

Sadie Levy
Engineering LAP 3: Plan and sketch
2/1/19

1. Content: Describe **what** it is you will teach. What is the content?
 - a. In this lesson we will continue in engineering design cycle with the next step of Planning and Sketching our boat designs as well as complete more of our engineering journals with vocabulary and writing in the design process. We will start the lesson by first writing down vocabulary in our journals that is relevant to the unit, then completing our design cycle in their engineering journals, and then starting in our groups to make plans and sketches of our boats.

2. Learning Goal(s): Describe what specifically students will **know** and **be able to do** after the experience of this class.
 - a. SWBAT read off the board and copy down definitions and a chart into their journals.
 - b. SWBAT work collaboratively to plan, sketch, and label with detail their plans.
 - c. SWBAT identify which materials and have a reason why.
 - d. Students will complete their individual worksheets in their journals as well as the group rubric afterward.

3. Rationale: Explain how the content and learning goal(s) relate to your Curriculum Unit Plan learning goals.
 - a. This lesson is the next step in our design cycle and is an important step before constructing our boats. Just as professional engineers do, it is important for our class to plan and sketch a detailed plan of their idea before attempting to build it. Asking them to think critically about the texture, durability, weight of materials is a huge part of second grade engineering and a learning goal of this CUP. Building off of the last lesson my dad gave on design and materials in relation to constructing a school building, students will use that same thinking to design a boat. This continuity across the unit will create a sturdy foundation of engineering frameworks and ways of thinking.

4. Assessment: Describe **how** you and your students will know they have reached your learning goals.
 - a. In this lesson, students will be assessed based on my observations of their participation and contribution to the lesson and their groups, the rubric they are given as a group, as well as their individual Engineering Journals. The rubric not only asks them about the construction of their boat, but also to self-assess on their group dynamics. These three pieces of information will tell me whether they are reaching learning goals.

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. During the first part of the lesson, students will all participate in the creation of and reminding ourselves of the design cycle. Although some students may not remember the exact words we used, they may get a concept and that is perfectly fine. I will show the words that I chose to use to describe our design cycle which they will write down in their Engineering Journals. This process of developing their own word for something and then giving it another name can be a gentle and effective way of expanding their vocabulary. In 380 with Carmen we talk about ways to value the way someone is able to communicate versus the grammar or words they choose, while also recognizing how valued academic language is in our society and schools. The more frequent ELL students are exposed to academic language, the more likely they are to be able to use it on their own. This is also excellent practice for all students to be able to recognize the synonyms that exist within academic language.
- b. In this lesson in particular, since students are working together, I will encourage students to help each other with spelling and some of the more logistical things which I don't want getting in the way of their inquiry and thought. Before handing the Engineering Journals back out, I will go through the "trial #1" sheet to ensure students get at least a gist of what the sheet is asking. The purpose of that sheet is to get students ideas on paper, so if reading is getting in the way of that, then I am happy to read it for them. I am grouping people for this project based on interest and personality equally with academic ability. For example, Angelyn has a hard time spelling and knowing exactly where to write things, but is a great team player and people like working with her. On the other hand, Keziah is very bright and has no issues getting her work done, but tends to boss her peers around. These students, as well as everyone else, have been placed thoughtfully.

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
in morning meeting: 10 minutes	Go over how to work in a group expectations: - <i>vocabulary</i> : Collaborative	

	<p>(we work together and build off of each other's ideas)</p> <ul style="list-style-type: none"> - "Share the mic" (listen to each other and share in each other's ideas) - Disagree with kindness (say "Hmm, I like where you're going, but what if we do....") - Compromise (your idea will not always be liked by your peers and that is okay! Can you settle on something that's kind of like it but a little different?) 	
3-5 minutes	<p>Write up objective and plans for the lesson: Today we will be adding to our Engineering Journal. We will also be able to plan and sketch plans collaboratively in a group.</p>	<p>Writing objectives on the board not only helps focus me as I go through the lesson, but also helps direct the students in their lesson.</p>
5-10 minutes	<p>Put engineering design cycle in Engineering Journals: Put pieces of paper over the design process so they have to tell me what comes next without peaking and then I take it off as they tell me and write down what comes next</p>	<p>As a way to get students to remember and internalize the design cycle, I think writing it down is very important, although I have noticed that simply copying from the board turns out to be really difficult for students, so I think if they are driving the conversation, the writing down of the steps will feel easier.</p>
5-10 minutes	<p>Add vocabulary to our Engineering Journals Engineer: someone who changes and creates things to make our lives easier or smoother Design: to create or make something</p>	<p>It's important to have one place where students can look back in their Engineering Journals for newly acquired vocabulary.</p>
1-3 minutes	<p>Make sure they know that they will be evaluating themselves on their own work put into this and how they work in groups Make sure they remember that spelling is important in this case, but</p>	<p>From the get go students should know what I expect so they can focus their learning, just I have focused my learning goals. It can also be helpful for younger minds to have big goals like "working as a team" broken into</p>

