

American Genius: Perseverance

How can failure lead to success?

Overview

Students investigate the importance of failure to the process of innovation by investigating several items that were invented by accident. They share one “failure to success” story by creating a 3-panel comic strip poster, and then write an essay in which they connect the trait of perseverance to success.

For the complete activity with media resources, visit:

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

Program

AMERICAN
GENIUS

Directions

1. Activate students' prior knowledge.

Write the terms perseverance and grit on the board. Invite volunteers to define the two terms in their own words. (*Perseverance* is the quality that allows someone to continue trying to do something even though it is difficult. *Grit* is mental toughness and courage.) Then have volunteers explain how they think the terms are related. (Both show strength of character in the face of obstacles.) Have a whole-class discussion using the prompts below. Ask:

- *Name someone who has never failed at anything. Why is that impossible?*
- *Think back to when you first learned to ride a bike. How many of you fell down while you were learning? Did you get back up?*
- *Have you or someone you know ever made a mistake while cooking, and ended up creating a new dish that you liked just as well? Share some of your experiences.*
- *Is failure final? If you fail at something, is it time to give up?*
- *Name some traits of people who show perseverance.*

2. Introduce the activity.

Write the following quotation from Thomas Edison on the board: “Many of life's failures are people who did not realize how close they were to success when they gave up.” Place the items you gathered before the activity on a table in front of the class. Write the names of the items, as well as those of innovations you couldn't bring in, on the board: Silly Putty, Post-It Notes, Scotchgard Carpet and Upholstery Protector, Penicillin, a Slinky, a Microwave oven, potato chips, and Saccharin artificial

sweetener. Ask: *Do you know what all of the items have in common?* Explain that all of these items were invented by accident, by mistake, or because the inventor tried and failed to invent something else. Explain to students that, in this activity, the class will work in teams to explore one of these items, which would never have been invented if its developers had given up. Students will investigate how it was invented or discovered and why it serves as an ideal example about the importance of perseverance and grit. Then they will share that story with the class in a unique and creative way.

3. Have small groups research an innovation.

Divide the class into pairs or groups of three. Distribute a copy of the Failures That Succeeded worksheet to each team and assign or allow them to self-select one of the items from the list. Try not to have more than one group investigate the same item. Explain that each team will research their item on the Internet and complete the Failures That Succeeded worksheet. When they have completed their research, they will create a simple comic strip on a poster to display to the rest of the class. Show the class a wooden matchstick (the kind sold in boxes; not safety matches torn from a book) and explain that the first friction match like this one was created by accident in the late 1820s by English chemist John Walker, who liked to use thin sticks to mix his concoctions. One day he found that he couldn't clean a mixture off the end of his stick. After rubbing with a cloth he started scraping the stick on the ground, and suddenly, the stick burst into flames. John Walker quickly realized that he had created something that would change the world.

4. Have small groups create a comic strip poster of the innovation.

Project the Matchstick Comic Strip example, and discuss the parts of the strip that they will be required to include in their own posters. Teams must include at least three and no more than four frames. Above or below each frame should be a short, 1–2 sentence caption explaining what is going on in the illustrations:

- Frame 1: Illustrate what the innovator was trying to do. Include details to suggest the setting like the laboratory in this example.
- Frame 2: Illustrate what “went wrong.” Include speech balloons if you'd like to show the inventor's reactions.
- Frame 3/4: Illustrate how this mistake became a success. This can be the inventor realizing what he or she has done or a different scene, showing the product in use.

Provide each team with poster board and have them use their research to design a 3-4 frame comic strip illustrating how this innovation came to be. Have students attach the object (or a photo of one) on the poster. Display all of the posters around the room or in the school hallway.

5. Have the whole class do a poster walk.

Have students walk around the displays and explore the posters, learning the stories of these “Failures that Succeeded.” When everyone has had time to fully explore the posters, have students vote on their favorite failure-to-success story.

6. Debrief the activity.

Invite students to share their favorite “failure to success” stories from the activity. Ask:

- *What is the main reason that you voted for that story?* (Possible responses: they like and/or use the product themselves, they enjoyed the story behind the invention, they were inspired by the way the inventor turned a mistake into a success or showed perseverance, and so on.)
- *How do the stories we’ve explored today highlight what Thomas Edison said in the quotation written on the board? What would have happened if these inventors had given up, or if no one else came along to see the possibilities in the mistakes that were made?*
- *What would the world be like today if nobody ever made a mistake? Do you think we would be enjoying chocolate chip cookies or Microwave ovens?*
- *How do these stories serve as a lesson for the rest of us to live by?*

7. Have students write an opinion statement essay of at least three paragraphs. First share the essay prompts:

- How can failure sometimes point the way to success?
- Is failure a critical part of achieving success?
- Does every success story include someone with grit and perseverance driving the experience?
- Explain your reasoning and provide examples to support it. How does your opinion relate to the Thomas Edison quote, “Many of life's failures are people who did not realize how close they were to success when they gave up”?

Project and discuss the Opinion Statement Rubric so that students know on what criteria their essays will be assessed (statement of purpose [opinion], adherence to all three questions in the writing prompt, as well as general writing skills like logic and organization).

Tip

Allow students with experience using Photoshop, PowerPoint, or other graphics software to design and create their comic strips on the computer and print them for the poster walk.

Modification

For a shorter activity, create a study sheet of the stories about each innovation and have students focus their efforts on creating the comic strip instead of the research.

