“The Real McCoy:” African American Inventors in History

From left to right: Granville T. Woods circa 1887, Lewis Howard Latimer in 1882, and Elijah McCoy were three famous African American inventors in the nineteenth century and early twentieth century. Images Courtesy of Wikimedia Commons.

Grade Level(s): 6-12
Subject(s): History, Engineering

In-Class Time: See below
Prep Time: 15-30 min

Part One: African American Inventors in History (2 class periods)
Part Two: Create Your Own Invention! (90 min)

Materials

Part One: African American Inventors in History
- African American Inventors Matching Worksheet (see supplemental materials)
- African American Inventors Patent List and Portfolio (see supplemental materials)
- Access to research materials and the internet

Part Two: Create Your Own Invention!
- Create Your Own Invention Worksheet (Grades 6-8) or Patent Worksheet (Grades 9-12)
- Art supplies
- Graph paper
- Legos, foam shapes, shaping clay, cardboard or other three-dimensional modeling supplies (optional)

Objective
This two-part lesson will introduce students to the lives of black inventors with the aid of media, primary sources, and government documents. The first part invites students to research the lives of notable African American inventors and analyze some of their patents. In the second part, students can create their own invention. This lesson plan could also be used on or around National Inventors’ Day (February 11) which is also during Black History Month.
Introduction

Have you ever heard the phrase “the Real McCoy”? What most people don’t know is that the phrase refers to Afro-Canadian inventor Elijah McCoy. McCoy was born in 1844 in Colchester, Ontario, Canada. His parents were African Americans who had escaped slavery in Kentucky by following the Underground Railroad to Canada. Because McCoy was born in Canada, he was born free. In 1847, the family returned to the United States and settled in Ypsilanti, Michigan. McCoy had 57 U.S. patents in his name, most of which had to do with steam engines which were a central part of the industrial revolution in the late nineteenth century. The expression “The Real McCoy” is associated with McCoy’s oil-drip cup invention. One theory says that railroad engineers used his name in order to avoid the work of inferior inventors. Though the phrase is still used in popular speech, most people don’t know the story of the man behind the expression. As this story illustrates, the history of African American inventors is not well known but for centuries, African Americans have made important contributions to the development of technology and innovation in the United States.

In the eighteenth century African American slaves were not allowed to patent their own inventions. According to U.S. patent laws of 1793, “the master is the owner of the fruits of the labor of the slave both manual and intellectual.” Therefore, the majority of African Americans, who were enslaved, were not able to file for patents. Despite this, a free man named Thomas L. Jennings became the first African American to be granted a patent in the United States in 1821. Jennings was a tradesman and abolitionist who operated a tailoring and dry-cleaning business in New York City. In 1821, he filed a patent for a process which he “dry scouring” for cleaning clothes. His patent caused a controversy in the United States, however, as a free man, the restrictions that applied to slaves did not affect him. Laws in the United States would not extend patent rights to all African Americans until 1861. African American inventors before the civil rights revolution of the mid-twentieth century were remarkable. Not only did they have to combat a racially discriminatory legal system and society, they also had to struggle against the prevailing American belief in black intellectual inferiority.

Contrary to popular understanding, invention has never been the result of simply an individual’s work; it also relies on a number of societal structures such as access to education, technical training, apprenticeship opportunities, membership in professional societies, and legal rights. Due to the racial discrimination throughout American history, many African American inventors did not have equal access to these larger structures. Until WWII, most schools and universities (other than HBCUs) did not admit non-white or non-male students, especially into scientific and engineering fields. In addition, professional organizations and societies which provided access to crucial business and scientific networks were segregated. In addition, invention often requires capital and because of systematic economic disadvantage, many African Americans were barred from the financial resources that made scientific invention possible. While technological innovation has come to represent an essential aspect of the American Dream, African Americans’ access to that dream has always been limited. Despite these barriers, African Americans have made significant contributions throughout history to the development of technology in the fields of agriculture, electronics, engineering, and more.

According to Rayvon Fouché, author of Black Inventors in the Age of Segregation, historians have tended to portray black inventors as two-dimensional heroes. What he calls the “black inventor myth” has come to dominate the history of African Americans and invention as a response to the long-held claims of black intellectual inferiority. While this approach has uplifted the stories of black inventors such as
Granville T. Woods and Lewis Latimer, it has also tended to remove them from the historical context within which they lived. To address this, Fouché’s book *Black Inventors in the Age of Segregation*, complicates the historical understandings of several well-known African American inventors from the late nineteenth and early twentieth centuries including Granville T. Woods, Lewis Latimer, and Shelby Davidson. While these inventors should be celebrated for their achievements, we must also place them in the historical context which shaped their lives and work.

In this lesson plan, students will meet several African American inventors whose lives reveal much about what it meant to be a black inventor in the late nineteenth and early twentieth century. Students will then learn about contemporary African American inventors such as physicist Dr. James West who invented the modern-day microphone. This lesson plan also includes a list of notable African American inventors to allow students to research additional historical figures in more detail. Lastly, the lesson plan contains a portfolio of patents by African American inventors. While this lesson plan will present these individuals as heroes and celebrate their remarkable accomplishments, it is our hope that students will also be introduced to the importance of historical context and a more complex understanding of heroes.

The following brief biographies can be used to introduce students to some famous African American inventors. Please see the list in the Instructions/Activities section of African American inventors as well as the Resources sections for more information about African American inventors.

**Granville T. Woods** (April 23, 1856 – January 30, 1910) was a prolific inventor in the late nineteenth and early twentieth century, mainly of electrical equipment. He lived and worked during the era dominated by Thomas Edison, Elihu Thomson, and George Westinghouse. Indeed, just after Edison had established the first central power station and was constructing his West Orange laboratory, the *Catholic Tribune* proclaimed Woods “the greatest inventor in the history of the race,” and a year later called him “the greatest electrician in the world.” Many also referred to Woods as “the Black Edison.” Like Edison, Woods spent his career in electrical engineering. Woods’ early life is somewhat of a mystery. Though it is known that he was born in 1856, some say that he was born in Columbus, Ohio while others such as Raymond Fouché say that he was born in Australia. According to Fouché, no record of Woods’ Ohio birth exists though census data from the era register his birthplace as Australia. Woods held a number of patents that were issued to him on various electronic devices. These included patents on an electromagnetic brake apparatus, and an overhead conducting system for electric railways. Though Woods was often compared to Thomas Edison, the two actually were at odds. Woods and Edison went to court twice over “patent interferences” – disputes between two or more inventors who are attempting to patent the same invention. In both disputes, Woods won.

**Lewis Howard Latimer** (September 4, 1848 – December 11, 1928) was born in Chelsea, Massachusetts. His parents were George and Rebecca Latimer, escaped slaves from Virginia. Latimer began studying drafting in Massachusetts and worked for patent solicitors Crosby & Gould, where he helped draft the patent drawings for Alexander Graham Bell’s patent application for the telephone. An original draftsman for Thomas Edison, Latimer was the only African American member of the twenty-four “Edison Principles,” Thomas Edison’s engineering division of the Edison Company. In 1890, Latimer co-authored a book on electricity titled “Incandescent Electric Lighting: A Practical Description of the Edison System.” In addition to working for Edison, Latimer was an inventor, draftsman, engineer, author, poet,
musician, and, at the same time, a devoted family man and philanthropist. Many people consider Latimer one of the most important inventors of all time, not only for the sheer number of inventions he created and patents he secured but also for the importance of his most famous development: the addition of carbon filament to the newly-invented incandescent light bulb. In 1882, Latimer patented a method of manufacturing his carbon filaments. Latimer’s other inventions include a threaded wooden socket for light bulbs, the first toilet that could be used in trains (1874, patent #147,363 - called "Water closet for railroad cars"), and a forerunner of the air conditioner (1886, patent # 334,078 - called "Apparatus for cooling and disinfecting").

