

# American Genius: Innovation

How have innovations impacted our world?

## Overview

Students assess three innovations, including the electric generator, the airplane, and the home computer. They read stories of the competition between specific innovators and participate in a debate to determine how those innovations have impacted their lives.

For the complete activity with media resources, visit:

<http://education.nationalgeographic.org/activity/american-genius-innovation/>

## Program

A M E R I C A N  
G E N I U S

## Directions

### 1. Activate students' prior knowledge and introduce the activity.

Write the term innovation on the board and work with the whole class to develop a definition (the process of making improvements on an existing invention by introducing something new). Ask students to brainstorm some innovations that make their own lives easier or better, and write the ideas on the board. If not already included, add the words *flight*, *electric generators*, and *computers* on the board, circling them to set them apart from the rest. Project the provided photographs of innovations. As you look at each image, ask: *How would your life be different if this had never been created?* Explain that students are going to conduct a three-way debate about which of these three innovations (electric generator, computer, or airplanes) has had the greatest impact on our lives today.

### 2. Introduce the reading material.

Divide students into pairs or small groups. Distribute the three readings—Wright and Curtiss, Jobs and Gates, and Edison and Tesla—and the Spotlight On Innovations worksheet to each pair or group. You may also choose to leave the images projected during this time for students to consult during the reading. Have pairs or small groups read the passages together and complete the worksheet as they read. Tell students that they will refer to this completed worksheet as a guide in preparation for the debate.

### 3. Have students choose an individual position.

Regroup to debrief as a whole class. Ask: *Which of these three innovations do you think has made the biggest impact on your life or on the world today?* Point to one of the three innovations and ask students who vote for that one as most impactful to stand and move to one side of the room. Point to another and have those students move to the other side of the room. Compare the two standing groups and the ones still seated (who chose the last innovation). If the groups are not relatively even, ask who is willing to move to one of the other groups in an effort to create a balanced debate. This creates the three teams for the debate.

### 4. Have students prepare and practice for the [debate](#).

Before beginning the group preparation, take a couple of minutes to project and review the Innovation Debate Rubric, to allow students to understand that they will be assessed on their preparation, debate performance, and ability to defend and rebut arguments during the debate. Distribute the Innovation Debate Preparation worksheet and have the teams work together to fill out their main points about the debate, as well as [rebuttal](#) points to argue against the other side. If time allows, have them conduct very brief “practice debates,” in which one member of the team randomly calls out one rebuttal point from the other side. Have team members take turns rebutting the points.

### 5. Conduct the debate.

Have the members of the three debate teams stand side-by-side, one team on each side of the classroom and the third in the back. You, as moderator, stand in the front. Conduct the debate in a dynamic (not pre-set) fashion, using the following prompts to begin. Continue providing prompts as the arguments guide the debate:

- FLIGHT team, you think the innovation of the airplane has made the greatest impact on society today. Can you give us one or two reasons why you think so?
- COMPUTER team, do you have a rebuttal for these points?
- ELECTRIC GENERATOR team, what is your response to what you have heard?
- What is another point that you would like to make, (ANY team)?
- (\_\_\_\_ team), do you have a rebuttal for these points?
- And so on . . .

Continue the debate until each team has had a chance to make their case.

### 6. Reflect about the debate experience.

Have students return to their seats and reflect about the debate experience in writing. Ask students to respond to the following prompts and submit their responses.

- Which point brought up by someone from any side made the biggest impact on your opinion? Explain.
- If you were asked to vote on the innovation that has had the greatest impact on the world today, would you change your mind from the first choice you made? Why or why not?

## Modification

As an alternative to a whole-group debate, hold three separate "mini debates," allowing two innovation groups (e.g., flight versus computers) to debate the impact of each. The remaining team (e.g., electric generators) can serve as an audience for the debate, asking questions of each side. Then allow two different teams to debate, and so on. Allot about ten minutes for each mini debate.