Tip

Have older students investigate the validity of the Failures to Success stories they find online. Some stories are told differently in different sources and some may be exposed as myths. Have them add a paragraph to their comic strips explaining how the story, although possibly not authentic, still stands

as a model for perseverance.

Informal Assessment

Observe students during class discussions and teamwork, and informally evaluate their final projects to determine if the comic strip told a story of failure leading to success. Evaluate the comic strip on a 5-point scale, reflecting how it met the requirements you described:

- (2 points) Includes 3–4 frames with captions that describe the illustration
- (3 points, 1 for each part of the story) Includes what the inventor was trying to do; what went wrong; how success came out of the failure.

Use the Opinion Statement Rubric to assess the opinion statement essay.

Extending the Learning

- (For Grades 10–12) Another innovation in world history in which perseverance and failure played a major role was the atomic bomb that was developed during World War II. Have students research and report on the supposed failures surrounding the invention of the atomic bomb. Students should use libraries and the Internet to find their information about the story of this innovation, and provide evidence of the reliability and validity of their sources. Ask students to explain what role failure played in the development of the atomic bomb.
- (For younger students) “I get knocked down, but I get up again.”¹ Research songs that promote the trait of perseverance. Choose one song and analyze the lyrics as they are related to the work of the scientists and innovators that were explored in this activity. What message is the song trying to convey to the listener?

1. Refrain from “Tubthumping,” by Chumbawumba. EMI Records, 1997.

Objectives

Subjects & Disciplines

Language Arts

- Reading
- Storytelling
- Writing (composition)

Science

- Engineering

Social Studies

- United States history
- World history

Learning Objectives

Students will:

- research the story of an American innovation that was developed or discovered as the result of mistake or failure
- create a three- or four-panel comic strip to share the story of this innovation with others, and

review his or her own comic

- develop and write an opinion about the importance of failure to achieving success

Teaching Approach

- Learning-for-use

Teaching Methods

- Cooperative learning
- Discussions
- Information organization
- Research
- Storytelling
- 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
 - Critical Thinking and Problem Solving
- Critical Thinking Skills
 - Analyzing
 - Creating
 - Understanding

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.

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

- **World History Era 8 (5-12) Standard 2:**

The causes and global consequences of World War I

Common Core State Standards for English Language Arts & Literacy

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

Key Ideas and Details, RI.11-12.1

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

Key Ideas and Details, RI.6.1

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

Key Ideas and Details, RI.7.1

- **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.9-10.1

- **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

- **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

- **Writing Standards 6-12:**

Text Types and Purposes, W.6.1

- **Writing Standards 6-12:**

Text Types and Purposes, W.7.1

- **Writing Standards 6-12:**

Text Types and Purposes, W.8.1

- **Writing Standards 6-12:**

Text Types and Purposes, W.9-10.1

- **Writing Standards 6-12:**

Text Types and Purposes, W.11-12.1

Preparation

What You'll Need

Materials You Provide

- Paper
- Colored markers or pencils
- Pencils
- Pens
- Posterboard (1 per team)
- Some examples or photos of innovations like Silly Putty, Post-It Notes, Scotchgard Carpet and Upholstery Protector, Penicillin, a Slinky, a Microwave oven, potato chips, or Saccharin artificial sweetener

Required Technology

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

Physical Space

- Classroom
- Computer lab

Grouping

- Large-group instruction
- Small-group work

Other Notes

Before conducting the activity, gather items or images of items including Silly Putty, Post-It Notes, Scotchgard Carpet and Upholstery Protector, Penicillin, a Slinky, a Microwave oven, potato chips, or Saccharin artificial sweetener.

Resources Provided: Handouts & Worksheets

- [Failures that Succeed](#)
- [Opinion Statement Rubric](#)

Resources Provided: Images

- Matchstick Comic Strip

Background & Vocabulary

Background Information

Perseverance is an important skill to teach students today. In a world of instant gratification, where the Internet provides answers to all questions at the click of a mouse, video games simulate real life, and social networking sites like Facebook and Twitter take the place of investing time to create real relationships, the ability to stick with something even when the going gets tough seems to be disappearing. As Steve Jobs once said, "I'm convinced that about half of what separates the successful entrepreneurs from the non-successful ones is pure perseverance."

One way to encourage the trait of perseverance is to reframe the idea of failure as iteration. *Iteration* is defined as the process of repeating a task or operation again and again, each time coming

successively closer to a desired result. When failure is thought of as iteration, it becomes simply a part of the process, a series of setbacks and wrong turns rather than mistakes. These setbacks become acceptable because the process feels purposeful—the innovator learns from every occurrence. We need to encourage students to think like Thomas Edison, who said, “I have not failed 10,000 times. I have not failed once. I have succeeded in proving that those 10,000 ways will not work.”

Sharing the stories of innovators celebrated in the National Geographic Channel series *American Genius* will help to make this point. The history of innovation is filled with stories of perseverance, making this topic the perfect opportunity to share the value of grit and perseverance with students.

Prior Knowledge

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Recommended Prior Activities

- None

Vocabulary

Term	Part of Speech	Definition
failure	<i>noun</i>	lack of success.
grit	<i>noun</i>	courageous and tough character.
innovation	<i>noun</i>	something new.
perseverance	<i>noun</i>	consistent effort despite any setback.

Partner



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