September 11, 2014 observation notes

One of the suggested prompts in the handbook is to “Discuss a specific fear or uncertainty that emerged for you during the lesson. What prompted it? How did it influence your teaching? What can you learn from it?” In this reflection, I will focus in on this prompt as I reflect on the segment I led. I will analyze specific moments that prompted the fear, discuss how that analysis will influence my future practice, and refer to California Standards for the Teaching Profession – I will focus on “engaging and supporting all students in learning” and “assessing students for learning.”

A fear/uncertainty that emerged from me during the lesson was this fear of not being able to meet the learning needs of more vocal students who want to move more quickly through material (for example, Sofia and Frank) and the learning needs of less vocal students who do not process the information as quickly (for example, Raymond and Michelle). I think reading over the observation notes, the fear emerges in realizing that when Frank shares out, he uses a lot of vocabulary and sounds very academic, and students will clap or snap or praise Frank in response. While this is great for Frank, I worry that students might see him as “smart” and if they aren’t processing as quickly then they may feel “not smart”.

I think it influenced me in the moment in that it made me really want to wait for everyone to be ready in order to move on (the thumbs up, seeing that Raymond and Hayleigh needed more time) but my CT said later that I was losing the attention of students who were ready to move on. What I need to learn are some strategies for keeping Sofia and Frank busy and learning while not appearing to be giving them extra attention or favoring them over other students. I think that this dilemma
directly relates to the California Standard for Teaching Practice on “engaging and supporting all students in learning”. How do I balance engaging and supporting all students while also emphasizing that speed does not equate to academic prowess or success? How do I structure activities and assignments and exams to hold all students to a high standard when not all students are starting with the same background knowledge or skills?

I think a second standard this fear relates to is “assessing students for learning.” The way in which Frank and Sofia understand material and recording their answers on lifelines is very different from how Raymond and Michelle record their answers. As I walked around to see how far along students had gone with their lifelines, Sofia and Rico had finished really fast with highly accurate answers and were starting to have a conversation that was not about biodiversity. I can look at that lifeline as an assessment of their learning but am I really pushing them with that assessment to show as deep of an understanding that they can come to? With Raymond and Michelle, their answers are far simpler, and in grading them I can see their level of understanding but they might lose points for things that were not as obvious to them as they were to Sofia and Rico based simply on the fact that Sofia and Rico were more comfortable writing task.

I’m worried about how we really assess for the understanding and learning of biology and I guess I’m not sure if lifelines are really getting to that. While I understand that writing and reading comprehension are important for all students to master, I wonder how I can emphasize to students that their learning of the science does not depend only on their writing and reading skills while not de-
valuing the importance of writing and reading skills. I would be curious to have a conversation with our supervisory group about this. As science teachers we have this really interesting task of working with students from all different skill levels, trying to convince them that science is important and fun, but also having to work with different levels of math knowledge, reading/writing knowledge, that all seem to converge in our study of biology.
Some moments I want to focus on in this reflection are ones where I lost student engagement, and ones that capture a sense of the classroom environment. The two standards I will tie in are “engaging and supporting all students” and “maintaining effective environments”.

The moments I want to analyze are ones during which engagement was lost. A few times in the observation notes, it was noted that students had their heads down. I think another related engagement issue is my use of share-out practices that involve getting all students to yell out. With those practices I was getting many of the same students sharing out, but with that type of activity I think it might be easier for students to “defect” from an activity that involves everyone yelling out because they can just choose not to speak and there isn’t a real way to keep them accountable. Whereas with a whip-around or something where they have to raise their hand or raise an object, it’s a lot easier to point out students who aren’t doing that task.

I think this will affect my future practice because if have learned anything from teaching this class period and contrasting it with other classes that I’ve seen, classes really vary in the dynamics between and among students. Different strategies and practices work better or worse for different learning communities. I look forward to trying different engagement styles to fit the needs of different students.

It seems like something that might be integral to shifting engagement practices to engage students it maintaining an effective learning environment.
During our class, two students were having a somewhat heated discussion and eventually one student asked to sit somewhere else, and then the entire vibe of the room changed. Unfortunately I did not check in with the students about how they were doing at that time but in the future I hope to address these types of management issues sooner after they occur.

Making sure students are quiet and focused at some times (of course not when they are doing pair work or group work) seems really critical to maintaining that effective environment. When students are quietly working and not bothering each other, student can learn uninterrupted by distractions or disruptions.

A question I have that connects these two standards (engagement and effective environment) is what can I do about pairs (when they are pair and sharing) who finish the task really quick and just sort of sit and hangout or pairs who don’t do the task? Especially in a larger class setting? The class says they really like talking to a partner in order to process and learn ideas, but at times I feel as though they are not really listening to each other. Something else students do that I’m not sure how to address is when you come to a pair or group and ask if both partners and all group members are participating. If students say yes, but in reality you know this is false, what do you say to students?

