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ACTIVITY : 45 MINS

Designing Our Products

Students learn the rest of the engineering design process. After becoming familiar with the final product of the unit project, project checklist, and project rubric, students work in their groups to finalize their drawing or design of their tool or product that will keep germs from spreading.

GRADES

1, 2

SUBJECTS

Biology, Health, Engineering

CONTENTS

2 PDFs

OVERVIEW

Students learn the rest of the engineering design process. After becoming familiar with the final product of the unit project, project checklist, and project rubric, students work in their groups to finalize their drawing or design of their tool or product that will keep germs from spreading.

For the complete activity with media resources, visit:
http://www.nationalgeographic.org/activity/designing-our-products/

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DIRECTIONS

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

1. Connect to the engineering design process and final product of the unit project to prepare students for planning their solutions to keep germs from spreading.

- Remind students of the driving question of the lesson (How can we help our community by designing a germ-stopping solution?), the final product of the unit challenge (to design a tool or product that helps keep germs from spreading), and the problem(s) they are trying to solve.
- Introduce the rest of the engineering design process by showing students the *Engineering Design Process Cycle Graphic.*
- Explain to students that in this unit, they won't fully see through this process since they won't create a prototype, test the prototype, nor improve and redesign their solutions, but they will continue planning their solutions by fully sketching them out and describing them.

2. Provide resources to support students as they create their final products for the unit project.

- Distribute and introduce the *Project Checklist and Rubric*. Review both parts of the document to highlight the different pieces that students will need to complete for their final product and how they will be assessed.
- Distribute the *Final Product* handout. Review the parts of the handout with students:
    - What problem they are solving (and the who/what/where/when/why/how of the problem)
    - Their solution (described in words and labeled drawings)
    - How their solution will solve the problem and slow the spread of germs that make us sick
- As students work in their project groups, prompt them to use their handouts from previous activities to inform their work. Circulate throughout the room to ensure students are adding appropriate detail and using evidence from previous activities as they explain their design solution.
- Let students know that in the next activity, *Sharing Our Solutions*, they will be presenting their solutions.

Informal Assessment

Project Group Discussion: Use students' small group discussions in Step 2 to evaluate students' ability to follow agreed-upon rules for discussions and build on others' talk in conversations.

Final Product Handout: Use the *Final Product* handout and students' collaborative discussions 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

In addition to the questions listed on their *Final Product* handout, consider asking students how people will feel 1) using their solution and 2) knowing they will keep more people safe. This can connect the beginning and end of the unit with a focus on feelings.

Other options for extensions include a peer review of solutions or creating, testing, and redesigning prototypes of their solutions. Students could progress all the way through the engineering design process and bring their solutions to reality, as time and feasibility permits!

OBJECTIVES

Subjects & Disciplines

Biology

- Health
- Engineering

Teaching Approach

- Project-based learning

Teaching Methods

- Cooperative learning

- Discussions
- Writing

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
    - Productivity and Accountability
    - Social and Cross-Cultural Skills
- 21st Century Themes
  - Health Literacy
- Critical Thinking Skills
  - Analyzing
  - Creating
  - Evaluating
- Science and Engineering Practices
  - Analyzing and interpreting data
  - Constructing explanations (for science) and designing solutions (for engineering)
  - Obtaining, evaluating, and communicating information
  - Planning and carrying out investigations

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).

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

Build on others' talk in conversations by linking their comments to the remarks of other's.

- **CCSS.ELA-LITERACY.W.1.7:**

Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions).

- **CCSS.ELA-LITERACY.W.2.7:**

Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations).

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 & VOCABULARY

Background Information

The engineering design process is a series of steps that engineers go through to solve a problem. In this lesson, students build out an explanation and sketch a model of their designs and solutions for how to stop the spread of germs.

Prior Knowledge

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Recommended Prior Activities

- Developing Our Germ-Stopping Solutions
- Feeling Yucky
- Getting Rid of Gross Germs
- Getting to Know Germs
- Invisible Villains
- Sick Solutions

Vocabulary

Term	Part of Speech	Definition
engineering design process	*noun*	series of steps that guides engineers as they solve problems.
limitation	*noun*	something that limits, controls, or reduces; a restrain
solution	*noun*	an answer to a problem.

For Further Exploration

Articles & Profiles

- Teach Engineering: Engineering Design Process

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