## Tip

Prepare to project photographs of some of the innovations described in this activity, found in the media carousel above, to support your discussions during the activity introduction and the debate.

## Informal Assessment

Use the Innovation Debate Rubric to assess each student's contributions to both the team and to the entire debate.

## Extending the Learning

- Ask students to revisit the list of innovations from Step 1 of the activity. Do they believe that one or more of those innovations has made a bigger impact on society than the electric generator, home computer, or airplane? Have them research and write a persuasive argument recommending a different item to be voted "most impactful innovation of all time."
- Investigate, research, and report on an American teen who has developed an innovative idea. Introduce the task by sharing the story of [Jack Andraka](#), a National Geographic Emerging Explorer. Then have students work in pairs or small groups to find the story of a different teen they wish to share with the class. For younger students, share [this site](#) to give them ideas. Have older students conduct their own research.
- As a class, brainstorm a list of everyday "innovations" that students have used or see often (e.g., pencil eraser, paper clip, credit card). Have students select one (by choice or random drawing) and develop their own "innovation skills" by coming up with a list of at least 10 things you can do with that item (as-is or with modifications) other than its original purpose. Ask them to select their favorite idea and create a marketing piece, such as a print, video, or online ad, to share their innovation with the world.

## Objectives

### Subjects & Disciplines

#### Language Arts

- Debate
- Reading
- Writing (composition)

#### Science

- Engineering

## **Social Studies**

- Technology and civilization
- United States history

## **Learning Objectives**

Students will:

- analyze and synthesize information about three innovations of the 20th century: electric generators, airplanes, and computers
- choose one innovation that they feel is most impactful on their life and explain why
- participate in a three-sided debate on which innovation has had the greatest impact on the world
- reflect about the debate experience by analyzing the most impactful points and making changes to their original selection

## **Teaching Approach**

- Learning-for-use

## **Teaching Methods**

- Brainstorming
- Cooperative learning
- Debate
- Discussions
- Writing

## **Skills Summary**

This activity targets the following skills:

- 21st Century Student Outcomes
  - Information, Media, and Technology Skills
    - Information Literacy
  - Learning and Innovation Skills
    - Communication and Collaboration
    - Creativity and Innovation
    - Critical Thinking and Problem Solving
  - Life and Career Skills
    - Initiative and Self-Direction

## **National Standards, Principles, and Practices**

### **IRA/NCTE Standards for the English Language Arts**

- **Standard 7:**

Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate, and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience.

- **Standard 8:**

Students use a variety of technological and informational resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge.

## **National Council for Social Studies Curriculum Standards**

- **Theme 2:**

Time, Continuity, and Change

- **Theme 8:**

Science, Technology, and Society

## **National Standards for History**

- **U.S. History Era 10 (5-12) Standard 2:**

Economic, social, and cultural developments in contemporary United States

- **U.S. History Era 7 (5-12) Standard 3:**

How the United States changed from the end of World War I to the eve of the Great Depression

