



Bike Psych

60 – 90 minutes

In this lesson, students will focus on the benefits of bicycles as a form of sustainable transportation. After examining how much energy is used by the vehicles that typically transport us from one place to another, students learn about the way they can use their own pedal power to ease demand on fossil fuels and combat climate change. Students will map out safe bicycling routes to and from school to serve as a resource for the entire school community.

Objectives

- Students will identify the benefits of using bikes as opposed to gas-powered vehicles.
- Students will discuss guidelines for safe bicycling.
- Students will research different bike route maps and then create their own.
- Students will assess the sustainability of bicycling as a form of transportation.

Materials

- *Bike Psych Classroom Presentation*
- *Bike Psych Handout* (one copy for every student)
- Colored pencils
- Drawing paper (one piece for every two students)

Background

The U.S. Department of Energy estimates that over three-quarters of the fuel that goes into a vehicle is lost in the engine, wasted when idling, and used to power accessories. Of the fuel that is used to get the vehicle from one destination to another, the majority is used to move the massive weight of the vehicle. In fact, only about one percent of the fuel that goes into a vehicle is actually used to get the *driver* from one place to another. Bicycles, on the other hand, do not experience such energy losses, making them friendlier to our wallets and to our environment.

Advance Preparation

You will need computers with internet access for this lesson. Bookmark the following website for students: <http://maps.google.com/maps?f=d>.

Do Now

Ask students to guess what percentage of the fuel that people put into their vehicles is used to get the driver from one place to another. Solicit their guesses and write them on the board.



Mini-Lesson

1. Tell students that very little of the fuel that people put into their vehicles is actually used to get the driver from one place to another – only about one percent. Ask them to guess what happens to the rest of the fuel.
2. Explain to students that the class will demonstrate what happened to the rest of the fuel by following these procedures:
 - Have all students stand up. Tell them that they represent the total amount of fuel that goes into a vehicle.
 - Tell half of the students to sit down. Explain that the students who sat down represent the amount of fuel that is lost due to engine inefficiencies (the majority is exhaust heat).
 - Of the students that remain standing, tell half of those students to sit down. Explain that the students who sat down represent the amount of fuel that is lost due to other inefficiencies and waste, such as idling.
 - Of the students that remain standing, have all students but one sit down. Explain that the students who sat down represent the amount of fuel used to move the vehicle itself. Even some of this fuel is wasted with excessive braking or wind resistance.
 - Explain to students that the one student who remains standing represents the amount of fuel that is used to actually move the driver.
3. Debrief the exercise by asking the following questions:
 - What most surprised you about the fuel that goes into our vehicles?
 - What are the financial costs of this fuel waste?
 - What are the environment costs of this fuel waste?
 - What are the alternatives to using fuel-driven vehicles to move us around?
4. Explain to students that they are going to explore the option of bicycling as a more economically- and environmentally-friendly way to move our bodies to our desired destinations.
5. Project *Bike Psych Classroom Presentation*. Guide students through each of the slides. Encourage students to ask questions and share comments on the information in the slides.

Activity

1. Tell students that they are going to research and map safe bicycling routes to share with members of the school community interested in bicycling. Ask students how many of them currently bike and to share what destinations they commonly ride to. (**Note:** In communities where bicycling is not a feasible option, consider having students map out routes and propose necessary changes to make those route safe and enjoyable for bicyclers.)
2. Distribute copies of the *Bike Psych Handout* and have students review its recommended guidelines and information for safe bicycling.
3. Place students in pairs and assign each pair to a computer. Have them load the following page: <http://maps.google.com/maps?f=d>.



4. Once on the Google Maps home page, have students enter in their school address in the field labeled "A," and one of their home addresses into the field labeled, "B." For students who live too far from school to consider bicycling, have them instead enter in the address of a useful destination close to school, such as the public library.
5. Have students click on the bicycle icon at the top of the address fields, and then click on "Get Directions" below the address fields. A road map with a bicycling route will appear, along with step-by-step directions.
6. Tell pairs to examine the route and use the "drag to change route" function to try alternatives. Pairs should also examine the satellite version of the map to make sure the route they choose is the best option from a safety point of view. (**Note:** Be aware that this online tool does not always account for construction and other obstacles that may present safety issues for a particular route. The satellite view does help address this concern, but make sure you review proposed routes for potential safety concerns.)
7. Once pairs have finalized their bicycle route, give each pair a piece of drawing paper and tell them to draw out their route. They should include street names and any other important landmarks. Pairs should record the distance and annotate the route with any additional helpful directions. For example, they could draw the library and note, "If you pass the library, you are halfway there."
8. Monitor pairs as they work on the maps of their bicycle routes. Once maps are completed, have the class determine a way to share these with the rest of the school community. They might post them on a website, create a bulletin board, or present them to different classrooms.

Assessment

Have students make a list of the personal, financial, and environmental benefits of bicycling. Then, have them write two or three sentences on why bicycling is a more sustainable transportation option than fuel-driven vehicles.

Modifications

- Pre-teach unfamiliar vocabulary concepts to **English Language Learners**. Give them a list of important words from the lesson and have them work with a partner to create an illustrated glossary of terms. Each term should include a definition and a simple visual. Consider the following terms for this lesson: efficiency, energy loss, sustainability.
- Create a visual diagram, such as a pie chart, in the Mini-Lesson to support **Students with Special Needs**. Use the approximate percentages outlined in the procedures for Step 2 of the Mini-Lesson.
- Introduce the concept of embodied energy to **Advanced Learners** when discussing energy losses during the Mini-Lesson. Using the vehicle as an example, consider having students research to determine the amount of embodied energy in other products. Then have students rank their products on a spectrum from "Most Embodied Energy" to "Least Embodied Energy."



Extensions

- Extend this lesson by having students research the alternatives to traditional gasoline fuel, such as natural gas or recycled cooking oil. Students might begin their research at this website: <http://www.afdc.energy.gov/afdc/fuels/index.html>.
- Extend this lesson by having students organize an "I Bike To School" day for the school community. After arranging a date with the administration, students could plan for any number of activities to raise awareness for bicycling. These might include a bicycling challenge, a bicycle safety demonstration, guest speakers, a bicycle maintenance workshop, and so on.