Overcoming Barriers to Achievement:

African Americans in Science and Technology 1750 to 1950

Since at least 1939, when a committee formed to name outstanding African Americans in United States history chose three African American scientists to be honored at the New York World’s fair in 1940, there have been efforts to recognize African American achievement in science and technology (Hayden, 1992). Indeed, there have been a fair number of books published on the subject during the past forty years. In 1970, Louis Haber pointed out that science and other textbooks contain very little material on the contributions of African Americans in science and technology. The sad truth is that not much has changed regarding the inclusion of this material in United States history or science textbooks today.

This unit contains an introduction to the history of African Americans in science and technology, as well as activities designed to expand and deepen students’ knowledge of the topic. It can be used as a standalone unit or can be used to supplement textbook lessons on scientists and inventors that fail to acknowledge the contributions of African Americans. The unit covers barriers to African American participation in science and technology, individual achievements, and the struggles and contributions of African American women in the field. The unit text provides a very small glimpse into the information that is available on the topic. Individual scientists and inventors are only briefly introduced so that students can gather further
information based on their interests while completing the activities. An extensive bibliography is provided so that teachers who desire to do so have the option of creating more expansive lessons on the history of African Americans in science and technology for their students.

*Educational Barriers*

In 1943, *Holders of Doctorates Among American Negroes* listed ninety three African Americans with Ph.D.s in the sciences (Sammons, 1990). This still small number was quite an achievement in light of the barriers to education African Americans experienced throughout United States history. During slavery, most southern states had laws prohibiting anyone from teaching slaves to read and write, and in 1870, the majority of African Americans were illiterate. Even after these laws were repealed, African American access to education was severely limited (Haber, 1970). Despite educational barriers, African Americans made significant contributions to science and technology throughout the eighteenth and nineteenth centuries, and beyond. Many of the scientists and inventors discussed below had to struggle to gain access to educational resources such as books, teachers, and schools. Some had to rely upon borrowed books and secondhand knowledge and others were completely self taught out of necessity (Jenkins, 1996).

*Legal Barriers*

African Americans have achieved much in science and technology despite oppression on multiple fronts (National Science Teachers Association, 1975). African American inventors were significantly hindered by the Attorney General’s 1858 ruling that slaves were not citizens and therefore could not enter into contracts with the government. This meant that slaves were not allowed to obtain patents in their own names. Several slaves are known to have invented
labor saving devices during the nineteenth century, but were forced to either patent the invention in a slaveholder’s name or forgo a patent altogether (Sertima, 1991).

Thomas L. Jennings is believed to be the first African American granted a United States patent. He received the patent for a dry cleaning process called dry scouring in 1821. By 1913,
roughly one thousand patents had been granted to African American inventors. Unfortunately, numerous early technological contributions made by African Americans remain impossible to prove since they occurred during slavery. Even after the Civil War, many did not have the funds necessary to apply for a patent. Additionally, numerous patents were taken out in the name of white lawyers because African American inventors frequently believed that the value of the invention would be lowered if their racial identities were revealed. As we consider the individual achievements of African Americans, it is important to keep in mind these larger societal and cultural contexts. Such accomplishments are inextricably linked to an ongoing struggle for equality (Sertima, 1991).

**African American Contributions to Science**

African Americans scientists contributed much to their various scientific fields during the eighteenth, nineteenth, and early twentieth centuries. Benjamin Banneker, an astronomer, and George Washington Carver, an agricultural scientists, are the most well known among them. Banneker invented a hardwood clock and used his astronomy skills to write an almanac used to help farmers determine their planting schedules. Carver discovered how to make numerous products out of peanuts, including soap, wood stain, leather dyes, plastics, oil and ink (Hayden, 1992).

<table>
<thead>
<tr>
<th>Name</th>
<th>Dates</th>
<th>Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benjamin Banneker</td>
<td>1731-1806</td>
<td>astronomer, wooden clock</td>
</tr>
<tr>
<td>Daniel Hale Williams</td>
<td>1856-1931</td>
<td>first successful heart surgery</td>
</tr>
<tr>
<td>George Washington Carver</td>
<td>1864-1943</td>
<td>agricultural scientist, peanut products</td>
</tr>
<tr>
<td>Matthew A. Henson</td>
<td>1866-1955</td>
<td>explorer, first to reach North Pole</td>
</tr>
<tr>
<td>Ernest E. Just</td>
<td>1883-1941</td>
<td>cell physiologist</td>
</tr>
<tr>
<td>Percy L. Julian</td>
<td>1899-1975</td>
<td>chemist, cortisone</td>
</tr>
<tr>
<td>Charles Richard Drew</td>
<td>1904-1950</td>
<td>blood plasma pioneer</td>
</tr>
</tbody>
</table>

(Hayden, 1992; National Science Teachers Association, 1975)
Others are lesser known but also are responsible for significant achievements in the sciences, especially medicine. For example, Daniel Hale Williams is widely acknowledged as the first doctor to perform successful surgery on the heart in 1883 (National Science Teachers Association, 1975). Percy L. Julian was a chemist who first synthesized cortisone, a drug used to ease inflammation and pain. Techniques for blood transfusions and storage were improved by Charles Richard Drew, who also worked to establish the first blood banks during World War II (Haber, 1970).

