

1. Content: Describe **what** it is you will teach. What is the content?
 - a. This lesson, once again, will be a multi-part lesson. We will start in morning meeting by adding to our Engineering Journal vocabulary list, especially reviewing new vocabulary like *compromise* and *accurate*. This will prepare them for the replanning and rebuilding stages later in the day. The focus on their replanning and sketching will be to practice *accuracy* and be precise with their language around materials. I'm asking that their reasoning is in writing, and their drawings could be reproduced because of its accuracy. Also, based on the input from the previous lesson, we will be going over descriptive words for our materials and placing them on our word wall for future reference. In groups, students will write their reasoning for choosing certain materials.

2. Learning Goal(s): Describe what specifically students will **know** and **be able to do** after the experience of this class.
 - a. SWBAT understand and explain why certain materials are more suited for certain purposes because of their qualities (i.e. stretchy, light, stiff, etc.)
 - b. SWBAT use vocabulary from the word wall to support their evidence.
 - c. SWBAT work collaboratively and compromise in a group work setting.
 - d. SWBAT rebuild and resketch a design that makes sense due to the problem they faced in the first trial.

3. Rationale: Explain how the content and learning goal(s) relate to your Curriculum Unit Plan learning goals.
 - a. This lesson fits into the CUP as the last step of the design process for what we created in our class. During this lesson we will continue practicing our skills of compromising and collaborating as team workers. This 2nd model testing will also build off of the last time we tested and redrew by really asking students to observe more closely and with more context to their fixes now that they've thought more about their material choices.

4. Assessment: Describe **how** you and your students will know they have reached your learning goals.
 - a. Students will be assessed based on my observations of their words they choose to use to communicate with one another, as well as their ability to work efficiently as a group to get the tasks completed.
 - b. Students will also be assessed as a group based on their Materials sheet they turn in, and their written work in their Engineering Journal. Students who have Written on the Trial #1 page how to improve their design, redrawn and labeled

their sketch, and filled out the Materials page with accuracy and detail will show me they understand.

- c. Students who have circled points for improvement in their sketch after they've tested will show me their understanding.

5. Personalization and equity: Describe how you will provide for individual student strengths and needs. How will you and your lesson consider the needs of each student and scaffold learning? How specifically will ELL students and students with learning disabilities gain access and be supported?

- a. This lesson is focused on honing in on the scientific vocabulary. From the feedback I got of my lesson last time, and based on my own observations, it was time to add in some more specific scientific words to our conversations. This specificity and clarity is not only helpful for ELLs, but all students. Many of the words on the word wall are probably familiar to students, but seeing them in written form may be new, and some of the words are not so recognizable. Angelyn is excellent at using her resources, so I knew by putting these words up on the board she would know where to look for ideas and spelling. Additional to the word wall, I am working on making my directions very clear, concise, and with scientific vocabulary so the words get used more regularly and all students can be more exposed to them.

6. Activity description and agenda

- a. Describe the activities that will help your students understand the content of your class lesson by creating an agenda with time frames for your class. Be prepared to explain why you think each activity will help students on the path toward understanding.

time	activity	rationale
PART 1		
10 min	During morning meeting, have students go back to seats and write down important vocabulary words: <ul style="list-style-type: none"> - Engineer: someone who changes and creates things to make our lives easier or smoother - Design: to create or make something - Compromise: to come up with one idea from many ideas 	I noticed from the last lesson, and with other less formal experiments that having some continuity of subject material across the day can be very helpful for students.

	<ul style="list-style-type: none"> - Accurate: something that is done neatly and precisely 	
PART 2	preface: this is a thinking and writing-heavy lesson, kids!	
10 min	<p>Help students understand the importance of noticing different qualities of materials with a couple examples:</p> <ul style="list-style-type: none"> - A pencil box: What kind of material would I need to build a pencil box? <ul style="list-style-type: none"> - pretty stiff, so that it doesn't break - a little flexible - see-through, so you can see a little of what's inside - water-proof, in case there's major spillage - hard, so that it doesn't collapse - smooth, so that it's nice to touch - Compare two materials we have: foam and tin foil. How are these different? What might those differences mean in terms of their purpose? <ul style="list-style-type: none"> - make a table (or venn diagram depending on their comments) differentiating the two materials <p>as we talk, point to the Engineering Word Wall which I will put up to have students refer to</p> <p>add durable to word wall?</p>	It's important to give an example to dive into as a group that may extend the student's thinking. This is an applicable example, but requires many details to eventually come up with plastic.
5 min	<p>Mini review lesson on accuracy</p> <ul style="list-style-type: none"> - They learned this in an impromptu (necessary) mini 	Especially for ELLs, but for everyone also, a quick review of a new word before a lesson is necessary for that

	<p>lesson so I will do it again with more describing words.</p> <ul style="list-style-type: none"> - Accurate drawings and explanations are <ul style="list-style-type: none"> - neat - precise - legible - detailed (don't leave anything out) 	<p>repetition and reminder of the context of the word.</p>
5 min	<p>Give an example of a detailed explanation of what went wrong and what there was to fix.</p> <p><i>We decided to change the cardboard for tinfoil, because water was getting absorbed by the cardboard because it is made of paper. Tin foil is water-proof. We also noticed that our edges were not rounded enough, so we decided to add styrofoam to the edges with tape.</i></p>	<p>Showing a model to the students will help guide their own thinking and set the expectation.</p>
10 min	<p>Groups fill out the Materials page - asks for the material, some of its qualities, and why they think it will work</p> <ul style="list-style-type: none"> - have students rotate being writer 	<p>I am asking students to trade off writers because I noticed some dominance of writing in past group-forms. This form will help organize their thoughts and really require them to think about why they're using the materials they are.</p>
	<p>Most students completed the Materials page, however a couple groups did not.</p> <p>This lesson ended up getting divided into 2 lessons. The second one also melded into the 6th lesson.</p>	
25 min	<p>Start/continue replanning and resketching making sure plans are accurate and students are compromising and working as a team.</p>	
	<p>This ended up being another lesson:</p>	

20 min	Rebuild the model	
5 min	Test your model with special attention to when it starts to sink - that is the moment when to stop counting the bears. What do you observe?	Unlike the first testing, it feels important to me to have this number of bears to be more accurate. They will need to practice observing closely - what happens to the water at what particular moments?
10 minutes	Circle in red the places of improvement or “problems” that arose on your sketch. Write below how you will fix it hypothetically in your Engineering Journal	To amend my mistake of not putting in a question of “What is the problem?” I am asking them to do a quick-fix of just circling the problem. I imagine this will help focus their own thinking as well as mine.

- b. What particular challenges, in terms of student learning or implementing planned activity, do you anticipate and how will you address them?
- i. I imagine students might feel challenged by the amount of energy I am asking them to put into writing. I will preface the lesson by saying this is as much a thinking and writing lesson as it is a building lesson. In previous lessons when I’ve asked groups to fill out forms as a group, it ends up being primarily that one student’s work, so I am asking that groups rotate writers so that they can really write down each material.

7. List the Massachusetts Learning Standards this lesson addresses.

- a. (science engineering) K-2ETS1-3. Analyze data from tests of two objects designed to solve the same design problem to compare strengths and weakness of how each object performs.
- b. 2-PS1-1. Describe and classify different kinds of materials by observable properties of color, flexibility, hardness, texture, and absorbance.
- c. 2-PS1-2. Test different materials and analyze the data obtained to determine which materials have the properties that are best suited for an intended purpose.
- d. listening/reading in standards Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups.
 - i. Follow agreed-upon rules for discussions.
 - ii. Build on other’s talk in conversations by linking their comments to the remarks of others.
 - iii. Ask for clarification and further explanation as needed about the topics and texts under discussion.

8. Reflection

- a. In light of all areas of planning, but especially in terms of your stated purpose and learning goals, in what ways was the activity(ies) successful? How do you know?

In what ways was it not successful? How might the activity be planned differently another time?

- b. What did you learn from the experience of this lesson that will inform your next LAP?

This lesson got a little butchered by the various snow days and students needing to be pulled out for various tests and meetings. Also, my predictions were correct for my students - they did indeed feel challenged by the amount of writing I was asking them to do. The Nathaniel, Kyara, Mario group that was being so thoughtful about their design then spent way too long on their original plan which didn't end up fitting in the pan to test their boats, and Mario was gone for some of it so the team waited for him. The combination of taking a long time and being disappointed that their boat didn't fit in the pan seriously lowered their morale and motivation. When other teams had completed their record-keeping, building and were almost ready for their second testing, they were still working on some of the beginning papers and were having a really hard time working together as a team. In this case, it was more important for me that they have important dialogue about the boat, so it meant Nathaniel rushedly doing most of the written work and not fully incorporating the team, but I was okay with that. In the end, I orally recorded them talking about their materials so it could be done faster, and then they were one of the first people to complete their 2nd boat model because they completely changed it - simplicity won! They just used an the flat top of a plastic egg carton and something in the middle for a flag. It was the most effective boat, and was an interesting paradox to their previous boat. I was glad I hurried them through the materials process so they could get to building, and I wonder who's original idea that was to make the egg carton boat!

For all the teams, though, timing seemed to be an issue, due to the snow days and changes in schedule. It seems like this pressure of time also made an impact on the feeling of momentum and drive for the project. After the previous lesson when I realized it was important to be explicit with our vocabulary to describe materials and use academic language, I wanted to ensure that my students had reasons for using the materials they chose. Although the form that I created to help guide this thinking could have been helpful, I think due to the timing of it, students were very resistant to it and seemed like they were begrudgingly filling it out. I realize in hindsight that if I had made that part of the project more fun, I think I could have achieved my goal more. I think creating a "video tour" of their boat would have also been a great idea where they video a talk where they explain why they chose each of those materials. I bet they would have been way more excited about this. And, especially for ELLs, talking scientifically and practicing those oral skills are incredibly important to acquiring new language.

These two points aside, the students were still very excited to work on their boats and for the most part all teams are getting along! I hear them trying their best to compromise and listen.

Below is some of their work on the materials itinerary and reasoning. I asked them on to take turns writing so they would each have a chance which I'm happy about because I saw more people writing than I would have otherwise, but this method didn't necessarily encourage group work more. While one student wrote, most others were spaced out or touching their boats. I think this is due to the combination of feeling rushed to finish this, but also not feeling

motivated to understand the *why* of using the materials (which is on me to make sure there is an impulse as to why we'd want to know something like that).

The following work shows their understanding of why they chose certain material. Many groups defaulted to explaining what the *purpose* of the material was instead of why they chose it in the first place. I realize that my columns could have been more clear perhaps if I had written, "What will this be used for and **why**?" to ensure that they write both components down.

This first group is Prince, Angelyn, and Astrid. Astrid was in her writing group for the beginning part of this lesson where Angelyn and Prince seemed to bicker at each other and not know what to get down. Once Astrid came back, it got done quickly with her as the only one writing, however their reasoning was not entirely sound. Like many other groups, they resorted to writing down what it would be used for and not *why* they picked it for that.

Names: Prince/Angelyn/Astrid Date: 2/8/19

TAKE 2: Our Materials and WHY we think they'll work

material	quality of it/ describe it	why it will work
!!! below is an example !!!		
plastic egg carton	kind of flexible, water proof	it will be great for the bottom so the water doesn't get in and we can bend it a little
popside	it is strong	for the bottom.
tin foil	box	because it will make some sort of bottom
Paper plate	flexible	because it will be a great base
jeeg carton	water proof	it will be good for the bears sit down.
bubble wrap	water proof and flexible	it can be good for a wall
Tape	flexible	to Tape it together

The following group also had it's challenges completing this worksheet, but ultimately wrote reasonings that made sense to me. My main concern was that students were picking materials that they had thought about. Naliya even asked me while she was doing this, "What if we don't know?" This told me that she in fact needed this materials sheet to guide her thinking.

Names: Mariya Sarachino

Date: 1/8/19

TAKE 2: Our Materials and WHY we think they'll work

material	quality of it/ describe it	why it will work
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!!! below is an example !!!

plastic egg carton	kind of flexible, water proof	it will be great for the bottom so the water doesn't get in and we can bend it a little
Styrofoam	it is light and airy	it will work because it is kind of water proof
Bubble cap	it is flat	it will work because its flat and it goes on the with the lip
Popsicle sticks	it's kind of bendable	it will work because it is great for a wall
Paper plate	it is flat	it is going on the bond
egg carton	kind of flexible	it will work because its going to hold the bears
Chill cap weak		it will keep water out
tape	strong	it will hold the things do not fall off.