	that friends can help each other out. There is nothing wrong with looking on someone's piece of paper to learn how to spell something	approachable goals like listening to each other, compromising, saying things in a way that make people feel good about their ideas instead of bad, etc.
15-20 minutes	Students will share their brainstorming ideas to each other and then come up with one idea that they want to try out. (Remind them they can always try something else the second trial). Once they have decided on something they can draw it in their individual sketching journals for the first trial (make sure they all have the same thing). This should be labeled.	Students will have to work on their compromising skills during this part of the unit especially, and giving sufficient time for this is important, while also keeping the time somewhat limited so they don't lose focus.
5-10 minutes	Groups will pick one person to be their writer who will fill out the rubric with this lesson (kind of like an exit slip)	

b. What particular challenges, in terms of student learning or implementing planned activity, do you anticipate and how will you address them?

i. I am worried that throughout this somewhat slow process, students will get bogged down in the process of it and lose excitement of the actual project which is creating a boat model. Especially since the last class I told them we might start building, so I'm worried they'll be annoyed about that, but I think reassuring them that the building is coming will keep them on task. Also, while they're planning and sketching they'll have the opportunity to play with the materials.

ii. I am also a little concerned about the group-makings even though I've tried my best to be intentional with them. If people are not happy in their group, I will try a method that Jenny told us worked in her classroom for a similar project which was to verify with the Old Group to verify it's okay that they're leaving and then also with the New Group to see if it was okay that they enter their group. Putting the group making in the student's hands I think will emphasize what I mean about collaborating and team making, and also encourage students to do the self reflective work that is necessary to work in a team.

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?

Overall this lesson went really well! I was proud of the planning I had done and, regardless of Holly's unannounced observation, I felt prepared. I didn't realize it until Holly had pointed it out to me so explicitly, but my lesson had a clear trajectory and arch which was helpful to both me and my students. I started out the lesson with a review of what we had done previously, then I introduced what we would be working on for the day (new material), I gave a task, allowed for work time, and then had a clear exit slip/reflection. These steps were each clear in my mind, and therefore clear for my students, and because of this I think the lesson went well!

There were a few things that were unplanned, but ultimately aided in the progress of the lesson. Firstly, I gave a lot of positive affirmation. I was surprised at points with how well the class was behaving. When I revealed the various parts of the design cycle, I had time to walk around and encourage students in their ability to "keep up" and copy the board correctly. Later on in the process, I also recognized a group that I felt like was not only producing excellent work, but also practicing great team-building skills of listening and compromising. I asked them to share with the class their project and even in that process I was proud of their interaction. I whispered to them, "Would your group be okay sharing with the class your project? I'm very impressed!" Prince immediately pointed to Astrid and said, "Why don't you do it?," which I was proud of because he often likes being the one to talk. Angelyn piped up, "Can I do it?" Astrid

immediately gestured to her, "Sure, you can do it!" I loved the way they communicated and came to a quick consensus.

This interaction was after a minor fail in the lesson, however. I was aware that not everybody would be entirely happy in their groupings, so I was considering how I would approach that situation if it came to needing to be switched. Earlier in the week, a peer of mine suggested a strategy she used for group switching where she told the student who wanted to move they would have to check with the old group as well as with the new group, and if everyone agreed, it would be okay. I figured this would be a good method which would encourage students to self-advocate, self-reflect, and also communicate. The process ended up being a little hurtful for Prince, however, because he was put in a group with George. They knew that they couldn't work together fairly quickly, so I told Prince the rules and he went to go ask the group he wanted to move into if he could. They sort of begrudgingly said "maybe," so I told him maybe that wasn't the best choice. Then George asked if he could go in their group and they agreed. This was obviously very hurtful to Prince and he wasn't blind to the fact that some of his peers had just rejected him and he assumed it was because they didn't like him. Mary talked to him about why they might not have liked him in their group, and he went back to his original group while George got to switch. In the future I will try and facilitate that process more and anticipate when students may feel disappointed. I assumed that the group Prince asked initially would agree, but they didn't. I should have had George ask a different group so it wasn't so stark the rejection of Prince and then the acceptance of George.

All in all, I was proud of the work my students did to work together and create something that worked for all of them. There was some group conflict with Chino, Naliya and Sara, so I'm hoping my next mini lesson on compassion and team building will help that group's dynamics out.

I was also proud of my student's awareness and ability to self-assess for this group project. Below shows some of their self-assessments.