African American Contributions to Technology

Despite the difficulties they faced in obtaining patents, there were numerous African American inventors, particularly during the nineteenth century. Norbert Rillieux developed a vacuum pan evaporator that made possible the type of sugar crystals we use today (Haber, 1970). Although Thomas Edison invented the light bulb, Lewis Howard Latimer made many improvements to its design and is largely responsible for the modern light bulb. Garrett A. Morgan created a breathing helmet for firefighters that eventually became the modern gas mask, as well the automatic traffic signal. He sold the rights to his traffic signal to General Electric for $40,000 in 1923 (Jenkins, 1996).
<table>
<thead>
<tr>
<th>Name</th>
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<th>Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norbert Rillieux</td>
<td>1806-1894</td>
<td>vacuum pan evaporator</td>
</tr>
<tr>
<td>Elijah McCoy</td>
<td>1843-1929</td>
<td>self-lubricating machines</td>
</tr>
<tr>
<td>Granville T. Woods</td>
<td>1856-1910</td>
<td>telephone transmitter</td>
</tr>
<tr>
<td>Lewis Howard Latimer</td>
<td>1848-1928</td>
<td>light bulb filament</td>
</tr>
<tr>
<td>Garrett A. Morgan</td>
<td>1877-1963</td>
<td>gas mask, traffic signal</td>
</tr>
</tbody>
</table>

(Haber, 1970; National Science Teachers Association, 1975; Sertima, 1991)

**African American Women in Science and Technology**

It remains difficult to paint a complete picture of African American women’s contributions to science and technology in early United States history. Even after the prohibition against granting African Americans patents was lifted, many of the inventions of women were recorded under the names of male relatives. And in the early twentieth century, barriers to education and employment persisted making it challenging for African American women to gain recognition for their talents. However, there were significant discoveries made by women in science and technology during this time (Sullivan, 2002).

<table>
<thead>
<tr>
<th>Name</th>
<th>Dates</th>
<th>Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ellen F. Eglin</td>
<td>1849-7?</td>
<td>clothes wringer</td>
</tr>
<tr>
<td>Sara E. Goode</td>
<td>1850-7?</td>
<td>cabinet bed</td>
</tr>
<tr>
<td>Miriam E. Benjamin</td>
<td>7-7?</td>
<td>signaling chair</td>
</tr>
<tr>
<td>Madame C.J. Walker</td>
<td>1867-1919</td>
<td>hair products</td>
</tr>
<tr>
<td>Annie Turnbo Malone</td>
<td>1869-1957</td>
<td>hair and skin products</td>
</tr>
<tr>
<td>Roger Arliner Young, Ph.D.</td>
<td>1889-1964</td>
<td>zoologist</td>
</tr>
<tr>
<td>Majorie Stewart Joyner, Ph.D.</td>
<td>1896-1944</td>
<td>permanent wave machine</td>
</tr>
<tr>
<td>Bessie Blount Griffin</td>
<td>1913-</td>
<td>automatic feeding tube</td>
</tr>
</tbody>
</table>

(Sullivan, 2002)
Many women of the eighteenth and nineteenth centuries were largely confined to the
domestic sphere, and many of their accomplishments reflect this. Perhaps this is why their
contributions have been even more
thoroughly ignored than those of African
American men. For example, Sara E. Goode
invented a cabinet bed that could be slept on
at night and folded up to save space and
provide a table during the day. Madame C.J.
Walker invented hugely popular hair care
products and became the first American
woman to earn a million dollars herself. It is
easy to imagine that such inventions were
dismissed as relating only to women’s work,
even if they had important uses for both men
and women. Other women, such as Roger
Arliner Young, a zoologist, and Bessie Blount Griffin, who invented an automatic hospital
feeding tube, were involved in science and medicine, but still gained very little recognition
(Sullivan, 2002).
Activities

Timeline

Have students do library or Internet research to determine the year when each of the inventions discussed in the unit was patented. Give students poster board and markers and ask them to draw illustrated timelines showing all of the inventions and when they were patented. Hang the timelines around the classroom and lead students in a discussion about them.

Research Project

Ask students to write a research report about one of the scientists or inventors discussed in the unit. The report should contain information about the person’s biography, accomplishments and the barriers to achievement they faced.

Patent How To

Write the website address for the United States Patent and Trademark Office on the board:

http://www.uspto.gov/

Ask students to research the process for requesting and obtaining a patent. Have each student write a paragraph describing the process using sequential words (first, second, finally, etc.).