I think I am beginning to move in my understanding and practice from a place of smaller more specific questions to larger questions and wonderings about the ecology of the class, and especially as I got to teach one whole lesson, how the ebb and flow of the class goes. I’m looking forward to thinking about bigger themes
and how to teach within and across units in really dynamic ways that engage students in an effective learning environment.
Reciprocal observation reflection
Observer: Mary Clare Bernal

The prompt I will directly respond to in this reflection is: What have you learned about your students during this lesson? What have you learned about yourself? What evidence of student learning can you identify, and how does that evidence influence what you will do next?

In this class period we did three things, a microslide activity, a game of ecological relationships charades, and then some time to get organized, finish up the microslide activity (for those who had not finished) and start homework. I will focus on the microslides activity (this took the bulk of class time) and the charades game.

I think that I learned more about effective differentiated instruction, and also about ways to get my students to explain things and to teach each other. I also had students do a lot of the passing papers and equipment out during the microslides activity. I think this was really effective and gave them a sense of ownership and importance in running the class. Also during the activity as people finished early, I made sure that they were helping their peers and was I think unconsciously teaching them how to teach each other. At some point, I said to the class, “Help each other out! You are each other’s best resource.” I think this is something I want to continue developing in my practice because it keeps all students engaged and they really do learn more when they explain and teach. (This hits the engaging and supporting students California teaching standard)

Then, with the charades game, I gave students a chance to explain ideas to each other as well as perform. I think students who are more performative really benefited from the chance to act out some concepts and explain them. For the students watching, I think it was entertaining to watch their peers and to have to explain their answers (which they would write on small white boards to predict which ecological relationship the “charades” actors were acting out. I think the planning I did with Stephannie for the
The charades game really allowed to be as successful as it was (this hits the lesson planning California teaching standard). The charades game was also a very practical and fun way to assess student learning. I could really see when students were matching their use of certain vocabulary when they saw certain relationships being performed, and when they had to justify their choice, they had to define the relationship which gave me a chance to see if they could explain it accurately.

One challenge I am having that Mary Clare was able to observe first hand, that Stephannie has also observed is the relationship between two students, Frank and Albert. This challenge is related to the California teaching standard on creating effective learning environments. They consistently bug each other, and I think I am beginning to see Frank as the instigator in these situations. I also think that Albert’s anxiety may be a part of the challenge here. There is a flag on file for Albert, and teachers should let him leave the room if his anxiety becomes an issue for him. I think that Frank is also developing and learning about how to interact appropriately with other students, as he is an adolescent in development.

I think my plan moving forward is to meet with Frank, and to take the pressure off Albert. I had been firm with both of them, together, and separately, but I think that Frank is triggering for Albert. If I were able to get Frank on my team, if I can get him to really think about how he is affecting the students around him, then we can move forward. Other than this relationship, I’m not too worried about student engagement from the rest of the class. I have a few English language learners who sometimes put their heads down, but I think if we play more games and have really active and participatory activities, I can maintain student engagement and a safe and effective learning environment.
One last reflective note about teaching practice, increasingly I’ve found that since I have such a small class, I’d like to let go of equity cards and start calling on students by name, only after opportunities for pairing and sharing. I think I really need to get my language learners as well as RFEP students talking in class. We are a small class and I think that if students can feel safe talking to their partners and then share out, we could develop a safe classroom space for learning science by making mistakes with the language in order to learn it more deeply (in the same way one would learn a foreign language). I think that also utilizing a re-voicer for class conversations could be another effective teaching practice to use with this class.
Observation Reflection for February 24

Some moments I want to focus on in this reflection are real-world connections and classroom management. The two standards I will tie in are “engaging and supporting all students” and “maintaining effective environments”.

In terms of engaging and supporting all students, the lecture on biotechnology and the corresponding graphic organizer were great because they really connected the science to real world examples such as using spider DNA in goats to make silk for everyday items. Many students had a cat or dog, and were interested in the domestication process.

But I think in transitioning from the importance of biotechnology to using the tools of biotechnology, I could have given students pipettes to hold and look at while I was explaining their use. I spent a lot of time showing them the pipettes and talking about them, but I could have told the students to just be very careful with the pipettes because they are delicate and shared across the district in order to ensure that they would be respectful of the equipment.

In terms of maintaining effective environments, I think that really setting the tone during announcements at the beginning of class and using more nonverbal communication and just stopping and waiting for the class to settle would have been helpful. I have been a bit soft and haven’t been firm where I’ve needed to be in order to reign in student energy. I have since been trying to have a more serious tone and look on my face when students are being disruptive or disrespectful.

Thinking about these themes will affect my future practice because sometimes I think I get into a routine and forget to really (1) take the time to make real world connections between content and students’ lives and (2) take the
importance of an orderly-feeling classroom for granted. But for students to feel like what they are learning is important and related to their life and for students to feel a sense of control and in the classroom will ultimately boost student engagement and create an effective learning environment.

A question I have that connects these two standards (engagement and effective environment) is how can I start building up a classroom culture where students are reinforcing those behaviors? Are there ways of teaching students how to make those real world connections or to seek out those real world connections on their own?

