

Scientist Stories

Grade Levels: 6-12

Duration: 60 min

PRESENTED BY



Learners will reflect on the stories of a diverse set of scientist role models, helping them to connect with science careers and recognize the qualities they share with scientists.



Outline

Frame the Activity	20 min total
Activate Prior Knowledge	5 min
Brainstorm: Qualities of a Scientist	10 min
Introduce the Activity	5 min
Activity	40 min
Investigate	15 min
Share	15 min
Reflect	10 min

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Concepts/Skills

Role models, careers, Innovator Mindsets

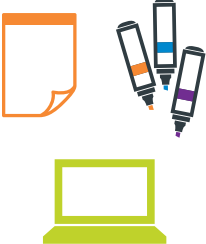
Objectives

Students will:

- Explore their preconceived notions of the qualities or traits scientists need to possess.
- Watch Scientist Stories videos and discuss in small groups the qualities and traits of a scientist that stood out.
- Reflect on the scientists' qualities that they identify with and ones they would like to develop.

Materials and Preparation

Materials

Videos	Materials
<ul style="list-style-type: none"> □ Scientist Stories video series (save link to share with students) There are several scientists with three 1-2 minute videos each: <ul style="list-style-type: none"> • <i>About Me</i> • <i>What I'm Working On</i> • <i>What I'm Discovering</i> 	<ul style="list-style-type: none"> □ Chart paper (6-8 sheets) □ Markers (2-3 for each sheet of chart paper) □ Large whiteboard or chart paper □ Devices to watch videos (1 per group of 3-4 learners) □ Scientist Stories Handout (1 per learner) 

Preparation

1. Set up chart papers/posters around the space with 2-3 markers at each station.
2. Watch the videos yourself or with other educators and consider how you would fill out the [Scientist Stories Handout](#).



Adaptations for Distance Learning

- Do the initial brainstorm **synchronously** using an **online word cloud generator** like Poll Everywhere. Create a second word cloud during sharing to capture the list of qualities generated by each group. Compare the two word clouds later in the activity.
- Groups can watch the videos and take notes **asynchronously** or watch and discuss the videos **in breakout rooms**.
 - If unable to do small groups, share the *About Me* videos for all of the scientists with the whole class.

For more tips on adapting Design Challenges to a virtual setting see our [Educator Tips for Remote STEM Learning](#).



Tech Tips

See our [educator guides and videos](#) for more design challenge facilitation techniques.

For this lesson check out:

- [Innovator Mindsets](#)

Many of the qualities of a scientist that students will identify in this lesson are Innovator Mindsets. Incorporate some of the strategies for reinforcing these mindsets into your closing debrief and extensions.



Background Information

The [Solve For Earth](#) exhibition at The Tech Interactive explores the connections between technology and living sustainably on Earth. **Solve For Earth** features the work of scientists who are figuring out how Earth systems function and what impact humans are having on those systems. The exhibition also highlights the personal stories of scientists, so that students (and adults) can better understand what inspires these scientists and what they do in their work. Each scientist in The Tech’s [Scientist Stories](#) video series has three videos: *About Me*, *What I’m Working On*, and *What I’m Discovering*. Put together, these videos share the spirit of innovation and act as sources of inspiration for learners to determine their own paths.



Frame the Activity

Activate Prior Knowledge (5 min)

1. Let learners know that today they will be exploring what it means to do science and be a scientist by looking at the personality traits and qualities that scientists possess and most value.
2. Use one of these **Guiding Questions** to start the conversation.
 - *Who uses science in their work?*
 - *What is a scientist?*
 - *What does it mean to “do science”?*
3. Invite learner responses and lead a short discussion about the term “scientist” and the types of work that scientists do.
4. During the discussion, point out:
 - The simplest definition of a scientist is *someone who does science*.
 - To “do science” means to explore the natural and physical world through observation and experimentation (research). Although this activity focuses on career scientists, it’s important to note that there are many ways to participate in science. *For example*, there are many [community science projects](#) that hobbyists all over the world participate in.
 - Professional scientists do their work in a variety of ways.
 - Their research can take them to all kinds of places: natural spaces like forests or oceans, indoor labs (on earth or in space) or even a combination of settings. Similarly, their work may be done as part of a small team or a piece of larger scientific collaborations.
 - In addition to research, scientists are essential to developing processes and policies that can improve our communities (environmental policy, public health and the creation of new technologies).
 - A critical component of participating in science is sharing one’s discoveries and findings with others. (**Note:** This is also a strong part of the [Innovation Design Process](#).) Some scientists, like Solve for Earth curator and electrical engineer Dr. Michelle Maranowski, even work in communication or education full time.