James Edward West (February 10, 1931 – ) was born on February 10, 1931 in Prince Edward County, Virginia. After graduating from high school he attended Hampton University before being drafted to serve in the Korean War, where he earned a Purple Heart. After his return to the U.S. after the war, he transferred to Temple University, where he studied physics. While in school, West worked during the summers as an intern for the Acoustics Research Department at Bell Laboratories in Murray Hill, New Jersey. Upon graduation Bell Labs hired West to full-time as an acoustical scientist specializing in electroacoustics, physical and architectural acoustics. In 1960, West teamed with Gerhard M. Sessler, a German-born physicist, to develop an inexpensive, highly sensitive and compact microphone. At the time, condenser microphones were used in most telephones, but were expensive to manufacture and necessitated a large battery source. Microphones convert sound waves into electrical voltages, thus allowing the sound to be transmitted through a cord to a receiver. Their electric microphone solved every problem they were seeking to address. It was inexpensive, could hold a charge without having to be connected to a power source, was compact and durable and could be applied to common uses in the office or in the home. The final model was finished in 1962 and on January 14, 1964, the pair received patent number 3,118,022 for their “electroacoustic transducer.” By 1968, the microphone was in wide scale production and was quickly adopted as the industry standard. Approximately 90% of microphones in use today are based on this invention and almost all telephones utilize it, as well as tape recorders, camcorders, baby monitors and hearing aids.

Lonnie Johnson (October 6, 1949 – ) is an engineer and inventor who was born in Mobile, Alabama in 1949. Johnson worked on NASA’s Cassini mission to Saturn and invented the popular toy, the Super Soaker. After graduating from Tuskegee University with a master’s degree in nuclear engineering, Johnson worked as a research engineer at Oak Ridge National Laboratory before becoming the Acting Chief of the Space Nuclear Power Safety Section at the Air Force Weapons Laboratory in New Mexico. In 1979, Johnson became a Senior Systems Engineer at NASA’s Jet Propulsion Laboratory in California. At NASA, Johnson worked on the Galileo mission to Jupiter. A few years later he returned to the Air Force to work at the Strategic Air Command. In 1987, Johnson returned to NASA to work on the Mars Observer Project and the Cassini mission to Saturn. By 1989, Johnson decided to found his own company to market the Super Soaker. Within its first two years on the market the Super Soaker generated over $200 million in sales, making it the most popular toy in the United States. Johnson has received over 80 patents.
Part One: African American Inventors throughout History

1. Below is a list of some famous African American inventors and some of their inventions. Students can form groups or work individually to write a short report on these inventors. Students should select one of the inventors and then choose 1-2 patents listed in the supplemental document “African American Inventors Patent List” to examine. Students should consider the following questions and resources as they conduct their research:
   a. Where was the inventor from and what was their background? How does where they’re from or their background affect their work as an inventor?
   b. What was the inventor doing when they were your age?
   c. What was life like for African Americans during the time the inventor was alive and inventing? Think about laws, social norms, economics, and other factors. For example, would the inventor be living in a segregated society or were African Americans allowed to apply for patents at the time?
   d. What region did the inventor live and work in? Where did they receive their education?
   e. Who were their contemporaries? What other scientists, inventors, or other notable people were living at the same time?
   f. What was going on technologically in the United States during this time? Example: the Industrial Revolution, the Space Age, etc.
   g. What field did the inventor specialize in?

2. These reports or presentations can then be shared with the class. Students should present a brief biography of the individual as well as an analysis of one of their patents and how their invention worked.

3. After the presentations, students should discuss as a larger group the following questions:
   a. What was similar and different about the inventors? Factors include where they were born, their experiences as an inventor, socio-economic background, gender, etc.
   b. What are the major laws or turning points in history that affected African American inventors? Examples:
      i. Slavery and U.S. patent laws
      ii. Jim Crow segregation
      iii. The Civil War and the 1861 granting of patent rights to African Americans
      iv. The Civil Rights Movement and end of legal segregation
   c. Were there any aspects of the inventors life that surprised you or that you felt you shouldn’t include in the presentation? What were they and how did you make the decision to include what you did?