I think I am beginning to move in my understanding and practice in that I can see how classroom norming and culture are really integrally linked to assessment. I think that I’ve begun to shift away from this idea of teaching to a test and want students to talk to each other, make real world connections, and hold each other accountable in building and maintaining this effective learning environment.

After a recent visit to Life Academy, I got to see a class of freshman where students were allowed to take a “100% quiz” where you had to keep taking the quiz over and over until you got a 100%. And each time someone passed, the whole class celebrated that and the test-passer got to add their name to a poster. Students show this kind of collective mindset when quieting down to listen to their teacher, and when listening to direct instruction. They readily make connections between content they learn and real world contexts.

I’m excited to continue to think about how to teach students how to be independent thinkers and learners!
video reflection from January 21, 2015
Starting at minute 39:00 through the end of 1st video
and the first 14 minutes of the 2nd video

• Describe any routines or working structures of the class (e.g., group work roles, class discussion norms) that were operating in the learning tasks seen on the video clips. If specific routines or working structures are new to the students, how did you prepare students for them? (PACT Teaching Event Prompt 2 - TPE 10)

The learning task seen on the video is an activity in which students (1) have to look at a series of pictures of cells missing organelles (2) identify which organelles are missing (3) record this information in a graphic organizer (4) also record why a cell would be impacted if it were missing organelles.

One routine in our classroom is using graphic organizers during activities to record reflections, notes, and content during activities. Another routine in our classroom is working with other students and discussing answers when completing activities and filling in graphic organizers.

Working with the pictures of the cells, which are models of cells was new for the students. Up until this point, students have had relatively little experience working with models. To engage with these cell models with missing organelles students needed a lot of scaffolding and modeling from the teacher.

So, I prepared students by explaining the activity multiple times, modeling how to identify the missing organelle in cell 1, and I also introduced some strategies for how to compare and contrast when identifying missing information. For example, I told students that cell 9 contained all the organelles, and that they could then use cell 9 as a reference for all the other cells, in order to see what those other cells were missing.

• In the instruction seen in the clips, how did you further the students’ knowledge and skills and engage them intellectually. Provide examples of both general strategies to address the needs of all of your students and strategies to address specific individual needs. (a version of PACT Teaching Event prompt 3 - TPEs 1, 2, 4, 5, 7, 11)

GENERAL STRATEGIES

I furthered student knowledge and skills and engaged student intellectually a few different ways:

1. As I mentioned in the previous section, I used this activity to get students to work with models and to engage in having to understand and explain a model in order to derive meaning from it. As students make sense of what each cell card was showing and what symbols represented each organelle, students had to be flexible in recognizing that the organelles are not always depicted one way or another, and that we use abstract models in order to illustrate these things we usually can’t see.
2. Students had to **argue, discuss, and convince** their group members of their thoughts and ideas about which organelles were present or not present in each cell. They did not always agree, and had to go back to their notes in their notebook to **look for and use evidence to defend their ideas.**

3. Before doing this missing organelles activity, students had created whiteboard presentations about the functions and importance of each of the organelles. The missing organelles activity allowed for students to **transfer and stretch** their knowledge from the previous activity into a new learning context.

4. Students had to use **hypothetical thinking** and also **recognize the importance** of the organelles to the functioning of the cell, and indirectly to how living things grow and survive, which is the big idea for our current unit.

**INDIVIDUAL STRATEGIES**

The individual strategies I used were:

1. **Going around to groups** while they were in their conversations and helping students **clear up misconceptions** specific to individual students or groups. I was able to do a bit of correcting and also assigned competence to students who were on the right track.

2. I also have a number of English language learners, and I tried to get individual students who were struggling with some of the vocabulary to **repeat the words** multiple times and to **practice using science language.**

**• Describe the strategies you used to monitor student learning during the learning task shown on the video clips. Cite one or two examples of what students said and/or did in the video clips or in assessments related to the lesson(s) that indicated their progress toward accomplishing the lesson(s)' learning objectives. (PACT Teaching Event Prompt 5 - TPEs 2, 3)**

To monitor learning I **checked in with students and their groups** to have conversations and to get students to **explain their thinking,** but I also have a record of their learning as they were **recording their answers and ideas** on a **graphic organizer** taped into their notebooks that I can reference to gauge their learning.

To return to the relevant learning **objective** I listed, pertaining to the learning task shown in the video:

- In this lesson, students will be able to **show and explain** the functions of various organelles and to **discuss** with their peers about how the organelles play a role in the survival of a cell

What students **said** or **did** in clips or assessments that indicates progress toward learning objectives:
At the very beginning of the second video, a male student (who has his headphones poking out of his hoodie) is talking to his group about what’s missing from one of the cells. He is remembering prior knowledge about how cells need some kind of outer layer, and identifies the cell wall as the organelle that is missing. I remind him that the cells shown are animal cells and so they do not have a cell wall, and I ask him to identify on a picture of the animal cell what that outer layer is called, and he says, “oh, plasma membrane.”

In this moment, this student is using his prior knowledge, applying it to a new context, and allowing me to clear up any misconceptions. He is getting closer to achieving the objective of being able to show, explain, and discuss the importance of the organelles to the growth and survival of a cell.
1. What is working? What is not? For whom? Why? (Consider teaching and student learning with respect to both content and academic language development.)

The general schedule for the day was:

1. Socrative review of last class’s material
2. Karyotype activity
3. Movie, slides, reading activity

The kids LOVED doing the formative assessment on socrative! It was our first time, and I think it really gave students a chance to engage with an assessment, see how their understanding was developing compared to their peers, and also share out ideas and different opinions. Students said, “This is fun!” “Can we do it again?”

I think this activity really allows for reflection and reinforcement of the content and academic language. This seemed to work well for all learners.

I think the karyotype activity went well as well because students were able to manipulate the chromosomes in ways that made sense to them, and then they were able to compare their work with a more standard karyotype. They really engaged with those elements of inquiry with more certainty than I’m used to seeing in them. I think in many ways, they are getting more comfortable with inquiry.

And finally with the conversation and movie on biological sex and gender identity, I would have liked to spend more time getting students prepared to watch the short movie. But I think that even getting them to connect their misconceptions about chromosomes and sex and gender identity in linking this understanding to the previous activity and their prior knowledge proved useful. They all seemed very impacted by the film, and I am hoping that this gives students some motivation to do their homework!

Since the homework is to do the spicy/mild reading about the SRY gene usually found on the Y chromosome.

Interestingly some students did choose the spicy reading, although many language learners took the mild reading. I think this was a great use of differentiation and I’m excited to see how students handle the reading. I hope that because it’s an interesting topic that they will do the reading and engage with it and reflect on it. I think it’ll deeper their understanding and sense of relevance with this material.

2. How does this reflection inform what you plan to do in the next lesson?

I think that I’d like to use socrative again, but this time to get students talking about and working on making meaning from the reading. My plan is to finish up the film, debrief the reading (not sure what order yet) and then use this idea of genes coding for physical traits as a starting point for the students’ understanding of how genes code for something
(like the color of alien earwax...) and how these genes could get passed from a parent to an offspring.
4-28 observation reflection

**What have you learned about your students during this lesson?**

During this lesson, I learned that some of my students who are sometimes quieter really thrived with the model-building activity. One pair – English language learners – actually finished building the model before any other pair. I think that because they were building the model using rules and not worrying about the science or academic language, they were just focused on using their analytical and problem-solving skills to complete the task. I also learned that my students have gotten used to and familiar with the practice of helping one another when they have completed a task.

I think the models really worked well in terms of giving all students an opportunity to engage with material through guided inquiry. Students were working together and trying different combinations and manipulating materials with purpose. They were also able to connect their experience of model building to the experiences of renowned scientists Watson and Crick. I think that students really felt like scientists.

**What have you leaned about yourself?**

I learned that I might have let myself slip in terms of strictness and classroom management. I need to make sure I have my clipboard ready when students are coming in, and that I set a calm, orderly, relaxed tone at the beginning of class that I maintain throughout. It’s ok to stop and wait and look at my students with a serious face. I think that I also did not move students around to give them space and new environments in which to focus. In the past this has been an effective way to stop talking and disruptive behavior in my class. I think also that I prefer giving students time to work on things in class over giving long lectures. While I do enjoy explaining concepts and running whole-
class discussions, I think that partner work, individual work, and group discussions and activities work better for students and also gives me as the instructor a break!

**What evidence of student learning can you identify, and how does that evidence influence what you will do next?**

I think that students were able to takeaway a general sense of what DNA is from the model-building activity, and then going over some of the vocabulary was new but challenging for students. There is a lot of new vocabulary, a lot of new words to remember. I think moving forward, I can review these terms but also find opportunities to remove scaffolds so that students become more familiar with the terms and get used to using them comfortably.

I want to also find more ways of applying this content to relevant contexts. Much of the material is somewhat abstract and new for students. It can feel technical and distant from reality. I'm also wondering how to balance out this feeling of needing to go extremely in depth and teaching a really technical unit as opposed to going less in depth with the technical aspects of genetics and focusing instead on real world applications, implications, and arguments.

One area I want to learn more about and practice more is how to engage my students in *scientific* argument. I learned about it and was skeptical of its utility in Jonathan Osborne's class, but am realizing more and more that scientific inquiry and argumentation is really distinct and unique from other forms of inquiry and discussion. How do we teach it? How do we get students to distinguish how it is different from other forms of inquiry and discussion?
5-12 observation reflection

In this observation, I would like to focus on how my classroom culture and management and practice have developed over the course of the year. I think that in some ways, I was able to create a really fun and engaging and safe learning environment. Students know that I demand respect, and that I in turn respect them and expect for them to respect each other. Students are very casual in class, and tell me about their lives and about what is challenging and what is interesting about biology and about school at large.

I think that I have achieved one very important thing that I’ve been taught to do as a teacher. I know my students. I really, really know them. I know that students know that I truly believe in their ability to challenge themselves and to succeed. I feel very proud of this accomplishment, and I hope that I never lose the ability to connect with students, to get to know them, and to get them to feel like they can learn and be successful in the classroom.

What I need to work on in the future is really establishing early on WHAT respect in a CLASSROOM looks like. I think that behaviors like students putting their feet up or having their ear buds in or talking over each other or me or charging their phones in class – these behaviors aren’t inherently evil. But in order for things to run more smoothly, in order to maximize teaching and learning time, I need to figure out really clear and consistent systems to facilitate a more calm and productive classroom without coming across as militant.

I think that this needs to happen really early in the year. At this point, with about one week of instruction (mostly review) left, I don't really know if it's in my
best interest to totally re-norm everything about my classroom. I believe that students will get as much work done as they can in class, and they may talk to each other and listen to music and be charging their phones. I’m ok with that, with this class, for one week. I want them to use their class time well and if that means they have to have their phone charging before start working on their review, that’s ok with me because I never created a rule at the beginning based on reflection with the class and some evidence of why no phones charging would be better for our class as a whole.

I think that when I’m creating rules and also as I need to come up with new rules at the beginning of my first year of teaching, that rule-making process needs to be done WITH students and not AGAINST them to control them. If I’ve learned anything this year, it’s that I don’t necessarily want to negotiate or argue with students, but the decisions I make that affect the whole class need to be reflected upon by the whole class.

In the same way a coach doesn’t just change a bunch of things about the workouts a team does without input from the team, I can’t just change a bunch of things. Good coaches reflect with their team on their performance, and together they sometimes have to make difficult decisions in order to ultimately have a more effective team. I know that I will have challenges similar to the ones I faced this year, and I think when I have my own classroom, I will be able to stop the whole class and establish new rules with them.

I see my classes and my students as individuals who are figuring out respect and how to collectively make decisions that – while they might seem un-fun or not
favorable in some moment – need to happen in order for effective learning and interaction to proceed.
## Basic Observation Notes

### California Standards for the Teaching Profession

<table>
<thead>
<tr>
<th>Time</th>
<th>Observations</th>
<th>Comments/Anecdotal Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:35</td>
<td>Sam: everyone should be in their seats and working on their warm-up. “Help me help you so I can get you out of here on time” Students work quietly on warm-up</td>
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<tr>
<td>7:39</td>
<td>Sam: Take just another minute to work on your warm-up...</td>
<td>While students warm-up and write things down and get organized, Sam is milling around the room answering questions.</td>
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<tr>
<td>7:40</td>
<td>Sam: moving on to objective, but before that set up new unit in notebook. Open to next completely free page. Set up unit 3 objectives page, date, and objectives, setting up notebook for beginning of unit 3. Name for unit 3 is electrons and bonding. The day’s objectives are “conduct a flame test properly and distinguish between elements based on their flame test color. We’re going to be using flames today!</td>
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<td>7:43</td>
<td>Sam: Agenda for today – we’ve done warm-up, taking notes on Bunsen burner, then flame test lab. Your homework is going to be to complete your lab and it’s due on next Wednesday. Everyone should have their agendas out and writing down their homework. Flame test lab will be due on Wednesday of next week.</td>
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<tr>
<td>7:46</td>
<td>Sam: Taking some notes on Bunsen burner. Passing out small handout to take notes on, diagram of Bunsen burner, paste this into your notebook. Grab a glue stick; paste this into notebook on the next full page. Also update table of contents. Writes “11/4 bunsen burner” on the “chemistry table of contents” white board Students get up to grab glue sticks.</td>
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<tr>
<td>Time</td>
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<td>Notes</td>
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<tr>
<td>7:49</td>
<td>We’re gonna be burning things today&lt;br&gt; We’re gonna connect gas inlet to a hose. Gas flow is controlled by the needle valve. Through base and air ports, up through barrel, burns at the top.</td>
<td>A few students say “yeah!”</td>
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<td></td>
<td>Pick up Bunsen burner. Use needle valve to adjust flow of gas. Turn it to the left to open. Counterclockwise to close the valve. A way to know if gas is opened or closed. Next, we have the air vents or ports. Unscrew that. You can see the spaces here will open and close. That will let more air or less air. More air you have, the hotter the flame you will get. Make sure when you tighten these, make sure you don’t make them too tight so the next person and make adjustments.</td>
<td>A few students play with the striker “you broke it!” “oh shit” lots of sounds of students trying it out.</td>
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<tr>
<td>7:55</td>
<td>Close all screws. Put on goggles. Anytime we work with flames, long hair tied back. Connect hose to gas. Other end connected to Bunsen burner. Next, look at striker. Make sure you and your partner try it so you can both get a good spark.</td>
<td>When the flame becomes lit, student say “whoa!” and a few stand up so that they can see what’s happening up front.</td>
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<td>8:00</td>
<td>Sam shows students how to turn on gas and then lights flame, adjusts the flame so that it’s hot and blue</td>
<td>Students start working on pre-lab questions (writing in notebook)</td>
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<tr>
<td>8:03</td>
<td>Now we’ll work on pre-lab questions. First few questions are what we were just talking about. (turns on music!) Put up for students who are drawing diagrams, and who are copying what they took notes on during the demo</td>
<td>Students go to back of room to get goggles and start tying up hair.</td>
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<tr>
<td>8:07</td>
<td>We need to be in lab safety mode, put everything away, backpacks under tables, get goggles, long hair should be tied back. Be ready to go in the next 45 seconds! Chair pushed in. Keep your goggles on, if you feel like you need to take them off, go to back of room.</td>
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<td></td>
<td>Now, everyone will connect their Bunsen burners. Please look up when you’ve done this so I know everyone is ready. We need to move you quickly but safely so we can get you out on time. If gas is open for more than 5-10 seconds, need to turn it off and wait before trying again.</td>
<td>I need everyone listening to me at this point. Open needle valve at one full turn.</td>
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<td></td>
<td>(at some point, Sam had them begin and I got distracted by all the sparks and flames) Students begin to light their flames, some exclamation, makes sure to go around and check in with groups making sure all have lit flame.</td>
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<td>Time</td>
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<td>Notes</td>
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<tr>
<td>8:13</td>
<td>We will turn off lights (students say oooh!) another student goes shhhhh so that students can hear Sam. Sam asks students to re-light flames to achieve the double cone with the blue inside.</td>
<td>Students struggling help each other get the flame lit.</td>
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<tr>
<td>8:16</td>
<td>If flame is too high, close down needle valve on the bottom. Next thing, identify your dropper bottle and wire loop in your tray. Each dropper bottle has different solution in it. It should say something, this one says KCl. Potassium Chloride. You have 7 solutions and you need to conduct a flame test for each. You have a white tray, hold loop over tray, and place a drop from your bottle onto the end of your wire loop. Need one drop that will stick on to the wire loop. Put the loop with chemical into the flame.</td>
<td>Students start asking a lot of questions, where do we go? What do we do?</td>
</tr>
<tr>
<td>8:19</td>
<td>At some point, slide containing the various chemical names gets projected.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>demonstrates how to test one of the chemicals</td>
<td></td>
</tr>
<tr>
<td></td>
<td>tells students you will test your chemical. Then, you will rotate clockwise around the room to test different chemicals, making sure to write down Name and Formula. Make sure you turn OFF Bunsen burner before moving around.</td>
<td></td>
</tr>
<tr>
<td>8:24</td>
<td>Re-reminds students, their task is to go around the room testing each chemical and recording observations. There are two “mystery” chemicals and based on the data they collect they can predict what these are.</td>
<td>Seems like after clarifying, students are able to independently get started on trying out different chemicals to test with the flame</td>
</tr>
<tr>
<td>8:29</td>
<td>Sam goes around and checks in with various groups. He also is having students get the set up going, and then giving them a stamp for having completed the lab techniques.</td>
<td>Students move around the room, testing chemicals, chatting casually.</td>
</tr>
<tr>
<td>8:35</td>
<td>We have about 20 minutes left in this lab. Make sure you get to the unknowns and finish the lab. Continues milling around room, checking in with students.</td>
<td>At one point, CT yells out “TURN IT OFF” at a student who had left the gas on for too long...</td>
</tr>
<tr>
<td>8:50</td>
<td>If you finished, return to your seat and start working on lab analysis questions. (students start taking off goggles) Sam asks that students keep goggles on while there is still flame. Raise your hand if you have not gotten a stamp yet?</td>
<td>One student asks Sam if he can take goggles off, takes goggles off and puts them away.</td>
</tr>
<tr>
<td></td>
<td>Make sure you’ve disconnected everything and placed them back in the bin</td>
<td>Not all students listening, different students doing different task, asking if they can take of goggles, asking for stamps.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Some students are chillin, talking</td>
</tr>
<tr>
<td>Time</td>
<td>Action</td>
<td>Notes</td>
</tr>
<tr>
<td>-------</td>
<td>------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>8:55</td>
<td>Students start returning to their seats. Sam reminds students to put all their materials back in the tray. Now I’m gonna have you work on your cool down, if everything if put away back in the tray. Changes to the slide on the screen, containing the cool down.</td>
<td>Students begin working on cool down, others are still putting away goggles, and others are finishing up the flame test.</td>
</tr>
<tr>
<td>8:58</td>
<td>Asks students to finish cool down, reminds students that the lab is due next Wednesday (that’s their homework). Sam turns lights back on.</td>
<td>Students get really quiet! They stay and continue to work on cool down even after the bell has rung.</td>
</tr>
</tbody>
</table>

**California Standards for the Teaching Profession**

1. Engaging and Supporting All Students in Learning
2. Creating and Maintaining Effective Environments
3. Understanding and Organizing Subject Matter
4. Planning Instruction and Designing Learning Experiences
5. Assessing Student Learning
6. Developing as a Professional Educator
Debrief of a Classroom Observation

Teacher Candidate: 

Supervisor: 

Grade Level/Subject Area: Chemistry School: Fremont High School

Observation focus: N/A

Strengths and highlights of the class:

The strengths of the class were how smooth it went at the beginning. Sam did a great job of orienting students to the day and clearly presenting the objectives and agenda for the day. At no point did students seem completely checked out or lost, from my perspective they all seemed really engaged in preparing for and completing the flame test lab. He assigned competence when students were doing things effectively and productively, and supported students who had questions or said they needed help. I feel that Sam had a real control over the classroom and over his students in terms of making sure they were ready for the lab.

Outcomes of and evidence for the identified focus: N/A

(i.e. student learning, classroom management, assessment)

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Next steps (instructional and/or candidate professional growth):

- What do the students need next?
  
  I think students generally need more of the same; Sam is doing a great job in terms of teaching clearly and efficiently. I think maybe one thing that Sam and I discussed was a concern with safety, and making sure to put extra emphasis on certain things that might be salient for labs with dangerous things like fire or toxic chemicals.

- What would you do differently if you were to teach the lesson again?

  We discussed just placing a bigger emphasis on turning the gas off after it’s been on for 5-10 seconds as that’s a safety hazard that some students were not 100% remembering during the lab.

- What goals for professional growth did the lesson prompt?

  When we chatted, we talked about a sometimes perceived sharpness in the delivery of content or directions, and we discussed a few strategies for how to get around this “sharpness.” But honestly I found Sam’s delivery to be very clear and concise. I’m not sure if I detected any sharpness at first, and I think that the crispiness of it makes it very clear and efficient.

  - How will you move forward with working on these goals?

    One goal we discussed was this idea of continuing to work on giving really clear explicit directions, and it seems like this was important to Sam before, but now more than ever paired with this idea of softening or warming up delivery, I think these two things to improve upon work really well and are definitely within reach with some practice.

Questions/clarifications/dilemmas:

Supervisor: Keep copy, and give one to STEP administration, Teacher Candidate, and Cooperating Teacher (as needed)
Reciprocal observation reflection  
Observer: Mary Clare Bernal

The prompt I will directly respond to in this reflection is: What have you learned about your students during this lesson? What have you leaned about yourself? What evidence of student learning can you identify, and how does that evidence influence what you will do next?

In this class period we did three things, a microslide activity, a game of ecological relationships charades, and then some time to get organized, finish up the microslide activity (for those who had not finished) and start homework. I will focus on the microslides activity (this took the bulk of class time) and the charades game.

I think that I learned more about effective differentiated instruction, and also about ways to get my students to explain things and to teach each other. I also had students do a lot of the passing papers and equipment out during the microslides activity. I think this was really effective and gave them a sense of ownership and importance in running the class. Also during the activity as people finished early, I made sure that they were helping their peers and was I think unconsciously teaching them how to teach each other. At some point, I said to the class, “Help each other out! You are each other’s best resource.” I think this is something I want to continue developing in my practice because it keeps all students engaged and they really do learn more when they explain and teach. (This hits the engaging and supporting students California teaching standard)

Then, with the charades game, I gave students a chance to explain ideas to each other as well as perform. I think students who are more performative really benefited from the chance to act out some concepts and explain them. For the students watching, I think it was entertaining to watch their peers and to have to explain their answers (which they would write on small white boards to predict which ecological relationship the “charades” actors were acting out. I think the planning I did with Stephannie for the
charades game really allowed to be as successful as it was (this hits the lesson planning California teaching standard). The charades game was also a very practical and fun way to assess student learning. I could really see when students were matching their use of certain vocabulary when they saw certain relationships being performed, and when they had to justify their choice, they had to define the relationship which gave me a chance to see if they could explain it accurately.

One challenge I am having that Mary Clare was able to observe first hand, that Stephannie has also observed is the relationship between two students, Frank and Albert. This challenge is related to the California teaching standard on creating effective learning environments. They consistently bug each other, and I think I am beginning to see Frank as the instigator in these situations. I also think that Albert’s anxiety may be a part of the challenge here. There is a flag on file for Albert, and teachers should let him leave the room if his anxiety becomes an issue for him. I think that Frank is also developing and learning about how to interact appropriately with other students, as he is an adolescent in development.

I think my plan moving forward is to meet with Frank, and to take the pressure off Albert. I had been firm with both of them, together, and separately, but I think that Frank is triggering for Albert. If I were able to get Frank on my team, if I can get him to really think about how he is affecting the students around him, then we can move forward. Other than this relationship, I’m not too worried about student engagement from the rest of the class. I have a few English language learners who sometimes put their heads down, but I think if we play more games and have really active and participatory activities, I can maintain student engagement and a safe and effective learning environment.
One last reflective note about teaching practice, increasingly I’ve found that since I have such a small class, I’d like to let go of equity cards and start calling on students by name, only after opportunities for pairing and sharing. I think I really need to get my language learners as well as RFEP students talking in class. We are a small class and I think that if students can feel safe talking to their partners and then share out, we could develop a safe classroom space for learning science by making mistakes with the language in order to learn it more deeply (in the same way one would learn a foreign language). I think that also utilizing a re-voicer for class conversations could be another effective teaching practice to use with this class.
STEP Summary Reflection

Teaching Philosophy Statement................................................................................................................2
Graduation Portfolio and CSTPs..............................................................................................................4
Strengths and Areas for Growth around the CSTPs...............................................................................6
Strengths and Goals for Professional Development...............................................................................8
Teaching Philosophy Statement

What is the role(s) of the teacher? How will you teach your students?

