



Drexel-SDP GK-12 ACTIVITY

Mean and Green

Subject Area(s): problem solving, reasoning & proof, science & technology

Activity Title: Mean and Green

Grade Level: 6 (5-12)

Time Required: 2- 1 hour periods

Group Size: 2 to 5

Expendable Cost per Group US\$0

Summary

Students become generally familiar with the design process through hands-on activities and lessons. They have experienced analysis, re-evaluation and re-design steps over and over, but before any of that happens engineers do feasibility studies. Before investing resources into perfecting a design, it is important to evaluate new ideas against a set of criteria. In this activity, students explore ways that their school could improve its carbon footprint by evaluating alternative methods to decrease its impact on the environment. Students will examine several areas of impact including building construction, energy use, human behavior and materials/supplies. After they have compiled a list of alternatives for their “Campus Green Initiative” they are asked to evaluate the feasibility of the alternatives in much the same way that engineers perform feasibility studies before implementing a project.

Engineering Connection

Feasibility studies are common in many fields, but especially in engineering. Before investing in time, money and man power into a project, engineers evaluate many alternatives. Some of the major factors they consider are technological and systems feasibility, operational feasibility, schedule feasibility, economic feasibility and legal feasibility. No matter how great an idea is, if it does not meet an established set of criteria it can not be designed or built.

Engineering Category

(#3) provides engineering analysis or partial design

Keywords

Design criteria, feasibility, evaluating alternatives, green, environmentally friendly

Educational Standards

PA State science: 3.27.B; 3.2.7.C; 3.2.7D

Pre-Requisite Knowledge

Students should be familiar with “green” initiatives in their communities and the world. If not, they should start this activity with a short film or video clip to improve baseline knowledge.

Learning Objectives

After this activity, students should be able to:

- Students should be able to define feasibility.
- Students should be able to explain why an alternative is or is not feasible.
- Students should be able to explain how engineers conduct feasibility studies.

Materials List

Each group needs:

- Paper and pencils
- Calculators
- Computers

Introduction / Motivation

Unless someone like you cares a whole awful lot, Nothing is going to get better. It's not. — Dr. Seuss, from **The Lorax**

There are many choices we make each day that affect the environment - we as individuals and as institutions, like our school. Our actions have a larger impact on the environment when we do them collectively. We all know why it is important to be “green.” Today we’ll look at ways that our institution can lessen its negative impact on the environment by making changes to its everyday workings. At the end of the exercise we will evaluate your ideas based on a set of criteria. When engineers need to make a decision about what project or design to implement, they do what’s called a feasibility study to make sure the project or design is doable within a set of constraints like how much it cost and how much time it will take to build. This is what you’ll be doing for each of you alternatives.

Vocabulary / Definitions

Word	Definition
feasibility	The capability of a proposed alternative to be done, effected, or accomplished
green	environmentally sound or beneficial

Procedure

With the Students

1. Allow students to access the website: <http://earthday.net/greenyourschool>
2. Give them 15 minutes to explore ideas in each section (Facilities; Curricula and Classroom; Food; Transportation; Recreation). This should stimulate their ideas. More or less time can be given based on their familiarity with the environmentally friendly alternatives

3. Have the students complete the “Green your School Worksheet.”
4. After each group has completed the worksheet, discuss the ideas as a class. Make a master list for each category and share it with the class.
5. Assign alternatives to each group. Have the group complete a feasibility assessment for each alternative. Answer the following questions for each alternative:
 - a. Would this alternative cost an exorbitant amount to implement?
 - b. Does this alternative require everyone in the school to participate for it to be successful or make an impact?
 - c. Would the school have to hire a technical expert to implement this idea or could students and teachers implement it?
 - d. Could this alternative cause any hazards to the safety of people in or around the school?
 - e. How much work would have to be done for this alternative to run smoothly? Would someone or lots of people have to monitor it daily, weekly, monthly?
 - f. How long would it take for you to get your alternative up and running?
 - g. How long will your idea last? Will the students in your class or school next year be able to continue?
6. Discuss the results as a class.

Safety Issues

None

Investigating Questions

How does each alternative help the environment?

Why do you need to know the answer to the feasibility questions for each alternatives?

Assessment

Post-Activity Assessment

Based on the reported results of the feasibility studies in each category, have the students rank the alternatives.

Activity Scaling

- For upper grades: Have students fully investigate their alternatives and give a report on the best idea in one of the categories.

References

Earth Day Network © 2009 Earth Day Network, 1616 P Street NW, Suite 340 Washington, D.C. 20036 , 202.518.0044 Available at: <http://earthday.net/greenyourschool>

Contributors

Jade Mitchell-Blackwood

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Supporting Program: Drexel University GK12 Program

Version: April 2010

Green Your School Worksheet

“Green Schools are the most effective agents for enacting significant positive environmental and educational change in schools and communities. School greening is quickly becoming more than a trend; rather, it is now the method of choice for providing healthy, comfortable and productive learning environments while saving energy, resources and money.”

“A green school improves the health and energy-efficiency of the school facility, ensures science-based environmental and civic education in the classroom, implements healthy food choices into the cafeteria, promotes alternative means of transportation, and expands recreational choices and opportunities for all students.”
(<http://earthday.net/greenyourschool>)

Think about your school and list some ideas in each category that would make your school greener.

Facilities/Building Construction

How is the building made? Does the building take advantage of its location? Does it allow adequate sunlight in the building during the winter but not too much in warmer months? Are your windows insulated? How is water conserved or not?

- 1.
- 2.
- 3.
- 4.
- 5.

Energy Use

How is energy used within the building? Is the building over heated in the winter? Do you have to open the windows? How do most students get to and from school?

- 1.
- 2.
- 3.
- 4.
- 5.

Human Behavior

Do students turn off lights and computers when they are not in use? Does your class recycle paper and plastics? Do you (even if the school doesn't provide facilities for you to do it)? Does the cafeteria provide local foods in its meals? Is there literature available to explain ways you can be greener like packing a “trashless” lunch?

- 1.
- 2.
- 3.
- 4.
- 5.

Materials/Supplies

Does your school use recycled paper and supplies? Does the cafeteria use Styrofoam and disposable paper products or reusable dishes? What kind of cleaning supplies do the janitorial staff use?

- 1.
- 2.
- 3.
- 4.
- 5.