

MEEP

Problem Based Learning -Energy

Created By: Kimberly Perkey	Topic: Energy	Grade Level/ Subject: 6th Grade Science
<p>Science Standards:</p> <p>PS3.1: Analyze the properties and compare sources of kinetic, elastic potential, gravitational potential, electric potential, chemical, and thermal energy.</p> <p>PS3.2: Construct a scientific explanation of the transformations between potential and kinetic energy.</p> <p>PS3.3: Analyze and interpret data to show the relationship between kinetic energy and the mass of an object in motion and its speed.</p>		
<p>Math Standards (optional):</p> <p>6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.</p>		
<p>ELA Standards (optional):</p> <p>6.SL.PKI.5 Include multimedia components and visual displays in presentations to clarify information.</p> <p>6.W.TP.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.</p>		
<p>Additional Standards (Social Studies, Art, Physical Education)optional:</p> <p>CTE Stem Explorers 3) Explain how asking scientific questions can help to define an engineering problem to be solved. Choose a specific question(s) and problem that a scientist or engineer would encounter, then develop a model to illustrate the problem. Provide textual evidence from science and engineering books and websites to justify why the model illustrates the problem.</p>		
<p>PBL Summary: Write a few sentences describing this PBL unit.</p> <p>In this PBL, students will gain knowledge of potential and kinetic energy as well as specific types of potential and kinetic energy (gravitational, elastic, chemical, mechanical, electric, radiant, thermal, and sound energy) as well as</p>	<p>Multi-Dimensional/Driving Question: Think of a relevant problem with multiple solutions that will drive student learning.</p> <p>There is an open area at Dollywood ready for renovation! How can we, Dollywood engineers, create/design an</p>	

<p>energy transformations. Students will create a ride for a local theme park to demonstrate their knowledge of energy. Students will gain an understanding of how rides are manufactured by engineers with energy in mind. At the end of their design, there will be a writing component where students are asked to describe the energy and energy transformations found within their design.</p>	<p>attraction for this area in order to maximize park attendance and maintain the manufacturing budget.</p>		
<p>21st Century Skills Addressed (circle all that apply):</p> <p>Creativity Collaboration Critical Thinking Communication</p>			
<p>Culminating Event: What final student learning products will show student mastery of the content area standards?</p> <p>Students will go through the Engineering Design Process to plan, design, and create a ride for the amusement park. After their ride is completed, they will write a report describing the energy and energy transformations that take place within their ride. This manufacturing report will also require students to expand their thinking and describe what they would do differently to improve their design if given the opportunity. Students may also create any visuals (poster or slides) to assist with their presentations.</p>			
<p>Hook Event: Develop an introductory activity that will spark student interest and further questions.</p> <p>Dollywood engineers are at a crossroads! They cannot decide what attraction to build in the empty space at Dollywood! It is up to you to help!</p> <p>Students will become “Dollywood engineers”. They will wear name badges that say “Dollywood Engineer”.</p>	<table border="1"> <tr> <td> <p>Community Partners: List potential business or industry partners that could add to the learning experience for students. Include websites or contact info.</p> <ol style="list-style-type: none"> 1. Dollywood employees- If actual employees are unreachable/unavailable, there are contacts within the county that have worked for Dollywood </td><td> <p>What do you need from these partners (i.e. guest speaker, field trip, help facilitate an activity)?</p> <ol style="list-style-type: none"> 1. Guest Speaker 2. As a 6th grade team, there is discussion of planning a Dollywood field trip at the end of the year. Although this will not take place during the time of this project, students can use the knowledge </td></tr> </table>	<p>Community Partners: List potential business or industry partners that could add to the learning experience for students. Include websites or contact info.</p> <ol style="list-style-type: none"> 1. Dollywood employees- If actual employees are unreachable/unavailable, there are contacts within the county that have worked for Dollywood 	<p>What do you need from these partners (i.e. guest speaker, field trip, help facilitate an activity)?</p> <ol style="list-style-type: none"> 1. Guest Speaker 2. As a 6th grade team, there is discussion of planning a Dollywood field trip at the end of the year. Although this will not take place during the time of this project, students can use the knowledge
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<p>Students will watch a variety of videos and immerse in lessons learning about potential and kinetic energy and the transformation that happens between them. We will watch Disney's "Imagineering" to learn about how Disney uses energy in their rides. This will lead us to creating our very own rides using energy transformations. Students will then read about Dollywood's history and recent expansions and future plans for the park.</p>	<p>before and can answer questions for students.</p> <p>2. Otis, USA- This manufacturing company can walk students through the actual manufacturing process for materials that would be needed in the process that comes after the prototype.</p>	<p>learned during this process to complete future activities while on the field trip.</p>
<p>Daily Activities: What activities will students complete to answer the multi-dimensional/driving question (that reinforces content from the standards)?</p> <p>Activity:</p> <p>1. Disney's "Imagineering" video- How does Disney use energy in their park rides?</p> <p>2. We will spend 3 days learning about the Engineering Design Process. During this time, students will learn about the steps of the process, design constraints, how it is used in manufacturing, and complete the "Marshmallow Challenge" to put this process into action.</p> <p>3. Energy lessons and labs- Students will complete a series of activities to learn about the different types of energy, the relationship between mass, speed, and kinetic energy, and energy transformations.</p> <p>4. Once CFA data shows students have a solid understanding of both energy concepts and the EDP, we will begin the creation of our prototypes. Students will spend approximately 2 days on steps 1-3 (ask, imagine, plan). They will</p>		<p>Resources/Materials Needed:</p> <p>Recyclable Materials: cardboard, paper, straws, paper towel rolls, milk jugs, bottles, etc....</p> <p>Glue, Tape</p> <p>Scissors</p> <p>EDP Guided Worksheet</p> <p>Slides Presentation for Instruction</p>

<p>have approximately 3 more days to complete step 4 and 5 (create and improve) as well as constructing their explanations.</p>	
<p>Technology Integration: How is technology embedded into this PBL unit?</p> <p>Students will use their laptops to conduct research about the park in order to make an informed decision. Students may use their computers/ Google Slides to create a presentation 3D design models are also a possibility based on student knowledge of the application at the time of the project.</p>	
<p>Capstone Presentation: How will students present what they've learned publicly? This can be the culminating event if that event is presenting what has been learned publicly.</p> <p>Students will have the opportunity to present their projects to the class. Then I will compile a presentation of pictures and/or videos of student projects/presentations for the school announcements on "Lincoln Live".</p> <p>Competition idea: Choose</p>	

Performance Based Rubric

Standards	Developing	On-Target	Mastery
Science	Students can identify the forms of energy.	Students can apply the forms of energy when identifying them in energy transformations.	Students can identify the forms of energy, the energy transformations in a system, and apply it to their design.
Math	Students can identify and complete given ratios.	Students can understand the ratio between their model and full scale ride.	Students can create an explanation of the ration between their model and full scale ride.
ELA	Students write about their design and present it to the class. Their multimedia component is present.	Students' presentation explains the use of energy in their designed ride. Their multimedia component is well organized and adds to the presentation.	Students present a clear explanation of how energy is used and transforms from the beginning to the end of their designed ride. Their multimedia component is well organized and adds to the presentation.