Note: Scientist vs. Engineer

Science and engineering each represent initials in STEM (Science, Technology, Engineering and Math), and both have essential roles in advancing society through research and new technology.

- *Scientists* expand our knowledge of the natural world through observation, experimentation and analysis.
- *Engineers* apply math and science to design, create and analyze structures, gadgets and systems.

This activity focuses specifically on scientists, but it's important to note that the traits and qualities which are important to being successful in science apply to engineering as well!



Brainstorm: Qualities of A Scientist (10 min)

1. Next, lead learners through a brainstorm to explore their own assumptions about the types of work scientists do and the qualities of scientists.
2. Ask the class to name some examples of types of scientists, scientific careers or scientific work. *For example:* biologist, chemist, microbiologist, geologist, laser technician, food safety inspector, park ranger, dietitian or nutritionist.
 - Record the types of scientists/work/careers that learners mention and post where everyone can see them.
 - Encourage students to share a quick sentence about what they know about the work of that type of scientist.
 - When needed, help students identify or research the names for specific types of scientists/careers.
 - If students bring up types of engineers you can add them to your list as well. See the **Note** regarding the distinction between scientists and engineers.
3. Once you have a list of 5-10 examples, tell students that they will now brainstorm the traits or qualities of a scientist.
 - Choose 4-5 types of scientists from your list and write each one on the top of a different sheet of chart paper or poster.
4. Place the chart papers and markers around the space.
5. Ask learners: *What qualities do you think these different scientists would need to have?*
6. Tell learners they have 5 minutes to write all the words they would associate with that category on the chart paper.
 - Challenge the learners to write on at least three different posters within the allotted time. Ask them to stick with single words or 2-3 word phrases.
 - Instead of repeating words or phrases, they should add a star next to existing words.
 - For larger classes where crowding around one poster may be an issue, consider putting out two chart papers for each science discipline.
 - You can also have learners write the qualities on sticky notes at their desks, then place them on the chart papers. (See pg 6 for word cloud and drawing **Adaptations**.)
 - Provide time warnings to help learners visit as many posters as possible.

Example:

Biologist	Chemist	Oceanographer	Physicist
Detail-oriented Perseverant ★★ Patient ★ Passionate	Likes mixing things Likes explosions ★★ Experimental Intentional	Adventurous Loves the outdoors ★ Swims	Curious Experimental ★★★ Purposeful

7. After 5 minutes, ask learners who are near the posters to call out what was written, including how many stars the word/phrase had, if any.
 - Record the starred qualities to a list where everyone can see them.
 - Save this list so that learners can return to it later in the lesson.
8. Note that this is the class's current understanding of what qualities they think scientists should have.
 - It is possible that some of the qualities and attributes that learners list fit into typical stereotypes of scientists or negative traits (ex: loner, evil genius, lab coat with white hair). Rather than examine these assumptions at this time, revisit them at the end of the lesson and debrief them as a class at that time.



Content Connection

Deepen learners' understanding of STEM careers with some of the following options:

- **Brainstorm:** During the initial brainstorm, help learners think about some of the specific disciplines and sub-disciplines of study.
 - Group the scientists listed into categories with specialized disciplines.
(Ex: *geneticist* would go under *biologist*).
 - Sub-disciplines can also go under more than one header if needed.
(Ex: *Geochemist* could go under *chemist* or *earth scientist*)

Biologist	Chemist	Earth Scientist	Engineer	Physicist
<i>Microbiologist</i>	<i>Pharmacologist</i>	<i>Geologist</i>	<i>Civil engineer</i>	<i>Atomic physicist</i>
<i>Geneticist</i>	<i>Toxicologist</i>	<i>Meteorologist</i>	<i>Aerospace engineer</i>	<i>Quantum physicist</i>
<i>Zoologist</i>		<i>Oceanographer</i>	<i>Chemical engineer</i>	<i>Astrophysicist</i>

- **Investigate:** Have learners research the specific careers of the scientist they are profiling and learn more about what someone would have to study and do to pursue a similar career.
- **Personal Passions:** After the lesson, have learners use career exploration sites like the ones listed here to learn about careers that might align with their own qualities and interests.