A big part of this lesson that I realize I need to focus more on is their thinking about the materials they use, and the focus on the *function* of this boat. There were a couple groups that were so focused on the beauty and funness of the boat, they were not focused enough on how the purpose of the boat is to float and hold weight. Those two factors are their main challenge. Within that challenge, they need to be thinking critically about the materials they choose. We talked about material choice in the first lesson and with my dad, but probably didn't hone in on it quite enough. In their self-assessment they were asked to write the materials they chose and *why*, however some groups wrote their purpose for why, instead of the quality of the material. In the future on their rubrics, maybe I'll ask a question more like, "What about this material makes you think it will do its job well?"

Below shows some of this work:

All work for this lesson was done in groups, so each paper has a few names assigned with it. Most groups either did one of the following when filling out their rubric: a) wrote about materials and their *purpose* for the boat; or b) wrote something very vague about the use of materials. No one really got to the step where they are writing about what qualities of the materials make them good for that purpose.

The second part of their rubric I also found very interesting because it asked them to reflect and assess themselves on their ability to work as a team. Naliya, Chino, and Sara's rubric is below and is especially interesting in comparison to their self reflection from the lesson following this one (delved more into in my CUP). This first lesson was really difficult for them to work together and compromise, which is why in my following lesson I made that a vocabulary word to focus on.

Group names: Natlydiana Chihlo Date: _____

PLAN AND SKETCH

Materials we picked	We picked this material because...
Popsticks	it could hold the flag
Bubble cap	so it could hold the wheel
egg carton	for hold the pennys
tin foil	to be the sail for the boat
paper plate	to hold the egg carton

	not very much	sometimes	most of the time
We listened to each other	X		
We worked as a team		X	

	yes	no
All of us have the same design in our Engineering Journals		X
We pencil sketched our design before coloring it	X	
We picked materials that we think will work	X	
We labeled our sketch with the materials used	X	

The following work shows what most students did which was write down the purpose of the materials in the boat instead of what qualities in the material made sense for where they were placed.

Group names: Khloe Keziah George Date: _____

PLAN AND SKETCH

Materials we picked	We picked this material because...
Egg carton	We chose this because the Egg carton it is a nice setting for the pennys.
tissue paper	We are going to use the tissue paper for the flag.
bubble wrap	We are going to use the bubble wrap for the bottom of the boat.
tin foil	We are going to put the tin foil at the bottom of the boat so it can float.
popstick sticks	We are going to use the popstick sticks to hold the flag.

	not very much	sometimes	most of the time
We listened to each other			X
We worked as a team			X

	yes	no
All of us have the same design in our Engineering Journals	X	
We pencil sketched our design before coloring it	X	
We picked materials that we think will work	X	
We labeled our sketch with the materials used	X	

The following group was clearly rushing through this part of the assessment, and were having a hard time deciding who could scribe for them, and ultimately Kyara just quickly wrote that the materials made sense for their project, and didn't understand the columns and how they coordinated with the materials they chose.

Group names: Nathaniel, Karina, Mario Date: 2/1/19

PLAN AND SKETCH

Materials we picked	We picked this material because...
plate + tin foil	we picked
egg carton / popsicle sticks	those materials
tape / label / pop	because, we
tissue paper	all agreed on
	it.

	not very much	sometimes	most of the time
We listened to each other			X
We worked as a team			X

	yes	no
All of us have the same design in our Engineering journals	X	
We pencil sketched our design before coloring it	X	
We picked materials that we think will work	X	
We labeled our sketch with the materials used	X	

groups:

Nathaniel - easy going, gets work done Mario - won't really participate, easy going	Keziah - bossy, gets work done, doesn't like working in groups at all Isaiah - hard to get	Chino - super spacey, will get work done in group, hard to work with	Prince - will get work done, hard to work in a group, not liked by many to work in groups	Serena - will get work done, very bossy in group Elijah - smart, not	Tariyah - hard worker, easy to be in group Angelo - excited, but not very focused, very personable
--	---	---	--	---	---

<p>Kyara - space cadet, does better in groups</p>	<p>started, easy going in group Khloe - timid, has good ideas, will get work done</p>	<p>Naliya - very hard worker, a little bit of a drama queen Sara - easy going, gets work done, good ideas</p>	<p>George - really doesn't like to write things down, kind of all over the place Astrid - hard worker, easy to work with, kind of likes prince i think bc they're both smart Angelyn - loves to learn, needs to be pushed to write stuff</p>	<p>very motivated Ashley - needs to feel very comfortable to work hard, but very smart. Friends with Serena</p>	<p>Christian - excited, hard to get to do work, a little difficult in groups</p>
--	--	--	---	---	---