



CLASSROOM ACTIVITY

Creating Healthy, Sustainable Schools

OBJECTIVES

Students will be able to:

- **Identify and evaluate** components of community health
- **Identify and evaluate** components of green buildings
- **Analyze** the sustainability of their school community and create a design that improves upon its current state
- **Assess** another sustainability improvement design and apply constructive critiques in order to optimize their own **design**

OVERARCHING QUESTION

How can we improve the health of our school community?

ACTIVITY SUMMARY

Students will explore the components of sustainability, as applied to their school community. They will suggest ways in which the health of their school community could be enhanced, and they will ultimately create a plan for redesigning a section of their school in order to promote wellness among students, staff, and the environment.

MATERIALS

- Devices with internet access, enough for at least one-quarter of the class
- Notecards or scrap paper, about eight per student
- Designing Solutions Handout, one per student
- [Dimensions of Wellness](#) Table, one per student
- Copy paper, enough for about one-quarter of the class

CHALLENGE

1. **Two-Minute Brainstorm:** Divide the class into groups of four students and distribute a stack of notecards to each group. Ask: When you think of a healthy community, what comes to mind? Encourage students to write down as many factors that exemplify a **healthy community** as they can and record each factor on a separate notecard.
2. When two minutes are up, encourage the groups to categorize their brainstorming. In other words: if they were to form between two and four categories out of the terms they brainstormed, what would they be? Allow groups a minute to do this, and then encourage groups to share.
3. After several groups have shared their categories, summarize what you heard. Arrive at the conclusion that a healthy community must have both healthy citizens *and* a healthy environment.

4. Tell students that today they will be challenged to make one aspect of their school community more **sustainable**. Share the following definition of sustainability with the class: “Sustainability or sustainable development is development that meets the needs of the present, without compromising the ability of future generations to meet their own needs.” Explain that when a community is sustainable, it promotes and protects the health of its environment and its citizens. This ensure that the needs of people and the environment are being met today and will continue to be met in the future.
5. Distribute one Designing Solutions Handout to each student, and then elaborate on the challenge by reading aloud the bullets listed under *Step 1: Define the Challenge*. Explain that students will complete this challenge with the groups they just formed.
6. After answering questions, prepare student groups to perform research to better understand the challenge:
 - Pass out copies of the “Dimensions of Wellness” printout to each student and explain that this table will help them understand the various components of health.
 - Write this website on the board: epa.gov/fgc. Explain that the links listed under the *FGC Target Areas* header describe how federal agencies are trying to be more environmentally-friendly, and students may apply these suggestions to their school.
 - Explain that student groups will have about 10–15 minutes to perform research. At the end of the research period, each group should have a better idea of the factors that contribute to a healthy environment and healthy people. Encourage groups to divide the research responsibilities (e.g. two students can begin reading the article and two students can use devices to begin the internet research). Remind students to only take notes on information that may be relevant to the challenge.

DESIGN

1. Bring the class back together and explain that it's now time to begin developing a solution to the challenge. Call on a student to read the handout's *Step 2: Create a Design* section aloud.
2. Then explain that as groups consider possible design solutions, each group member will look at the challenge through the eyes of a specific career. Assign the following careers to one student in each group, and share the career description as you assign the roles:
 - **Environmental Engineer:** You help develop solutions to environmental issues, such as recycling, water pollution control, air pollution control, safe waste disposal, and public health!
 - **Sustainability Architect:** You design structures and landscapes that are environmentally-friendly and energy-efficient!
 - **School Counselor:** You advocate for students and help students with their emotional, social, behavioral, and mental health needs.
 - **School Nurse:** You also advocate for students. In addition to providing care to students, you work to promote a healthy and safe school environment.
3. Tell the class that they will have about 15 minutes to select one environmental factor and one human health factor that they want to improve in their school and develop a design solution. Quickly recap and encourage students to:
 - Use their background knowledge about their school community and their research notes to decide which factors to tackle.

- Think about the challenge from the perspective of their new career as they discuss possible solutions with their group.
- Use a separate piece of paper to sketch a draft of their proposed design once they have selected a health need and a sustainability need and brainstormed a solution.
- Be ready to explain and justify the rationale behind their design solution!

SOLVE

1. When there are about 10 minutes left in the class session, pair each student group with another student group. Explain that an important part of the engineering design process is the process of optimization, in which solutions are assessed and improved upon.
2. Explain that each group will share their design with each other. As they do, they must:
 - Share the human and environmental health areas that they identified as needing improvement and explain how their design accomplishes this.
 - Listen carefully to the other team's rationale from the role of your career, ask questions, and provide critiques and/or suggestions on how to improve the design. Critiques and suggestions should be rooted in research and/or background knowledge of the school community.
 - Remember that the ultimate goal of the solution is to create a space that promotes community health and sustainability!
3. Go on to explain that once both designs have been shared, groups should work together to complete the *Step 3: Analyze Solutions* portion of the handout and consider how to optimize their design. If time permits, they may re-draw their design in order to illustrate these optimizations.

STANDARDS

Next Generation Science Standards

- Earth and Human Activity
 - MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
- Engineering Design
 - MS-ETS1-1 Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
 - MS-ETS1-2 Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

ITEEA Standards for Technological Literacy

- Standard 8: The Attributes of Design Inquiry. In order to realize the attributes of design, students should learn that:
 - E. Design is a creative planning process that leads to useful products and systems.
 - F. There is no perfect design.
 - G. Requirements for design are made up of criteria and constraints.

STEP 1: DEFINE THE CHALLENGE

Your challenge is to:

1. Identify one way that student/staff health and wellness could be improved in your school community.
2. Identify one way that your school could be more environmentally-friendly.
3. Redesign an area of your school in order to improve both the health of students/staff *and* the environment. While money is not a concern, it must be a design that your school community would realistically use and enjoy!

Brainstorming and research notes that could help you tackle the challenge:

STEP 2: CREATE A DESIGN

Work with your group to select two community health focus areas (one human-focused and one environmentally-focused). Then use the space below to brainstorm how to redesign a section of your school to meet these needs. Once you are ready to create a draft of your re-design, work as a team to draw a model of your solution on a separate piece of paper.

STEP 3: ANALYZE SOLUTIONS

Think about the feedback your design received and consider how you could improve upon your design. Then work as a group to describe at least two design optimizations below: