

KEEP Energy Infusion Plan - Social Studies Links

Lesson Title: Automobile Alternatives: Beyond the Gas Guzzler

For the majority of the people who reside in the United States, automobiles are a necessity. Automobiles serve as a determining factor in our lifestyle, including the decisions of where we live, work and shop. A large portion of our income is reserved for gasoline, car maintenance and paying the loans and leases for our vehicles.

As the number of automobiles throughout the United States and the world climb, as well as the daily usage of each of these vehicles, concern about their impact on the environment grows. These worries include traffic congestion, exhaust and smog, oil dependence, acid rain, our planet's ozone layer – and this is just a start.

While watching television, we notice a large number of commercials showcasing their company's vehicles for a number of reasons, including safety, performance and power. Interestingly, more and more advertisements have included mention of the vehicle's impact on the environment, focused on hybrid and high gas mileage choices. One young child fears how other children will react if they learn her father is not driving a hybrid vehicle as he takes her to the movies. In response, the dad informs his daughter that he does drive a hybrid, but doesn't feel the need to brag about his choice.

The students in our classrooms need to become educated on the alternatives available to them, not only for purchasing cars, but for their daily energy uses. There will be a major transition in their lifetime from a fossil fuel, non-renewable driven economy to one chiefly fueled through the use of renewable energy options. Purchasing environmentally-friendly vehicles is only the start.

This lesson will focus on individual automobile use and the hidden environmental costs of driving, instead of walking, biking or using public transportation. The topics that will be covered include the following:

- Student's Daily Use of the Automobile
- Costs of Driving
- Alternatives to Automobiles
- Green Vehicle Options

Instructional Objectives

- Students will describe and chart their family's driving habits in a Car Use Log and compare the data with national and worldwide patterns
- Students will differentiate between the direct and indirect costs of driving
- Students will brainstorm personal choices that reduce our nation's and the world's dependence on automobile use in our daily lives
- Students will diagram and explain how driving a car leads to air pollution and global warming
- Students will visit a local car dealership to learn some of the new model specifically focused on lowering the negative impact of driving on the environment
- Student will research and discuss alternative fuel and environmentally-friendly vehicles available for purchase in today's society

Subject Areas Integrated

Social Studies, Science, Environmental Education, Math

Wisconsin State Standards

Social Studies

A.8.5 Identify and compare the natural resource bases of different states and regions in the United States and elsewhere in the world, using a statistical atlas, aerial photographs, satellite images, and computer databases

A.8.10 Identify major discoveries in science and technology and describe their social and economic effects on the physical and human environment

A.8.11 Give examples of the causes and consequences of current global issues, such as the expansion of global markets, the urbanization of the developing world, the consumption of natural resources, and the extinction of species, and suggest possible responses by various individuals, groups, and nations

Science

A.8.8. Use the themes of evolution, equilibrium, and energy to predict future events or changes in the natural world

G.8.5 Investigate a specific local problem to which there has been a scientific or technological solution, including proposals for alternative courses of action, the choices that were made, reasons for the choices, any new problems created, and subsequent community satisfaction

Environmental Education

B.4.2 Illustrate how they use energy in their daily lives

B.4.3 List sources of energy, distinguishing between renewable and nonrenewable sources

B.8.10 Explain and cite examples of how humans shape the environment

B.8.15 Analyze how people impact their environment through resource use

B.8.16 Recognize the economic, environmental, and other factors that impact resource availability and explain why certain resources are becoming depleted

B.8.17 Explain how human resource use can impact the environment; e.g., erosion, burning fossil fuels

B.8.18 Identify major air, water, or land pollutants and their sources

C.4.1 Identify environmental problems and issues

C.4.4 Identify some of the decisions and actions related to the issue

D.4.2 Identify and give examples of short-term and long-term solutions to a problem

Math

E.8.2 Organize and display data from statistical investigations using appropriate tables, graphs, and/or charts (e.g., circle, bar or line for multiple sets of data)

Grade Level

4-6

Lesson Activity Time Frame

Four 60-Minute Class Sessions

One 75-Minute Field Trip

Teaching Site

Classroom

Technology Lab

Local Car Dealership

Material List

Thirty Hot Wheels Toy Cars

Vocabulary

Fixed Costs	Household
Variable Costs	Traffic Congestion
Emissions	Greenhouse Gases
Commuter	Foreign
Alternative Fuel	Domestic
Global Warming	

Teacher Background & Preparation

The teacher should research recent data on car use per nation globally, the automobile's impact on the environment, and alternative fuel and car choices that are geared to providing a lower impact on the environment. Internet newspaper websites will have a great deal of recent articles about improvements in the car industry, national and worldwide, in regards to reducing emissions and environmental costs from their products. The teacher will also have to complete pre-planning forms for a field trip and contact a local car dealership to set-up a student tour that informs and showcases the green cars available for purchase or lease.

Student Background

The students will need to track the car usage in their own household for one week prior to the beginning of the lesson, using a handout, Car Use Log (Worksheet #1).

Background References

1. AAMA Motor Vehicle Facts & Figures. 1993-1994. Government Affairs Division of the American Automobile Manufacturers Association. Detroit, MI.
2. MacKenzie, J. and M. Walsh. 1990. Driving Forces: Motor Vehicle Trends and their Implications for Global Warming, Energy Strategies and Transportation Planning. World Resource Institute. Washington, D.C.
3. Hybrid Cars <http://www.hybridcars.com/>
4. National Renewable Energy Laboratory <http://www.nrel.gov/vehiclesandfuels/>
5. Green Car Congress <http://www.greencarcongress.com/>

Procedure

Day One

- The teacher will begin the lesson by reading the book, If the World Were A Village, to the class. When finished, she will ask the students questions about the book, including the following:
 - (1) What figures was the most surprising to you?
 - (2) The book mentions, “In one part of the village, someone buys a new car. In another, a man repairs the family’s bicycle, their most valued possession.” Does this surprise you at all?
- The teacher would then transition the students into looking at their Car Use Logs. The teacher will ask the students if they believe their family could “survive” with only one bicycle in their household and no automobiles.
- In continuation, the teacher will then ask the students, using the SMART Board, the number of cars in each household and their daily household car use. The students will only look at the weekly total use column listed on the log sheet. First, the teacher will ask the students for a total number of cars for each household and find a classroom average. Second, the teacher will create a plotted line graph of the number of miles each household travels each week.
- The teacher will divide the students into two groups. Group One will examine the Material World reference book, finding the number of automobiles in ten nations throughout the globe: Iceland, Western Samoa, Mali, Brazil, India, Russia, United States, China, Iraq & Germany. Group Two will examine the same countries, using classroom wireless laptops. They will log on to the United Nations Cyber School Bus website at <http://www.cyberschoolbus.un.org/infonation3/menu/advanced.asp> . The students will see how the data may have changed between the publishing of the book (1994) and the last census data (2000), and how other nations around the world compare to the United States.
- After the students have their data, the teacher will use the Hot Wheel Cars to visually show the students how much our nation depends on the use of automobiles when compared to other people on our planet. The teacher will then ask the students what this data and finding means to the world around us, our environment? This will lead in a discussion of the direct and indirect costs associated with driving or using an automobile for transportation. The teacher will again use the SMART Board to chart the direct and indirect costs in a columned, chart format. She will

explain the difference between a direct (fixed) cost and an indirect (variable) cost. She can call individuals to write their responses on the SMART Board, or add typed responses by the student or teacher.

- To close Day One, the teacher will ask the students to make a list of ways to minimize the costs – both direct and indirect - of driving. What can they do individually and within their own household? They should have at least five ideas when they arrive at the next day's class session.

Day Two

- The teacher will begin the class by consolidating the student's ideas in minimizing the costs of driving. The teacher and students should look for any cross-over between households and formulate a top ten list of ways to minimize driving. The teacher could include this data in the monthly classroom or school newsletter.
- The teacher will discuss the threats driving brings on the environment. The teacher will have a photograph of a car positioned on the SMART Board and then ask students to brainstorm some ideas of the hidden costs associated with driving.
- Once the students are finished brainstorming, the teacher will save the student's ideas and click onto the next page of the SMART Board notebook. This page will have the same picture in the middle of page, but the hidden costs will be listed around the car. The students will then compare their own findings, to the hidden costs listed in the resource(s) utilized by the teacher. The teacher should also discuss how automobile emissions are contributing to the greenhouse effect and global warming, on all scales – local, national and global. If a teacher can find a local news article or report, it would make this lesson feel even more personable to the students.
- Next, the teacher will show the students a video produced by the Wisconsin Department of Natural Resources, *Easy Breathers*. This video discusses alternative car choices and newer car options that have a smaller impact on the environment than past models.
- The teacher will then inform the students they would be going on a field trip to a local car dealership for tomorrow's class session. The student's assignment would include formulating five questions about car choices for their tour guide on a teacher-provided 4" x 6" index card.

Day Three

- The students will be taking a field trip to a local car dealership. If your school is located within walking distance of a dealership, this would serve as a great example of what choices you hope your students make in regards to transportation options for short trips. The students should bring their index cards with them on the trip.
- The teacher should pre-plan the trip with the man or woman giving the tour to the students, focusing on environmentally-conscience choices when purchasing an automobile. The tour guide should focus on emissions, mile per gallon averages, alternative fuel options, hybrid models and any other topics he or she feels will help students understand the environmental factors individuals should include when determining what vehicles to purchase.

Day Four

- The teacher will introduce a one-day research project to the students (Worksheet #2) and hand out a grading rubric (Worksheet #3) to the students. The project will require each student to create a five-slide PowerPoint presentation on one car available to purchase that they believe is a good Green Car Choice, in regards to having a minimal impact on the environment.
- The students will have the entire class period to research in the technology lab. The teacher will also monitor the technology lab for one hour after school today and one hour before school tomorrow, if additional time is needed.

