

Chapter 6 (Innovative Designer)

Bonus AI-Enhanced Learning Plan

What Will You Invent?

Invention & Design from the Histories of African American and other Diverse Inventors

Student Engagement Question: How many names of inventors can you list in 50 seconds without looking at your computer or smartphone?

Invention is the act of creating something new to address needs or problems facing individuals and communities. Inventors are those who envision new ways of doing things and who take the risks of trying new approaches; often failing many times (Thomas Edison is said to have failed 1000 times before inventing the light bulb). When fortunate, inventors produce items and ideas that change people's lives.

Only some inventors, usually those who are White and male, have made it into most school curriculums and the public memory. When we ask college students in our classes the same student engagement question that began this activity, they find it difficult to name anyone but the most well-known inventors and struggle greatly to name any African American and/or women inventors.

Most students never learn the histories and herstories of African American inventors and scientists, observed basketball legend and writer Kareem Abdul-Jabbar (2013). The accomplishments of Benjamin Banneker, Elijah McCoy, George Washington Carver, Granville Woods, Judy W. Reed, Sarah E. Goode, Madame C J Walker, George F. Grant, Thomas L. Jennings, Henry Blair, Norbert Rillieux, Garrett Morgan, Jan Matzeliger, and many others remain absent from school curriculum. Yet, from 1870 to 1940, with 50,000 total patents, Black people accounted for more inventions than immigrants from every country except England and Germany (Rothwell, Perry, & Andrews, 2020).

During those years, racial discrimination prevented many Black inventors from getting patents for their inventions, leading many to put their patents in the names of their White lawyers.

Underrepresentation of inventors and scientists in school curriculums extends to other groups as well. One study found only 3% of the scientists in biology textbooks are Asian American ([Wood](#), et.al., 2020). Students have limited opportunities to learn the accomplishments of women inventors and scientists: [Margaret Hamilton](#) who wrote the software for the 1969 Apollo Landing and invented the term "software engineer"; [Annie Easley](#), a Black rocket scientist whose work set the stage for space shuttle launches; or [Radia Perlman](#), the "mother of the Internet" who invented an algorithm for organizing and moving data; and many more women technology inventors and science trailblazers. Meanwhile, Native Americans and Alaska Natives are only 0.1% of the nation's scientists, even though native peoples' inventions have had a significant impact on society, including the great granddaughter of Chief John Ross, Mary Golda Ross, who helped design fighter planes during World War II and was one of the "hidden figures" of the space race.

For civic learning, it is important to understand that the whole society benefits when everyone's ideas can be part of rigorous processes of scientific investigation and discovery. Understanding the history of science and technology and the ways that discrimination based on race, culture, ability, language, and gender have blocked advancements is an important step in ensuring that such barriers will not exist going forward. Freed from the barriers of discrimination and informed by examples from history, every student can be inspired to see themselves as an inventor, a maker, a creator whose ideas and innovations can make a difference in their lives and society.

Learning Goal: Students will develop their innovative design skills by learning from and about inventors from underrepresented groups in history (e.g., African Americans, Asian Americans, women).

- **ACTIVITY 1: Learning About Inventors from Underrepresented Groups with GenAI**

- Begin class by reading aloud a picture book or pages from a YA (young adult) book about the lives of inventors. Examples include:
 - *The Boy Who Harnessed the Wind* by William Kamkwamba is the story of a young boy who built a windmill to bring water and electricity to his African village.
 - *Whoosh!* by Chris Barton tells the story of Lonnie Johnson's unplanned invention of the super soaker toy for kids.
 - *Dave the Potter: Artist, Poet, Slave* by Laban Carrick Hill tells the life of an enslaved African in South Carolina who was an extraordinarily creative and prolific artist.
 - *Ada's Violin: The Story of the Recycled Orchestra of Paraguay* by Susan Hood that describes how discarded stuff in a junkyard became transformed into unique musical instruments for children.
- Then, ask students to research and create a list of at least 50 inventors from underrepresented groups in history. They can use the following prompt to jumpstart their research:
 - **Example Prompt:** "Create a table that lists 50 inventors from underrepresented groups in history, along with what they invented (column 1), how their invention shaped society in the past (column 2), how their invention shapes society today (column 3), and resources/external links to learn more."
- Next, have each student select one individual from their list and write a children's book, young adult book, or graphic novel about the inventor and how their invention has shaped society.

- **ACTIVITY 2: Building a Prototype of an Invention with GenAI**

- Ask students to create a working prototype of one or more of the inventions that the person they selected from Activity 1 created.
- Setup a makerspace where students can use cardboard, paper, recycled materials, Makey Makey's, Hummingbird Robotics, and other available materials for their prototype.
- Students can get assistance from a GenAI tool to help with the design and quality of their prototype:
 - **Example Prompt 1:** "I would like to create a working prototype of the 3 position traffic light from Garrett Morgan using cardboard and other recycled materials, how do I get started?"

- **Example Prompt 2:** [upload image of prototype; only if using a GenAI tool licensed by the school that protects students’ intellectual property rights] “How can I improve the quality of this prototype to match Garrett Morgan’s original invention?”
- Set up a virtual gallery space (e.g., [Padlet](#), Google Slide Deck) where students can submit a photo of their invention; share out the virtual gallery with friends, family members, and community members!

REFLECTION QUESTIONS

- What historical or present-day inventors were listed by the most students in the classroom? Why might that be?
- Whose stories of invention surprised you the most, and why?
- Why are some inventors and scientists well-known while others are neglected or lost in history?
- How does learning about underrepresented inventors change the way you think about who can be an inventor?
- After participating in a makerspace and designing your own invention prototype, how has your identity as an inventor changed?

AI LITERACY QUESTIONS

- If you changed the prompt from “Create a table that lists 50 inventors from underrepresented groups in history” to “Create a table that lists 50 inventors” how might the results have been different? Why might that be?
- Should students be allowed to use GenAI tools in school science fairs and competitions? Why or why not?
- If some students use GenAI, how should their projects be fairly judged against other students who did not use GenAI?

CURRICULUM CONNECTIONS

- *Constructing Explanations and Designing Solutions* (Next Generation Science Standards).
- *Standard 4.20: Science, Medicine, and Technology in Black Communities* (AP African American Studies Unit 4 Movements and Debates).
- *Standard 8, Science, Technology and Society* (National Council for the Social Studies).

ISTE Innovative Designer Criteria

- 1.4.c Prototypes. Students develop, test and refine prototypes as part of a cyclical design process.

- 1.4.d Open-ended Problems. Students exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems.

References

BOOK: Abdul-Jabbar, K. (2013). *What color is my world? The lost history of African-American inventors*. Candlewick Press.

WIKI PAGE: [African American Inventors of the 19th Century](#).

ARTICLE: [The Black Inventors Who Elevated the United States: Reassessing the Golden Age of Invention](#), Brookings (November 23, 2020).