4. Note: The African American Matching Worksheet can be used to help students associate the name of the inventors with their inventions.
Some Famous African American Inventors:

- **Granville T. Woods** (1856–1910) – Electrical systems and railroad
- **Lewis Latimer** (1848–1928)
- **Garrett Morgan** (1877–1963) – Traffic signal, underwater breathing devices
- **Elijah McCoy** (1844–1929) – Railroad lubrication systems
- **Jan Ernst Matzeliger** (1852–1889) – Shoe-making technology
- **George Washington Carver** (1864–1943) – Peanut products
- **Sarah Breedlove also known as Madam C. J. Walker** (1867–1919) – Hair-straightening creams
- **Otis Frank Boykin** (1920–1982) – Electrical engineering
- **Patricia Era Bath** (1942 – ) – Cataract removal technology and methods
- **Marie van Brittan Brown** (1922–1999) – Home security system with television surveillance
- **Mark E. Dean** (1957 – ) – Refined the personal computer, color PC monitor, gigahertz chip
- **Charles Richard Drew** (1904–1950) – Developed systems for preserving blood leading to creation of blood banks
- **Kenneth J. Dunkley** (1939 – ) – 3-D glasses
- **Betty Harris** (1940 – ) – Explosive removal techniques
- **Lonnie G. Johnson** (1949 – ) – Toy water gun, Supersoaker, projectile launchers
- **Frederick McKinley Jones** (1893 – 1961) – Truck refrigeration unit
- **Valerie Thomas** (1943 – ) – Illusion transmitter
- **Henry Blair** (1807 – 1860) – Seed planter
- **Thomas L. Jennings** (1791–1856) – Dry cleaning technique (first African American to receive a U.S. patent)
- **George Edward Alcorn, Jr.** (1940 – ) – Imaging x-ray spectrometer fabrication technique
- **Shelby J. Davidson** (1868–1930) – Paper-rewinding mechanism for adding-machines
- **James Edward Maceo West** (1931 – ) – Directional microphone
- **Norbert Rillieux** (1806 – 1894) – Improvements in sugar production processes

Part Two: Create Your Own Invention!

1. Students can take a look at some of the patents filed by famous African American inventors (see African American Inventors Patent List) to get an idea of what a patent looks like and how to draw an invention. They can also use the Google Patents database to search for household items or technology in order to get an idea of how inventors describe their work. In addition, students should be encouraged to use scientific descriptions in their patents and emphasize what inventions allowed them to create their own.

2. Each student should get a copy of the Create Your Own Invention Worksheet (for grades 3-5) or the Patent Worksheet (for grades 6-12). The worksheets are available among the supplemental materials.

3. Students can work individually or in small groups to develop their own invention. After presenting their ideas, students can draft drawing of their inventions with graph paper and/or build three dimensional models of their inventions using legos, cardboard, or other materials available.
Required/Recommended Reading and Resources

Part One: African American Inventors throughout History
- African American Inventors Matching Worksheet
- *Blacks in Science* by Ivan Van Sertima
- The Black Inventor Online Museum: http://www.black-inventor.com/

Part Two: Create Your Own Invention!
- Create Your Own Invention Worksheet
- The i©®ea™ (icreatm) Resource Guides were created by the United States Patent and Trademark Office. The teacher’s guide provides a unit of lesson plans and activities that encourage middle and high school students to think about intellectual property and invention. The guide is available online at:

Discussion Questions

Part One: African American Inventors throughout History
1. Where was the inventor from and what was their background? How does where they’re from or their background affect their work as an inventor?
2. What was the inventor doing when they were your age?
3. What was life like for African Americans during the time the inventor was alive and inventing? Think about laws, social norms, economics, and other factors. For example, would the inventor be living in a segregated society or were African Americans allowed to apply for patents at the time?
4. What region did the inventor live and work in? Where did they receive their education?
5. Who were their contemporaries? What other scientists, inventors, or other notable people were living at the same time?
6. What was going on technologically in the United States during this time? Example: the Industrial Revolution, the Space Age, etc.
7. What field did the inventor specialize in?

Part Two: Create Your Own Invention!
1. How did you think of your invention? Did you begin by thinking about your daily life or the people around you?
2. What does the process of coming up with an invention teach you about how inventors come up with their innovations?
3. What is the difference between a patent, trademark, and copyright?
Further Reading and Additional Resources

Books on African American Inventors:


Online Resources:


Extensions

**Extension Activity: Getting Your Invention Patented**

1. Ask your students to list some of the machines they use everyday (e.g., computers, MP3 players, televisions), including objects in the classroom. Then, use Google Patents ([www.google.com/patent](http://www.google.com/patent)) to locate the patent for this machine. Write down the patent
number and discuss some of the processes by which such machines arrive in the user’s hand—
invention, patent, production, marketing, sale.

2. Then ask students to research and draw up an outline of the development of one machine. Have them consider the following:
   a. What does this machine do?
   b. What did the developers perceive as the need for this machine?
   c. How did they get started financially?
   d. Did somebody hire them to do it?
   e. Did their ideas build on earlier ideas?
   f. Who did the actual development of the machine?
   g. Who got credit for it? Who profited from it?
   h. What were the reasons for building it?
   i. Who uses it? Do students believe this machine is useful? How?

### Common Core Standards

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<th>History/Social Studies</th>
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<tr>
<td>CCSS.ELA-LITERACY.RH.6-8.2</td>
<td>Determine the central ideas or information of a primary or secondary source; provide an accurate summary of the source distinct from prior knowledge or opinions.</td>
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<tr>
<td>CCSS.ELA-LITERACY.RH.6-8.7</td>
<td>Integrate visual information (e.g., in charts, graphs, photographs, videos, or maps) with other information in print and digital texts.</td>
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<tr>
<td>CCSS.ELA-LITERACY.RH.9-10.7</td>
<td>Integrate quantitative or technical analysis (e.g., charts, research data) with qualitative analysis in print or digital text.</td>
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<tr>
<td>CCSS.ELA-LITERACY.RST.11-12.7</td>
<td>Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.</td>
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<tr>
<td>CCSS.ELA-LITERACY.RST.11-12.9</td>
<td>Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</td>
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<th>Science &amp; Technical Subjects</th>
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<td>CCSS.ELA-LITERACY.RST.6-8.1</td>
<td>Cite specific textual evidence to support analysis of science and technical texts.</td>
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<tr>
<td>CCSS.ELA-LITERACY.RST.6-8.2</td>
<td>Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.</td>
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<tr>
<td>CCSS.ELA-LITERACY.RST.6-8.4</td>
<td>Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.</td>
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<tr>
<td>CCSS.ELA-LITERACY.RST.6-8.7</td>
<td>Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).</td>
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CCSS.ELA-LITERACY.RST.6-8.9

Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

CCSS.ELA-LITERACY.RST.9-10.4

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.

CCSS.ELA-LITERACY.RST.9-10.6

Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.

CCSS.ELA-LITERACY.RST.11-12.2

Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

CCSS.ELA-LITERACY.RST.11-12.6

Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.

CCSS.ELA-LITERACY.RST.11-12.9

Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

Next Generation Science Standards


| Dimension One: Practices | 1. Asking questions (for science) and defining problems (for engineering)  
2. Developing and using models  
3. Constructing explanations (for science) and designing solutions (for engineering)  
4. Obtaining, evaluating, and communicating information |
|--------------------------|--------------------------------------------------------------------------|
| Dimension Two: Crosscutting Concepts | 1. Systems and system models  
2. Structure and function |
| Dimension Three: Disciplinary Core Ideas | Core Idea ETS1: Engineering Design  
Core Idea ETS2: Links Among Engineering Technology, Science, and Society |