Day Five

- Today, the students will show their PowerPoint presentations on their Green Car Choice in class, utilizing the SMART Board. The teacher will grade their project, utilizing the rubric (Worksheet #3). Students will have five minutes to present their findings to their classmates, and if time is available, their classmates can ask them questions regarding their choices.

Conclusion

After the student's presentations, the teacher will ask how this lesson and research will help them in their lives beyond the classroom. How will this project help the environment in our local community and in our global community? What can we do individually to help the world, in regards to driving and purchasing automobiles? How can we, as a class, make an impact that will help our community and world?

Overheads/Worksheets/Graphic Organizers

Worksheet #1: Car Use Log

Worksheet #2: Green Car Choice Guidelines

Worksheet #3: Green Car Choice Rubric

Assessment

Formal Car Use Logs, Green Car Choice PowerPoint

Informal Minimize Costs List, Index Card Dealership Questions

Special Needs Modifications

- The Green Car Choice PowerPoint assignment can include a fewer number of slides for special education students

Websites & Technology Connections

SMART Board (if not available, overhead transparencies will also work)

United Nations Country Comparison of Motor Vehicles

<http://www.un.org/Pubs/CyberSchoolBus/infonation3/menu/advanced.asp>

United Nations- Technology Data Comparison (1990 to 2000)

<http://www.cyberschoolbus.un.org/infonation/index.asp?theme=tec>

Resources

1. Menzel, P. 1994. Material World: A Global Family Portrait. Sierra Club Books. San Francisco.
2. Smith, D. 2002. If the World Were A Village: A Book About the World's People. Kids Can Press. Tonawanda, New York.

Lesson Extensions

- Students can design an alternative, energy-efficient vehicle of their own, including the creation of a model and the materials needed for a manufacturer to start production.
- Student can play XRT: Extraordinary Road Trip, a game designed for use on a PC, which requires the players to improve the air quality of the game's fictional city.

Worksheet #1: Car Use Log

Students will record the miles traveled for each purpose, each day, for their own household.

Record the total miles traveled for each day and the entire week.

	Work	School	Shopping	Visiting	Religious, Civic & Volunteer	Pleasure	Other	TOTAL
Monday								
Tuesday								
Wednesday								
Thursday								
Friday								
Saturday								
Sunday								
TOTAL								

Worksheet #2: Green Car Choice PowerPoint Project

The students will be completing a research project on environmentally-friendly automobile choices. Each student will be asked to research various car models and car companies/corporations, and choose one vehicle that they feel is the best “green” choice. The students have unlimited money to spend, so cost will not be a factor in their decision.

Each student will create a five slide PowerPoint presentation that will be presented to their classmates the following class session. Each slide needs to include the following information to receive full credit:

- **Slide 1** Name of Car, Picture of Car
- **Slide 2** Manufacturer Name, Price, Model Year, Closest Place to Purchase from School
- **Slide 3** Options Available That Makes It A Green Car Choice
- **Slide 4** Why Did You Choose This Car As The Best Green Choice?
- **Slide 5** What Changes Could Make Your Green Car Choice Even Better?

Listed below are some websites to get you started in the right direction to purchasing your Green Car Choice:

<http://editorial.autos.msn.com/specials/green/default.aspx>

<http://www.greencars.org/pr13.html>

<http://www.hybridcars.com/cars.html>

<http://autos.msn.com/advice/article.aspx?contentid=4018862&src=LP%20Passenger>

<http://www.greencars.org/>

<http://www.cleangreencars.co.uk/jsp/cgcmain.jsp?lnk=310>

Worksheet #3: Green Car Choice Grading Rubric

Green Car Choice Project Rubric				
Points	5	3	1	0
Slide 1	Correct Name of Car, Clear Picture of Car, No Spelling Errors	Correct Name of Car, Clear Picture of Car, 1-2 Spelling Errors	Car & Picture Present, 3+ Spelling Errors	No Mention
Slide 2	Correct Manufacturer Name, Price, Model Year, Closest Place to Purchase from School Listed, No Spelling or Grammar Errors	Correct Manufacturer Name, Price, Model Year, Closest Place to Purchase from School Listed, 1-2 Spelling or Grammar Errors	Correct Manufacturer Name, Price, Model Year, Closest Place to Purchase from School Present, 3+ Spelling Errors	No Mention
Slide 3	Three or More Listed Options That Makes It A Green Car Choice, No Spelling or Grammar Errors	Two Listed Options That Makes It A Green Car Choice, No Spelling or Grammar Errors	Two or Less Listed Options That Makes It A Green Car Choice, Spelling or Grammar Errors	No Mention
Slide 4	Answers Question: Why Did You Choose This Car As The Best Green Choice?, Gives Three or More Reasons	Answers Question: Why Did You Choose This Car As The Best Green Choice?, Gives Two Reasons	Answers Question: Why Did You Choose This Car As The Best Green Choice?, Gives One Reason	No Mention
Slide 5	Lists three of more changes that could make green car choice even better	Lists two changes that could make green car choice even better	Lists one changes that could make green car choice even better	No Mention
TOTAL POINTS				
TOTAL SCORE				