Imagine Your Own Invention

Use the Imagine Your Own Invention worksheet to encourage students to think creatively about the invention process. Ask students to present their invention ideas and drawings to the class.

Primary Source: Benjamin Banneker’s Letter to Thomas Jefferson
Explain to students that Benjamin Banneker was an abolitionist who wrote a twelve page letter to Thomas Jefferson defending the intelligence of African Americans and arguing for equal treatment. Ask students to complete the worksheet Benjamin Banneker’s Letter to Thomas Jefferson and then discuss the letter as a class (Source: Haber, 1970).

Act it Out!

Assign small groups of students one of the inventions discussed in the unit. Each group should write and perform a skit about how the invention was received when it was first introduced to the public. One student in each group should play the inventor and explain the invention and its potential uses. Each group should have at least one person act as someone who is excited about the invention and one person who is skeptical about it. The skit should demonstrate the reasoning behind the different ways it is perceived by the public.

Science Connection

This unit can be used in conjunction with a science course. One way to do that is to gather additional information about the scientists discussed in the unit and present it to students along with relative scientific topics. For example, Ernest E. Just made important contributions to cell theory, but is not mentioned in most science textbooks. Materials about Just’s achievements can be included during discussion of the cell in a Biology or life science class.
Imagine Your Own Invention

Imagine something you would like to invent. Answer the following questions about your invention.

1. What is the name of your invention? _____________________________________________

______________________________________________________________________________

2. What is it used for? ___________________________________________________________

______________________________________________________________________________

3. What materials are needed to build your invention? _________________________________

______________________________________________________________________________

4. If you invention is something that can be sold, how much does it cost? __________________

______________________________________________________________________________

Draw a picture of your invention in the space below. Use a separate sheet of paper if you need more space.

My Invention
In 1791, Benjamin Banneker sent a copy of his first almanac to Thomas Jefferson, along with a letter about slavery. Read the excerpt from Banneker’s letter and answer the questions that follow.

…Sir, I freely and cheerfully acknowledge, that I am of the African race, and in that color which is natural to them of the deepest dye; and it is under a sense of the most profound gratitude to the Supreme Ruler of the Universe, that I now confess to you, that I am not under that state of tyrannical thralldom, and inhuman captivity, to which too many of my brethren are doomed, but that I have abundantly tasted of the fruition of those blessings, which proceed from that free and unequalled liberty with which you are favored; and which, I hope, you will willingly allow you have mercifully received, from the immediate hand of that Being, from whom proceeded every good and perfect Gift.

Sir, suffer me to recall to your mind that time, in which the arms and tyranny of the British crown were exerted, with every powerful effort, in order to reduce you to a state of servitude: look back, I entreat you, on the variety of dangers to which you were expose; reflect on that time, in which every human aid appeared unavailable, and in which even hope and fortitude wore the aspect of inability to the conflict, and you cannot but be led to a serious and grateful sense of your miraculous and providential preservation; you cannot but acknowledge, that the present freedom and tranquility which you enjoy you have mercifully received, and that it is the peculiar blessing of Heaven.

This, Sir, was a time when you clearly saw into the injustice of a state of slavery, and in which you had just apprehensions of the horrors of its condition. It was now that your abhorrence thereof was so excited, that you publicly held forth this true and invaluable doctrine, which is worthy to be recorded and remembered in all succeeding ages: "We hold these truths to be self-evident, that all men are created equal; that they are endowed by their Creator with certain unalienable rights, and that among these are, life, liberty, and the pursuit of happiness." Here was a time, in which your tender feelings for yourselves had engaged you thus to declare, you were then impressed with proper ideas of the great violation of liberty, and the free possession of those blessings, to which you were entitled by nature; but, Sir, how pitiable is it to reflect, that although you were so fully convinced of the benevolence of the Father of Mankind, and of his equal and impartial distribution of these rights and privileges, which he hath conferred upon them, that you should at the same time counteract his mercies, in detaining by fraud and violence so numerous a part of my brethren, under groaning captivity and cruel oppression, that you should at the same time be found guilty of that most criminal act, which you professedly detested in others, with respect to yourselves.
1. What does Banneker mean when he writes, “I am not under that state of tyrannical thralldom, and human captivity…”? 
______________________________________________________________________________
______________________________________________________________________________

2. Explain how Banneker compares slavery to the period of British colonial rule in America. How are they similar; how are they different? Do you think this is an effective comparison? Why or why not? 
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________

3. What does Banneker accuse Jefferson of? 
______________________________________________________________________________
______________________________________________________________________________

______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________

5. How does Banneker use the quote from the Declaration of Independence to support his argument? 
______________________________________________________________________________
______________________________________________________________________________
6. Imagine that you are Thomas Jefferson, a slaveholder, and write a letter in response to Banneker on a separate sheet of paper.
Bibliography

Books:


Overcoming Barriers to Achievement


Articles:


Websites:


Videos:


