

I am an Engineer Lesson Plan

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Date lesson will be taught: September 16th, 2011

Grade level: 6

Lesson Concepts: engineering, engineering and science, tissue engineering

Lesson Objectives: students will gain an understanding of engineering, how engineering and science are related, and that there are several career paths in science and engineering

Materials list, advance preparation, and handouts: balloons, post-it notes (or scraps of paper), pens/markers

Accommodations to special needs:

Safety:

Five-E Plan

Teacher Does	Probing Questions	Student responses
Engage: <i>Learning Experience(s)</i> <i>Time: <u> 5 </u> minutes</i>	<i>Critical questions that will connect to prior knowledge and create a need to know.</i>	<i>Expected Student Responses/Misconceptions</i>
Ask questions to gauge prior knowledge of the students.	<i>How many of you have heard of engineering? How many of you feel that engineering impacts everything you do each day?</i>	I am assuming very few students will raise their hands for either question.
I will write a brief list on the board of the students' experiences so far that day.	<i>What have you done so far to get here in your day? How did your day start and what did you do until you got to school?</i>	I am expecting answers like the following: woke up, ate breakfast, brushed teeth, traveled to school, etc.

I will mention we will come back to our list later on.

Teacher Does	Probing Questions	Student responses
<p>Explore: <i>Learning Experience(s)</i></p> <p><i>Time: 10 minutes</i></p>	<p><i>Critical questions that will guide students to a common set of experiences.</i></p>	<p><i>Expected Student Responses/Misconceptions</i></p>
<p>I will give each student a balloon and some post-it notes and instruct them to come up with as many applications as they can think of that the balloon can be used for. I will tell them to be creative and within their respective tables (~4 students each) they must write down each idea on a post-it and place it where everyone in the group can see (this is called jot thoughts). Each post-it from their table should be different and I will encourage them to fill up their entire table with ideas in a 5 min. period.</p> <p>Demonstration after I call time: I will demonstrate to the students how you can make a refrigerator out of a balloon and I will instruct them to try it out and see for themselves that it is possible.</p>	<p>If I see students struggling to come up with ideas I can ask them questions like the following: <i>What is the balloon made out of? Is there an application for this material that you can think of? Does the balloon have to stay in its original form or can you manipulate it to create something?</i></p>	<p>I am anticipating that some of the applications will seem obvious at first when the students are brainstorming, but then as I ask them questions and encourage them to think outside of the box, I am anticipating very creative applications.</p>

Transition: This is the revealing moment where I will explain to the students that for the last 10-15 minutes or so, they were all engineers! I will briefly explain how they were just engineers (engineers are complex problem solvers; they design things, invent things, and come up with solutions to practical problems in everyday life).

Teacher Does	Probing Questions	Student responses
<p>Explain: <i>Learning Experience(s)</i></p> <p><i>The students explain!</i></p> <p><i>Time: <u>10</u> minutes</i></p>	<p><i>Critical questions that will help students clarify their understanding and introduce information related to the lesson concepts/skills.</i></p>	<p><i>Expected Student Responses/Misconceptions</i></p>
<p>I will instruct the students to now help explain to me how they think engineering is involved in the activities listed on the board.</p>	<p><i>How did you wake up? What woke you up? If you ate cereal, did you use milk? Where did your milk come from? When you brushed your teeth, did you use water? How did the water get to your faucet? How did you get to school? Even if you walked, did you wear shoes? How is engineering involved in the tables you're sitting at?</i></p>	<p>As we go through the different activities on the board, I believe it will become easier and easier for the students to see the engineering in those activities.</p>
<p>I then want to start focusing on how engineering is involved in science. I will then show a picture on a PowerPoint presentation of a supernova that the students learned about on the first day I came, and I will ask them if they can tell me how engineering can be involved in astronomy? I want them to understand that engineering can help us learn more about science and vice versa.</p>	<p><i>How far away is this supernova again? How did we get this picture then? What took the picture?</i></p>	<p>Through my guidance, students will explain to me how engineering is involved in astronomy.</p>

I will explain to the students that there are different types of engineering and I will give very brief examples (architectural engineers help design buildings so they can withstand hurricanes, environmental engineers try to help conserve the environment, etc.).

Teacher Does	Probing Questions	Student responses
<p>Extend / Elaborate: Learning Experience(s)</p> <p><i>Time: <u> 5 </u> minutes</i></p>	<p><i>Critical questions that will help students extend or apply their newly acquired concepts/skills in new situations.</i></p>	<p><i>Expected Student Responses/Misconceptions</i></p>
<p>I will explain to the students that I am an engineer that focuses on problems in medicine and that I am trying to create/repair tissues in the body to help treat patients.</p>	<p><i>How would you go about designing a tissue? What would you do first? What would you like to know about the tissue?</i></p>	<p>Through my guidance, students will explain that they need to understand how the tissue works before they can try to recreate it. In other words, they will understand that they need to know the science behind the tissue itself.</p>

My type of engineering is one of the many types out there. I will challenge the students to go home and see if they can find something that is not impacted by engineering.

Teacher Does	Probing Questions	Student responses
<p>Evaluate: Include summative evaluation below.</p> <p><i>Time: ongoing</i></p>	<p><i>Critical questions that ask students to demonstrate their understanding of the concepts and process skills. These questions must directly relate to the lesson's performance objectives.</i></p>	<p><i>Expected Student Outcomes</i></p>
<p>I will constantly be evaluating the students to make sure they are learning throughout the entire lesson.</p>	<p><i>n/a</i></p>	<p>I expect the students will gain a better understanding of engineering as well as a brief understanding of what I do as an engineer and how it relates to science.</p>