- To give students a better understanding of the contrasting nature of manufacturing work, arrange for a machinist to come to your class to give a presentation of how precision parts are produced and used, and invite a local craftsperson to demonstrate how products are made by hand.
- Eli Whitney's invention of the cotton gin in 1793 changed the course of the 19th century. Ask students to write an essay or journal entry about an invention that they feel will have a similarly profound impact on the 21st century. Ask them to consider inventions in the areas of genetic engineering, computers or communications technology.
- Ask students to research the life of Catherine Greene, who may have contributed to the development of the cotton gin. There is speculation that Whitney received credit for Greene's idea, possibly because Greene faced 18th-century social and legal constraints on women. Have students compose a hypothetical correspondence or dialogue between Greene and Whitney in an attempt to figure out what might have happened between them during the process of inventing the cotton gin.
- Many historians suggest that Whitney's cotton gin entrenched slavery in the United States. By law, slaves were forbidden to learn to read or write, but accounts of their lives can be learned by listening to or reading the lyrics of slave songs — a form of protest against the brutal conditions in the cotton fields — and the origin of the musical genre known as the Blues. Ask students to interpret and analyze the lyrics from emancipation songs from Richard Crawford's *The Civil War Songbook*, Dover Publications, or listen to them at this Web site: www.pdmusic.org/civil-war.html. Students could also research slave interviews collected from the Federal Writer's Project from 1936–1938 at memory.loc.gov/ammem/snhtml/snhome.html.
- Ask students to read some of the letters of the Mill Girls, who worked at the many textile factories that sprouted in New England after Whitney improved the production of cotton at this Web site: www.osv.org/education/docs/farm/MillGirls.htm. Instruct students to write their own version of a letter home or diary entry describing what it might have been like to leave home for a year to work in a textile mill.

Suggested Internet Resources

Periodically, Internet Resources are updated on our Web site at www.LibraryVideo.com

- **www.eliwhitney.org**
  The Eli Whitney Museum in Hamden, CT, preserves what remains of the manufacturing complex where Whitney produced muskets and developed the technology of interchangeability. It includes a good biographical sketch of Whitney, a drawing of the cotton gin and a description of the former Whitneyville. *(Continued)*

- **www.nps.gov/lowe/loweweb/Lowell_History/prologue.htm**
  This Lowell National Historical Park site provides students with a look at the history of an early New England factory town.
- **www.tecsoc.org/pubs/history/2001/mar14.htm**
  The Center for the Study of Technology and Society offers an excellent image of the cotton gin from Whitney's original patent.

Suggested Print Resources

- Diouf, Sylviane A. *Growing up in Slavery.* Millbrook Press, Brookfield, CN; 2001.
- Green, Constance McLaughlin. *Eli Whitney and the Birth of American Technology.* Addison-Wesley Publishing Co., Boston, MA; 1998.
- Lathan, Jean Lee. *Eli Whitney.* Chelsea House Publishers, Broomall, PA; 1991.

TEACHER'S GUIDE

Jim Quinn
Writer-in-Residence
National Inventors Hall of Fame

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Inventors of the World™

ELI WHITNEY

This guide is a supplement designed for teachers to use when presenting programs in the video series *Inventors of the World.*

This series focuses on famous inventors who have helped change the course of history with their groundbreaking ideas. Programs in this series stress that the process of inventing is much more than a quick "eureka" moment and is more likely the culmination of a great deal of hard work and experimentation. These programs also dispel the notion that advancements in science occur only due to the work of a lone, isolated genius and illustrate how the great inventors of history often "stood on the shoulders of giants" and improved upon the work of others. In addition to documenting the inventors and their process of invention, this series also highlights how new technologies influenced society at the time of their inception and how they continue to shape our modern world.

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Historical Overview

In the late 18th century, England was leading the Industrial Revolution while the young United States was still largely an agricultural country. There was a general lack of specialized workers or skilled craftsmen in the new nation. During this time, Eli Whitney helped solve America's labor shortage by developing a whole new way of manufacturing goods that changed the very nature of work. Known as the American system, Whitney's process of producing guns by using machine-made interchangeable parts became the basis for the future of manufacturing goods in the United States. Of course, Whitney is best remembered as the gifted inventor whose cotton gin helped transform the American South. Whitney's simple yet effective invention easily removed seeds from cotton, enabling Southern planters to profit from this valuable crop and making cotton America's main export. Tragically, the cotton gin also had the unintended consequence of firmly entrenching the system of slavery in America. Whitney's manufacturing system stimulated the industrial economy of the North while his cotton gin enriched Southern plantation owners, accentuating the cultural and economic differences that eventually led to the Civil War.

Time Line

1765 — Eli Whitney is born in Westborough, Massachusetts.

1775 — The Revolutionary War begins with battles at Lexington and Concord.

1789 — Whitney enrolls at Yale and decides to become a teacher.

1792 — Catherine Greene invites Whitney to visit her plantation in Georgia.

1793 — Whitney invents the cotton gin.