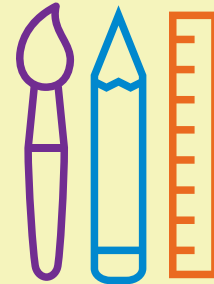
Career Resources

- Career sites with profiles and videos about a variety of fields including STEM:
 - [Roadtrip Nation: Explore Careers](#)
 - [Discover Engineering: Engineering Careers](#)
 - [Science Buddies: Science and Engineering Careers](#)
- Role models and career information for girls and young women in STEM:
 - [Career Girls: STEM Careers](#)
 - [Engineer Girl](#)
 - [If/Then Collection for Educators](#)
- State and government resources can provide local information on salary and links to colleges and areas of study.
 - [California Career Zone](#)
 - [Career One Stop: Explore Careers](#) (US Department of Labor)
 - [My Next Move](#) (O-Net)



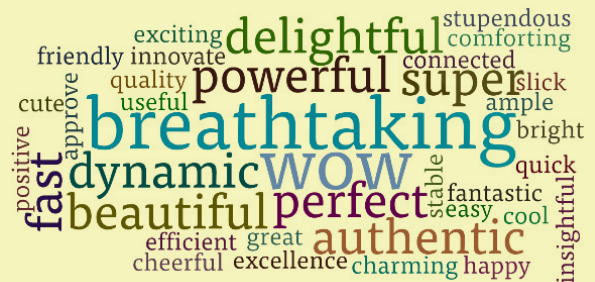
Adaptation: Drawing

- Instead of writing down words on posters, ask learners to draw what they think of when they picture a scientist.
 - Ask a few learners to share out. While they share, draw and/or write down what they describe on the whiteboard, marking if certain qualities show up repeatedly.
- At the end of the activity, learners can redraw their scientists and discuss how their perception of their qualities changed.



Adaptation: Word Cloud

- Have students fill out their responses to the qualities using an online tool like Poll Everywhere or another word cloud generator.
- Instead of creating different word clouds for each discipline, have learners respond sequentially to the same word cloud.
 - *For example:* They can first input all the qualities they associate with a chemist, and then a biologist. Make sure to repeat terms if they think they apply to more than one discipline.
- Create a second word cloud during share out to capture how their thinking evolved.



Word cloud tools generate text images showing the most frequently used terms.



Introduce the Activity (5 min)

1. Now that learners explored their own assumptions, it's time to examine how scientists think about themselves and their work.
 - Explain to learners they are going to further examine what it means to be a scientist by hearing a few scientists tell the stories of their lives and work.
2. Introduce the [Scientist Stories videos](#) and let them know each group will be watching a three-video series from one of the scientists, including *About Me*, *What I'm Working On*, and *What I'm Discovering*. Each video will be about 1-2 minutes long.
3. Organize the learners into groups of 3-4. Assign each group a device and a scientist.
4. Pass out the [Scientist Stories Handout](#) to each learner.

Activity



Investigate (15 min)

1. Have each group of learners watch and discuss their scientist's videos.
2. Groups should fill out their [Scientist Stories Handouts](#) and identify the qualities that have helped these people become scientists.
3. Encourage learners to consider qualities they notice the scientists exhibiting in their work or conversation in addition to how they describe themselves. *For example:* If the scientist talks persistently about how they overcame a problem, learners could identify *perseverant* as a quality.
4. If learners need help thinking of qualities, have them consider:
 - *What qualities does this scientist mention as important?*
 - *What skills or qualities did they develop?*
 - *What qualities do you notice in them?*



Share (15 min)

1. Once each group has watched the videos and listed a set of qualities, bring the class back together.
2. Have each group share out:
 - The name of the scientist whose videos they watched
 - The discipline of science they study
 - What scientist qualities they identified from the videos
 - Why these qualities stood out
 - The evidence they saw for that trait
3. Record their observations on the whiteboard or chart paper as they present.
 - Results will vary, but some themes should appear multiple times. Star the repeated qualities to show how often they were mentioned (or use the word cloud adaptation).
 - If learners do not mention them, ask about qualities that are critical for seeking and discovering new information like curiosity, wonder, excitement, passion, purpose, etc.
4. After all the groups have shared, bring the first master list from the initial brainstorm back up and ask the learners to compare the two lists.
5. Have the class discuss with some of these **Debrief Questions:**
 - *Are there qualities that appear on both lists? How do the lists differ?*
 - *Do any of the qualities from the second list surprise you? Why?*
 - *Could any of the qualities on the second list be used to describe other people in your life? Which ones?*



Scientist Stereotypes

- Often learners have perceptions of scientists from movies and cartoons. This male, loner/evil genius persona can affect how they view scientists, and whether they see themselves as someone who can or should become a scientist. As they reflect on the activity, guide them to see qualities of scientists that they can relate to as well as those that reflect their own experiences.
- Similarly, it may help to remind them that the interests and journeys that bring people to a career path are not always straightforward or predictable.
 - *For example:* Oceanographers might get seasick or work in Colorado far from the sea. A dairy farmer might study computer science after working with technology that regulates their cows' milking schedule.



