It was no longer a matter of pointing out that the animalcules in the Thames were "larger, fatter, and uglier" than those found elsewhere.⁵

The second part of the Industrial Revolution took place after 1870 and focused on the United States and Germany, but especially the latter. From the perspective of the 1990's it looks as though these industrial transformations constitute a change comparable to the Neolithic transition from hunting to agriculture. In Neolithic times, the techniques of farmers multiplied the food and power resources several times over, supported a radical increase in human numbers and made possible the concentration of comparatively massive populations into cities.

2. WASP (White Anglo-Saxon Protestant) Culture

It may be very easy to exaggerate the lasting importance of the institutional and intellectual framework within which Great Britain's modern industrialism arose. Possibly such ideals as the "Protestant ethic," the "nonconformist conscience," and the "capitalist spirit" were vital and necessary ingredients of pioneer industrialism. In a country like Hungary, however, neither Calvinism nor nonconformity had industrial consequences. Certainly Britain was favored by the easy availability of beds of coal and iron ore, a labor force able to be constrained to accept new routines of work, and a class of innovators and entrepreneurs willing to develop new ideas and able to acquire the money or credit needed to pursue them.

D. Conclusion

Issues of economic and intellectual freedom from political constraints run through this lecture. The incompatible inseparables at work here are those between faith and reason, value and fact, morality and science, each claiming to be the path to truth. By studying the Introduction to the Industrial Revolution, Overview and Ramifications, the student is better able to evaluate the impact of technology upon civilization according to a criteria of the chronology, personalities, places, and degrees of certitude warranted. Students are reminded to read, study, think, and prepare a comment.

E. Ramifications

1. Social Policy (continued)

The end of want did not, in fact, seem within reach. Some comparative statistics help to illustrate what happened. Using 1950 dollars, the national per capita income of Great Britain for the year 1800 was 200 versus 165 for the United States. In 1845, the comparison was 325 to 275; in 1860, 370 to 360; in 1877, 500 to 430; in 1895, and 745 to 735. By 1895, the United States was the leading manufacturing nation of the world.⁶

Chambers writes that Robert Koch finally identified the cholera bacillus in 1883,⁷ whereas, above, Dr. Jirran writes that "By the 1880s bacteriologists had isolated and identified the specific causative agents of cholera and typhoid fever." Dr. Jirran is unsure whether these two statements contradict one another.

E. Education

In a yet broader sense, changes at a more personal level took place. In time, the school replaced the family or neighborhood as the basic training ground for later economic success. The history of the development of that change has yet to be told convincingly.⁸

Two basic issues confront the history of education. Was education a vehicle for liberation, as the masses seemed to think, or was education a vehicle for duping the masses into conformity with what the ruling classes wanted? The results of the research thus far are inconclusive. For example, there were already high literacy rates in the areas affected before primary education was promoted by the Guizot Law of 1833 and the Ferry laws of 1881-82.

Recent research tends to be revisionist, in that it stresses the repressive aspects of compulsory education. Recent studies of various localities in England, France, and Germany have not confirmed the assumption that industrialism had been a catalyst for educational improvements. The argument is being made that because most people, including workers, eventually accepted and even welcomed public schools, the working class lacked institutions in which a genuine culture of opposition could flourish.

Comments on the Seventh Edition of Chambers, pages 630-643

In the opinion of the professor, Chambers is the most scholarly textbook on the market. Chambers well represents mainstream thinking in the history profession. The professor, however, disagrees in many significant ways with mainstream thinking. Some of these disagreements are set forth above and others in the following comments.

Page Column
Paragraph
Line

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0631 2 1 13 "...his or her ..."

There is a tendency to substitute *their* for *his or her* and *his/her*. While the professor does not use *their* himself, he no longer counts *their* as a grammatical error.

0633 1 1 18-19 "...close ties between money and power facilitated economic investment."

Seems to contradict the comment made in Topic 05--Russia at page 0610 2 1 1 "... the Bank of England in 1694."

0634 1 3 1 "At around ..."

Avoids *At about*. The Professor would prefer eliminating *at* in either case.

0634-0636 "... both spinning and weaving were totally transformed."

Because slave-grown cotton was still used, the Professor would prefer simply *transformed*.

0637 1 1 3 "... improved the quality of pigs ..."

Just as there were cattle drives west of the Mississippi, so were there pig drives to Cincinnati east of the Mississippi. These pig herds have not been written up by historians. The Professor wonder whether there might be any connection with Eighteenth Century English animal husbandry. At first the slaves seem to have eaten well, because of the availability of pork; later stealing a pig was a crime punishable by death.

Endnotes

¹ Carville Earle, review of Gloria L. Main, Tobacco Colony: Life in Early Maryland, 1650-1720, in The American Historical Review, Vol. 88, No. 5 (December 1983), p. 1318.

² Deuteronomy, 15:11; Matthew 26:11; John 12:8.

³ p.578, probably in Melvin Krantzberg and Carroll W. Pursell, Jr., History of Science and Technology: Technology in the Twentieth Century, 2 volumes (New York: Oxford University Press, 1967), Vol. II; also see pages 714-715 in the fourth edition of Chambers.

⁴ John Harley Warner, review of Christopher Hamlin, A Science of Impurity: Water Analysis in Nineteenth-Century Britain The American Historical Review, Vol. 97, No. 2 (February 1992), pages 204-205.

⁵ Christopher Hamlin, A Science of Impurity: Water Analysis in Nineteenth-Century Britain, page 110, as cited in the review by John Harley Warner in The American Historical Review, Vol. 97, No. 2 (February 1992), pages 204-205.

⁶ Student Sharon Wells developed this statistic from the 1910 eleventh edition of The Encyclopedia Britannica, Vol. 1, page 413. The lecture uses rounded figures, so that the statistics can be the more easily learned. The more accurate statistics are: In 1845, the comparison was 323 to 274; in 1860, 370 to 359; in 1877, 497 to 430; and in 1895, 745 to 735. By 1895, the United States was the leading manufacturing nation of the world.

⁷ Seventh edition of Chambers, page 820, footnote 6.

⁸ See, for example, David Hogan, review of Paul E. Peterson, *The Politics of School Reform, 1870-1940* in The American Historical Review, Vol. 91, No. 4 (October 1986), page 997.