- **World History Era 8 (5-12) Standard 3:**

The search for peace and stability in the 1920s and 1930s

## **Common Core State Standards for English Language Arts & Literacy**

- **Reading Standards for Informational Text 6-12:**

Key Ideas and Details, RI.8.1

- **Reading Standards for Informational Text 6-12:**

Key Ideas and Details, RI.6.1

- **Reading Standards for Informational Text 6-12:**

Integration of Knowledge and Ideas, RI.6.8

- **Reading Standards for Informational Text 6-12:**

Integration of Knowledge and Ideas, RI.7.8

- **Reading Standards for Informational Text 6-12:**

Integration of Knowledge and Ideas, RI.8.8

- **Reading Standards for Informational Text 6-12:**

Integration of Knowledge and Ideas, RI.9-10.8

- **Reading Standards for Informational Text 6-12:**

Key Ideas and Details, RI.7.1

- **Speaking and Listening Standards 6-12:**

Presentation of Knowledge and Ideas, SL.8.4

- **Speaking and Listening Standards 6-12:**

Presentation of Knowledge and Ideas, SL.9-10.4

- **Speaking and Listening Standards 6-12:**

Presentation of Knowledge and Ideas, SL.11-12.4

- **Speaking and Listening Standards 6-12:**

Presentation of Knowledge and Ideas, SL.6.4

- **Speaking and Listening Standards 6-12:**

Presentation of Knowledge and Ideas, SL.7.4

- **Writing Standards 6-12:**

Text Types and Purposes, W.7.2

- **Writing Standards 6-12:**

Text Types and Purposes, W.9-10.1

- **Writing Standards 6-12:**

Text Types and Purposes, W.9-10.2

- **Writing Standards 6-12:**

Text Types and Purposes, W.7.1

- **Writing Standards 6-12:**

Text Types and Purposes, W.6.2

- **Writing Standards 6-12:**

Text Types and Purposes, W.6.1

- **Writing Standards 6-12:**

Text Types and Purposes, W.11-12.1

- **Writing Standards 6-12:**

Text Types and Purposes, W.11-12.2

- **Writing Standards 6-12:**

Text Types and Purposes, W.8.1

- **Writing Standards 6-12:**

Text Types and Purposes, W.8.2

## Preparation

### What You'll Need

#### Materials You Provide

- Paper
- Pencils
- Pens

#### Required Technology

- Internet Access: Required
- Tech Setup: 1 computer per classroom, Projector

#### Physical Space

- Classroom

#### Grouping

- Large-group instruction
- Small-group work

## Resources Provided: Handouts & Worksheets

- [Wright and Curtiss](#)
- [Jobs and Gates](#)
- [Edison and Tesla](#)
- [Spotlight on Innovations](#)
- [Innovation Debate Rubric](#)
- [Innovation Debate Preparation](#)

## Resources Provided: Images

- Early Plane
- Electric Generator
- Early Computer

# Background & Vocabulary

## Background Information

Some people treat the terms *invention* and *innovation* synonymously, but there are distinct differences. Invention is the creation of a product or introduction of a process for the first time. Innovation, on the other hand, is the development of a better idea or method. In other words, innovation improves on an existing idea. The United States has been a growing field for thousands of inventions and innovations over the years, from unique and original inventions to improvements that take existing products and resources farther than their originators ever dreamed. But innovations do not exist in isolation. For every genius who has been credited with inventing a gadget, discovering a new idea, or developing an earth-shaking innovation, there were hundreds, sometimes thousands, of others striving for the same goal. Many of these unsung heroes and heroines made breakthroughs and discoveries that led their rivals to the final idea but were never given the credit. You might say that the famous innovators are standing on the shoulders of those forgotten peers. Sometimes it's a good idea to think about that. They may not have earned the awards, but we wouldn't be here without them.

## Prior Knowledge

["basic understanding of electric currents, specifically the difference between alternating and direct currents", "basic understanding of flight, including thrust, lift, and drag", "understanding of the difference between computer hardware and computer software"]

## Recommended Prior Activities

- None

## Vocabulary

Term	Part of Speech	Definition
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Term	Part of Speech	Definition
<b>debate</b>	<i>noun</i>	instructional strategy that fosters the mastery of content and the development of critical thinking skills, empathy, and oral communication skills. The process of considering multiple viewpoints and arriving at a judgment. Applications range from an individual using debate to make a decision in his or her own mind to an individual or group using debate to convince others to agree with them.
<b>innovation</b>	<i>noun</i>	something new.
<b>rebuttal</b>	<i>noun</i>	act of proving something is false by using arguments or evidence.

## For Further Exploration

### Websites

- [Jack Andraka, National Geographic Emerging Explorer](#)
- [7 Incredible Inventions by Teenage Wunderkinds](#)

## Partner



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