

Trash to Treasure

Grade Level: 6
Duration: 5-6 60 minute
 classes

Subject: 6th Grade Science

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Materials Needed

Computers (teacher and student) Alternative Fuel Resources -Websites bookmarked -Books -Magazines -Scientific Journals Video Camera MovieMaker Video Waste Frying Oil NaOH Methyl Alcohol	Microwave Flasks Electronic Scale Worksheets -Pre-assessment -Research Sheet -Open Response -Family Usage Homework Assignment ActiVote Clicker System Posterboard
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Analyze Learners

Overview & Purpose (STEMcinnati theme) Overview: APPLICATION: In this unit, students will take information they find about alternative fuels and debate other students about which fuels should be considered for use in the future. Not only will students have to learn the facts about their type of fuel, but they will have to be able to think about what other groups may have as arguments and prepare a rebuttal. CAREERS: Because energy and alternative fuels are such a large area of discussion, there are many careers currently associated with the research of these fuels, as well as future careers in the research and use of these energy sources. As students are researching their group alternative fuel source, they will come across career opportunities and will begin to see the vast opportunities that are and will be available in the future. SOCIETY: Energy is a major topic of discussion in the United States today. This unit allows students to explore some of the major alternative fuels that are being researched today for sources of energy in the future. These students are not yet at driving age, but are beginning to become aware of their impact on the environment around them. Acquiring the knowledge of these alternative fuels will enable current students to be informed citizens and voters in the future.		Education Standards Addressed SC-6-I-U-2 Students will understand that communities do not exist in isolation, but are globally interconnected by a number of Earth systems (e.g. ocean, atmosphere, lithosphere). SC-6-I-U-3 Students will understand that science can sometimes be used to inform ethical decisions by identifying the likely consequences of an action, but cannot be used to establish if taking that action would be right or wrong. SC-6-I-S-4 Students will differentiate the usefulness of scientific research to predict the possible consequences of decisions about environmental issues from its limitations in making ethical/moral decisions about those issues	
Select Goals and Objectives	Teacher Guide	Student Guide	Assessment

<p>Goals and Objectives (Specify skills/information that will be learned.)</p>	<p>Goals:</p> <ul style="list-style-type: none"> -The teacher will inform students of the use of science in important societal decisions and debates -The teacher will direct students in a small group research assignment <p>Objectives:</p> <ul style="list-style-type: none"> -The teacher will show students a video of research experience at the University of Cincinnati -The teacher will review family oil consumption with the class -The teacher will monitor student groups during their individual research time and provide guiding questions to the groups as needed -The teacher will mediate between groups as they debate the need for their alternative fuel to be used in the future as an energy source 	<p>Goals:</p> <ul style="list-style-type: none"> -Students will understand that science can be used to identify consequences of an action <p>Objectives:</p> <ul style="list-style-type: none"> - Students will complete surveys with their families to determine their consumption of oil - Students will research alternative fuels and investigate the positive and negative aspects of these fuels. - Students will debate other groups of students who have researched different alternative fuels and attempt to determine the best fuel choice for the future -Students will complete an open response question focused on the role of science in societal decisions 	<p>FORMATIVE:</p> <ul style="list-style-type: none"> -Alternative Fuel Research Chart -Group Poster <p>SUMMATIVE:</p> <ul style="list-style-type: none"> -Debate participation -Open Response
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<p>Select Instructional Strategies –</p> <p>Information (Catch, give and/or demonstrate necessary information, misconceptions, etc...)</p>	<p>PRE-ASSESSMENT</p> <ul style="list-style-type: none"> -Teacher will give students pre-assessment in order to determine their previous knowledge/experiences they have with oil consumption, alternative fuels, energy usage -Teacher will share video of research experience at University of Cincinnati. She will also show the posters created during the summer research. <p>DAY 1</p> <ul style="list-style-type: none"> -Teacher will create an environment in the classroom where there is no oil usage (to the furthest extend possible.) Eg. no electricity, no plastics, etc -Lead discussion on oil dependence using “Think-Pair-Share”. This discussion will be guided by the pre-assessment results -Show Bill Nye’s “Alternative Fuel” video -Assign homework assignment “Family Oil Usage” <p>DAY 2</p> <ul style="list-style-type: none"> -Discuss homework assignment. Share results using ActiVote clicker system. Class-wide results will be graphed and immediately discussed. -Teacher will perform transesterification of a small batch of waste frying oil. She will explain the process as the steps are taken and will explain key words such as catalyst, product, byproduct. -After biodiesel has been made, students will be asked to observe the products. There will be glycerol present and this will generate a discussion on byproducts, and pros and cons of different situations. -Teacher will review with the class some of the different sources of energy that have already been discussed. -Introduce the research project. Each group is a 	<p>PRE-ASSESSMENT</p> <ul style="list-style-type: none"> -Students will take pre-assessment to share previous knowledge and experiences with energy usage and alternative fuels -Students will be in a presentation of the teacher’s research experience at the University of Cincinnati. -Students will complete an exit slip that shares what interested them about the biodiesel research and what they want to know more about <p>DAY 1</p> <ul style="list-style-type: none"> -Participate in no oil usage simulation and reflect in notebook -Share journal entries (Think-Pair-Share) -View Bill Nye video and take notes in notebook -Complete homework assignment “Family Oil Usage” with parents at home <p>DAY 2</p> <ul style="list-style-type: none"> -Share homework results by entering answers into the ActiVote clicker system. -Students will analyze graphs that are produced to identify the oil/energy usage of the class -Observe and document the steps of the transesterification while the teacher demonstrates it. Write down what they see happen and what the finished products look like. -Students will form groups and will begin research on 	
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	<p>different energy company that will research a particular type of alternative fuel. They will create a presentation/poster/video that explains the pros and cons of their fuel. Then each group will participate in a debate to determine which alternative fuel should be used in the future (whichever group has the most support!)</p> <p>DAY 3 -Teacher will guide student groups through their research assignment and will distribute the "Alternative Fuel Research Sheet" in order to help organize the information they will find. -Teacher will help students determine what kind of presentation they would like to create (PowerPoint, poster, video, skit, etc) to present the information about their fuel type</p> <p>DAY 4 -Teacher will help guide students in their research and time management. -At the end of class, the teacher will gather students back together and begin presentations on the key information regarding their alternative fuel</p> <p>DAY 5 -Teacher will insure that all groups have presented their alternative fuel key information. -Teacher will explain that each group is now a company that has been given the alternative fuel they researched and must convince the rest of the "fuel business world" that their fuel should be selected to fuel the future. Each group will have time to prepare for a debate with the rest of the groups to convince the class that their fuel is superior. -Teacher will monitor group work and answer any questions that may come up</p> <p>DAY 6 -Teacher will mediate the debate between the different "companies" and may pose questions in order to continue the debate and spark questions/arguments</p>	<p>their assigned alternative fuel. Students can use the internet, magazines, books to complete the research</p> <p>DAY 3 -Students will continue work on their research using the "Alternative Fuel Research Sheet" to organize the information -Students will determine the type of presentation they would like to create and will begin work on the presentation</p> <p>DAY 4 -Students will finish their research and presentations -Students will present key information regarding their alternative fuel</p> <p>DAY 5 -Students will finish making their group presentations -Students will be given the debate assignment and will begin work with their group to market their fuel and prepare for the debate</p> <p>DAY 6 -Students will participate in the class debate between "companies" marketing different fuels.</p>	
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	<p>-Teacher will have students choose the alternative fuel they feel has the most potential use in the future and will have them report their answer using the ActiVote clicker system.</p> <p>-Teacher will lead discussion on survey results of the class and talk about how science played a role in the process they have just gone through</p> <p>DAY 7</p> <p>-Teacher will assign each student an open response question in order to evaluate the increased knowledge of each student throughout the unit.</p>	<p>-Students will reflect on the experience so far and choose the alternative fuel they feel has the most potential use in the future and will vote using the ActiVote clicker system.</p> <p>-Students will participate in discussion of survey results</p> <p>DAY 7</p> <p>-Students will answer an open response question as a summative assessment.</p>	
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Require Learner Participation Activity (Describe the independent activity to reinforce this lesson)	Students will complete the attached open response question in order for them to individually show their understanding of the energy debate that is currently occurring in our society. It will also require them to identify the role science plays in important and everyday decisions.		
Evaluate (Assessment) (Steps to check for student understanding) – See Objectives above	FORMATIVE: -Alternative Fuel Research Chart -Group Poster	SUMMATIVE: -Debate participation -Open Response	Additional Notes

Important Attachments:

1. Pre-Post Assessment
2. Worksheets
3. PowerPoint
4. Reflection after lesson