NATIONAL GEOGRAPHIC

RESOURCE LIBRARY
ACTIVITY : 45 MINS

Developing Our Germ-Stopping Solutions

Students learn the next step of the engineering design process—plan by selecting a solution—and reflect on an unsuccessful attempt at trying something difficult. They read and discuss a children's book about overcoming obstacles, like *Rosie Revere, Engineer* by Andrea Beaty. In groups, students review their research and proceed with their best solution.

GRADES

1, 2

SUBJECTS

Biology, Health, Engineering

CONTENTS

1 PDF

OVERVIEW

Students learn the next step of the engineering design process—plan by selecting a solution—and reflect on an unsuccessful attempt at trying something difficult. They read and discuss a children's book about overcoming obstacles, like *Rosie Revere, Engineer* by Andrea Beaty. In groups, students review their research and proceed with their best solution.

For the complete activity with media resources, visit:
http://www.nationalgeographic.org/activity/developing-our-germ-stopping-solutions/

Brought to you by

Lysol

DIRECTIONS

This activity is part of the *Germ Problem-Solvers: Using Engineering to Develop Solutions* unit.

1. Introduce the next step of the engineering design process—plan by selecting a solution—by reading and discussing a children's book about overcoming obstacles, to prepare students for selecting a possible germ-stopping solution.

- Remind students of the driving question of the lesson (How can we design something that keeps germs from spreading?), the final product of the unit project (to design a tool or product that helps keep germs from spreading), and the problem(s) they are trying to solve.
- Introduce the fourth step of the engineering design process—plan by selecting a solution—by showing students the *Engineering Design Process* poster from Teach Engineering.
- Ask students to think about a time when they tried something difficult and were not successful. Ask students to share that experience with their neighbor or in their small group.
    - Assure students that this is a common feeling in the engineering process, and this step that we are tackling today—plan by selecting a solution—is typically the hardest!
- Introduce a text, such as *Rosie Revere, Engineer* by Andrea Beaty, or a similar story in which a child learns a lesson about engineering from the people in the child's life.
    - Ask students to pay attention to:
        - How Rosie felt throughout the story in response to obstacles and successes.
        - What Rosie learned about engineering.
    - Read the story aloud or show the video *Rosie Revere, Engineer (Read Aloud) by Andrea Beaty* (6:49).
    - Lead a class discussion using the following questions:
        - *How did Rosie feel when she made something for her uncle Fred?* (She was embarrassed and unsure whether he liked her invention or not.)
        - *How did Rosie feel when she made something for her great-great aunt Rose?* (She was embarrassed that her invention crashed and felt like a failure/wanted to give up.)
        - *What lesson did Rosie learn about engineering from her aunt?* (It's a perfect first try! The only failure is quitting.)

- Let students know that they will apply what they learned about engineering from Rosie to their work in the next step.

2. Facilitate project groups' work on selecting the best solution by providing guiding questions and discussing constraints.

- Share these questions with students to guide their thinking about their solution:

  - *What do we want to design?*
  - *Who is it for?*
  - *What problem are we solving?*
  - *What are the project requirements?*
  - *What are the limitations?*

    - You may need to explain what limitations or constraints are. You might say: *Some examples of constraints or limitations could be money, time, or type of materials. For example, if you were shopping for a birthday gift for your cousin, your constraints might be how much you had to spend, the stores you could shop from before your cousin's birthday, your cousin's age, and your cousin's interests. Limitations help make your solution successful for your context. Let's say your solution is to make hand sanitizer more widely available in your school. One limitation might be HOW MANY dispensers you could have installed. Placing one dispenser every foot would cost a lot of money and probably wouldn't be necessary! However, having a dispenser at the school entry way, one in each classroom, and one before entering the library, office, or cafeteria would be working within the constraints that might limit your design.*

  - *What is your goal? How does your solution help slow the spread of germs that make us sick?*

- Distribute and review the *Selecting a Solution* handout to each student. Help students locate their *Brainstorming Solutions* handout from the previous activity, *Sick Solutions*. Have students work in their project groups to review their previous thinking and discuss their ideas. Students should compare their best ideas using the sentence starters in the *Selecting a Solution* handout and make plans to move forward with one solution per project group. Each student should complete the *Selecting a Solution* handout with their team.

- Let students know that in the next activity, *Designing Our Products*, they will be finishing their solution designs.

Informal Assessment

Class Discussion: Use class discussions to assess students' ability to participate in collaborative conversations in which they demonstrate understanding of key details in a text.

Selecting a Solution Discussion: Use the *Selecting a Solution* small group discussions to evaluate students' ability to follow agreed-upon rules for discussions and build on others' talk in conversations.

Selecting a Solution Handout: Use the *Selecting a Solution* handout to assess students' ability to ask questions, make observations, and gather information about a problem that can be solved through the development of a new or improved object or tool (K-2-ETS1-1), as well as their ability to develop a simple sketch of their tool or product (K-2-ETS1-2).

Extending the Learning

Conduct a focus group or expert review after students select their best solution in their groups or before they make their choice to help students understand the audience and limitations for the solution.

OBJECTIVES

Subjects & Disciplines

Biology

- Health
- Engineering

Teaching Approach

- Project-based learning

Teaching Methods

- Cooperative learning
- Discussions
- Reading

Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
  - Learning and Innovation Skills
    - Communication and Collaboration
    - Creativity and Innovation
    - Critical Thinking and Problem Solving
  - Life and Career Skills
    - Social and Cross-Cultural Skills
- 21st Century Themes
  - Health Literacy
- Critical Thinking Skills
  - Analyzing
  - Applying
  - Creating
  - Evaluating
- Science and Engineering Practices
  - Constructing explanations (for science) and designing solutions (for engineering)
  - Obtaining, evaluating, and communicating information

National Standards, Principles, and Practices

COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS & LITERACY

• **CCSS.ELA-LITERACY.RI.1.1:**
Ask and answer questions about key details in a text.

- **CCSS.ELA-LITERACY.RI.2.1:**

Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.

- **CCSS.ELA-LITERACY.SL.1.1.A:**

Follow agreed-upon rules for discussions (e.g., listening to others with care, speaking one at a time about the topics and texts under discussion).

- **CCSS.ELA-LITERACY.SL.2.1.A:**

Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion).

NEXT GENERATION SCIENCE STANDARDS

- **K-2-ETS1-1:**

Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

- **K-2-ETS1-2:**

Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

Preparation

What You'll Need

REQUIRED TECHNOLOGY

- Internet Access: Optional
- Tech Setup: 1 computer per classroom

PHYSICAL SPACE

- Classroom

GROUPING

- Heterogeneous grouping
- Large-group instruction
- Small-group work

Background Information

The engineering design process is a series of steps that engineers go through to solve a problem. The fourth step—plan by selecting a solution—includes revisiting needs, constraints, and prior research. In order to design a successful solution, engineers (and students!) have to account for constraints and limitations. In this activity, students collaboratively select the best solution for how to stop the spread of germs to solve a specific problem for a specific context.

Prior Knowledge

[]

Recommended Prior Activities

- Feeling Yucky
- Getting Rid of Gross Germs
- Getting to Know Germs
- Invisible Villains
- Sick Solutions

Vocabulary

TermPart of SpeechDefinition

For Further Exploration

Articles & Profiles

- Teach Engineering: Engineering Design Process

© 1996-2021 National Geographic Society. All rights reserved.