Reflect (10 min)

1. Have learners consider how these ideas about the qualities of a scientist relate to them personally.
 - *Could any of the qualities be used to describe you?*
2. Have learners flip over their [Scientist Stories Handout](#) and complete the Reflection section on the back side.
3. First, share the quote from Solve for Earth curator and scientist Dr. Michelle Maranowski and get their initial impressions.
 - *“If you have a question, you are already a scientist. It starts small. It’s really about the excitement and wonder of answering a question.”*
4. Then have learners complete the reflection individually by taking notes on a few of the qualities that they identify with and one(s) they want to develop.
 - Learners could also consider what steps they could take to develop these key qualities.
5. Ask learners to share their reflections with the class if time allows.



Extension: Interview a Role Model

- Ask learners to find a role model to interview. This can be a family member, a family friend or professional working in an area of interest to them.
- Have learners ask what traits their role model has found key in their work/career. Encourage learners to share WHY they consider this person a role model and ask how they developed these traits.
- Encourage learners to reflect on how their interviewee exhibits some of the qualities of a scientist and how they use them in their lives.

Interview and Oral History Resources

- Review the following resources for helping learners develop techniques for conducting interviews and oral history projects.
 - [StoryCorps](#) has a number of sample interviews, DIY tips, the StoryCorps App and a StoryCorps Connect video conferencing tool.
 - Smithsonian Institution Archives has a number of resources on [How to Do Oral History](#), including sample interview questions.
 - For interesting stories about science through the lens of people across history, see this list of [Science Related Oral History Projects](#) from the Center for Oral History.

Standards Connections

Common Core State Standards: English Language Arts

Grades	Standard	Description
6	CCSS.ELA-LITERACY.SL.6.2	Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.
7	CCSS.ELA-LITERACY.SL.7.2	Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.
6-8	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.
11-12	CCSS.ELA-LITERACY.RST.11-12.7	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.

California Quality Standards for Expanded Learning

Active and Engaged Learning: Participants gather evidence to support their ideas and understand other perspectives.

California Career and Technical Education Standards

Grades	Standard	Description
7-12	CTE 3.1	Career Planning and Management: Identify personal interests, aptitudes, information, and skills necessary for informed career decision making.
7-12	CTE 3.2	Evaluate personal character traits, such as trust, respect, and responsibility, and understand the impact they can have on career success.
7-12	CTE 3.4	Research the scope of career opportunities available and the requirements for education, training, certification, and licensure.

Resources and References

1. *CitizenScience.gov*, www.citizenscience.gov
2. "Career Exploration That Starts With You." *Roadtrip Nation*, roadtripnation.com/explore.
3. "Engineering Careers." *DiscoverE*, 6 Jan. 2014, www.discovere.org/discover-engineering/engineering-careers.
4. "Science Careers." *Science Buddies*, www.sciencebuddies.org/science-engineering-careers.
5. "STEM Career Cluster." *Career Girls*, 12 Jan. 2021, www.careergirls.org/cluster/stem/.
6. "Homepage." *EngineerGirl*, www.engineergirl.org/.
7. *IF/THEN® Collection*, www.ifthencollection.org/educators.
8. "California CareerZone." *Announcements RSS*, www.cacareerzone.org/.
9. *CareerOneStop*, 26 Dec. 2014, www.careeronestop.org/ExploreCareers/explore-careers.aspx.
10. *My Next Move*, www.mynextmove.org/.
11. "The Conversation of a Lifetime." *StoryCorps*, storycorps.org/participate/.
12. Niekrasz, EJ. "How to Do Oral History." *Smithsonian Institution Archives*, 7 May 2020, siarchives.si.edu/history/how-do-oral-history.
13. "Science-Related Oral History Programs/Projects." *Links to Science-Related Oral-History Programs/Projects | Science History Institute | Center for Oral History*, oh.sciencehistory.org/oral-histories/links-to-science-related-oral-history-programs-projects.

Student Handout

Title	Page
Scientist Stories Handout	11

Name:

Date:

Scientist Stories



Part 1: Scientist Profile

Create a profile on the scientist in the video series by answering the questions below.

Scientist's name:

What discipline of science do they study?

How did they view science in their youth?

What inspired them to pursue a career in science?

Record the qualities they value as a scientist as well as the ones you notice them using.



Part 2: Reflection



“If you have a question, you are already a scientist. It starts small. It’s really about the excitement and wonder of answering a question.”

— Michelle Maranowski, Ph.D., electrical engineer and curator of Solve for Earth exhibition, The Tech Interactive

After watching the videos, what does this quote mean to you?

Think about the scientist qualities the class discussed today.

What scientist qualities do you identify with? Why?

What scientist qualities would you like to develop more deeply?