1794 — Whitney receives a patent for the cotton gin.

1795 — Fire destroys Whitney's cotton gin factory.

1795 — Thomas Jefferson begins to promote a new system of manufacturing based on using interchangeable parts.

1798 — Whitney wins a government contract to produce 10,000 muskets in two and a half years.

1801 — A demonstration is given by Whitney to government officials to prove that he can produce muskets from interchangeable parts.

1809 — Whitney completes delivery of the muskets specified in his government contract.

1825 — Eli Whitney dies at age 60.

Vocabulary

gin — A machine used to remove seeds from raw cotton; from a Middle English word meaning to trap or snare.

entrepreneur — A person who organizes and operates business ventures.

forge — A furnace or hearth used to heat metals so they can be shaped.

plantation — A large agricultural estate where crops are tended by residential workers. *(Continued)*

upland cotton — A type of cotton that can be cultivated inland, but which has seeds that can't be removed by hand.

Sea Island cotton — A type of cotton from which the seeds are easily removed by hand, but which can only be cultivated in coastal areas.

prototype — The first model of a product, which is used as a pattern for making more of that product.

patent — A legal grant issued to an inventor, giving the inventor exclusive rights to profit from the invention.

musket — A primitive shoulder-fired gun featuring a smooth barrel.

interchangeable parts — Uniform parts made so precisely by a machine that a broken part can be easily replaced with another.

militia — A group of people organized for emergency military service.

mechanical engineer — A person responsible for designing, developing, testing and bringing to production machines and their parts.

machine tools — A power-driven tool used to produce precision parts.

mass production — A manufacturing process designed to facilitate the rapid production of a large quantity of cheaply produced goods.

Pre-viewing Discussion

- The ability to produce machine-made products quickly, without the special skills of craftsmen, allowed ordinary people to afford products that were formerly available only to the wealthy. Have students look at the goods in the classroom and in their possession, and discuss which ones were made by hand and which were made by machine. Which products are more common, those made by hand or by machine?
- Thomas Jefferson was a friend and supporter of Eli Whitney, and he encouraged Whitney to try to duplicate the type of mass production methods that he had seen in France. Jefferson used his influence to help Whitney obtain a contract to build muskets with these new methods. Ask students why Jefferson might have been so interested in the mass production of weapons in the late 18th century.
- Even today, when most goods are machine-made, some products are still produced by skilled craftsmen. Ask students to list items that they know are made by hand. Further the discussion by mentioning that most homes and other buildings are still made by hand, although mass production methods are slowly taking over some of this work, too. Have the students discuss whether they would prefer working with machines or producing materials by hand. Discuss which job might be more difficult, potentially dangerous, fulfilling or profitable. Students should discuss the pros and cons of both types of manufacturing.
- Article I, Section 8 of the United States Constitution states that Congress should promote the progress of science, indicating that the Founding Fathers understood the importance of technological advancements. Ask students to brainstorm why they think the Founding Fathers thought science and invention were so important for the new country. Ask students to speculate whether early American inventors like Whitney were inspired to choose problems to solve that would improve their new nation. *(Continued)*

- To get students thinking about cotton and cotton production, ask students to think of as many items as possible that are made from this natural fiber. Are any students wearing clothing that is made from cotton? Where does cotton clothing come from?

Focus Questions

1. What was the most common way of earning a living in colonial America?
2. How did Whitney first get involved in the business world?
3. What role did Catherine Greene play in Whitney's life?
4. What is the difference between upland cotton and Sea Island cotton?
5. Why did Southern plantation owners use slave labor?
6. Why didn't Whitney profit from his cotton gin?
7. What effect did the cotton gin have on slavery?
8. Why did the United States need muskets in the late 18th century?
9. How were most muskets made in the late 18th century?
10. Who was Honore Blanc?
11. What is the American system of manufacturing?

Follow-up Discussion

- Eli Whitney once wrote "an invention can be so valuable as to be worthless to the inventor." Ask the students to discuss what Whitney meant by this statement, while considering the many problems that Whitney encountered during his inventing process.
- In the years prior to Whitney's invention of the cotton gin, the institution of slavery was dying out in the South because the cost of buying and keeping slaves was too high in comparison with the value derived from the agricultural products being cultivated in the South. Ask the students how the nation's history might have changed if the cotton gin had never been invented.
- It has been said that geography is destiny. Ask students to apply this statement in trying to understand the different paths toward economic development the Northern and Southern states took before the Civil War. What are some of the physical differences between the two regions that led to the North becoming more industrialized, while the South remained largely agricultural? What role did Whitney's cotton gin play in the development of these sectional differences?

Follow-up Activities

- One of the noteworthy characteristics of Whitney's cotton gin was the simplicity of its design. Ask students to research the cotton gin, building a model or drawing a detailed picture that shows how it operates.
- Several technological developments led to the shift from Cottage Industry to the revolution in production known as the factory system. Ask students to find information on important inventions from the early part of the Industrial Revolution such as the steam engine, spinning jenny, flying shuttle and power loom. *(Continued)*