In William Glasser’s book “Choice Theory in the Classroom” it is recommended that teachers should be like modern managers in classrooms, where they are, “willing to share power” (90).

I agree with Glasser that teachers should not be traditional managers, but I also find that this term “modern” is still problematic in that there does not yet exist within this era a form of management that exists outside of other problematic systems of power that privilege certain behaviors and backgrounds over others.

Instead, I much prefer approaches shared by Stanford researcher and science educator Bryan Brown. He says that teachers are learning coaches. Coaches take on many roles such as that of counselor, friend, mentor, their main goal is to work on a specific set of skills with their athlete in order for that athlete to improve and be successful in whatever sport they are being coached in.

As a teacher, I will similarly fill a role for my students as a counselor, friend, and mentor. But my main goal will be to coach my students as learners, to come up with collective and individual strategies that help my students learn, so that they will be able to learn independently in the future and to be resilient as people and as learners.

How does your identity influence your ideas about teaching?

Parker Palmer in his work “The Heart of Teacher” says that, “teaching is always done at the dangerous intersection of personal and public life” (10). I find this rather alarming. Why should work done at the intersection of personal and public life be considered “dangerous”?

I chose teaching precisely because my personal and public identities cannot be separated. My queer, mixed race, female, and Catholic identities are both personal and public. They are constantly at odds with my identities as a teacher and a biologist. I hope to be transparent about my identities, how I am struggling and growing with them, and I hope my students feel safe and open in my classroom to talk about their own journeys with their multiple identities.

How have any theoretical perspectives shaped your thinking on CML?

Theorist of education Paolo Freire says in “Pedagogy of Freedom”:

“Respect for the autonomy of every person is an ethical imperative and not a favor that we may or may not concede to each other.”
Freire’s theories in general resonate with me as an educator. But this quote in particular has shaped my thinking on CML. No matter how much research or evidence shows that a controlled classroom facilitates learning, I would not sacrifice the autonomy of my students in order to create a sense of order. I also believe every human being has a right to live and love and survive in the world without being discriminated against or judged.

Freire’s work and theories motivate my desire for my classroom to be one where autonomy, possibility, respect, and resilience guide our learning and interaction.

**Summing it up: my role as a teacher, how I will teach, and why**

I believe teachers have tremendous power as learning coaches to teach students how to learn, both **academically, socially, and emotionally** and that this is a part of giving students from all backgrounds the skills they need to live **resilient and respectful lives**. **A common theme that will run throughout this classroom management plan is a focus on teaching resilience and respect.** I chose the teaching profession because of my belief in its capacity for creating safe and open spaces for learning and progressive change. I hope my classroom management reflects all of the values expressed above.
## Graduation Portfolio and CSTPs

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Relation to CSTPs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literacies project</td>
<td>This project really aligns well with engaging and supporting all students in learning. Literacies were all about dialogic discussion where every student has a voice and brings something to the classroom. Each student’s sense making is supported, highlighted, and respected as part of a process of creating knowledge together.</td>
</tr>
<tr>
<td>Adolescent case study</td>
<td>This project really aligns well with all six of the standards because this project grounds the teacher in student experience. In order for teachers to do any of the standards well, we have to first know about and understand our students.</td>
</tr>
<tr>
<td>CML plan</td>
<td>This project is directly aligned with the standard on creating and maintaining effective environments. In this project, I really explored many different ways of maintaining this effective environment, and I think that creating a management plan allowed me to directly address this standard and now I’m ready to implement in my own classroom to meet this standard in my practice.</td>
</tr>
<tr>
<td>LPP project</td>
<td>This project really allowed me to explore the standards on organizing subject matter, planning and designing learning experiences, and assessing student learning through the lens of supporting English Language Learners. I had to really understand how to meet all of the standards and then organize, design, and assess for the unique needs to ELLs in the LPP projects.</td>
</tr>
<tr>
<td>TLHC project</td>
<td>The TLHC addressed all standards because it really hit all 5 of the more in-classroom standards while also allowing me to develop professionally as I collaborated on the entire project with another STEP teacher.</td>
</tr>
<tr>
<td>Assessment Plan</td>
<td>I found that this assessment plan really focused on the standard on assessing student learning. I will be going into my first year of teaching very well prepared around this standard with an assessment plan and philosophy in place.</td>
</tr>
<tr>
<td>SPED case study</td>
<td>This project allowed me to engage with all of the standards that the adolescent case study did. Also, in the same way that the LPP project allowed me to focus my practice on supporting ELLs, this class allowed me to really focus my practice on how to differentiate for students with special needs while also aiming to have a classroom teaching practice that is designed for universal learning.</td>
</tr>
<tr>
<td>PACT and curriculum unit</td>
<td>Both the PACT and curriculum unit hit all of the standards and required me to reflect on them.</td>
</tr>
<tr>
<td>Resume and reflections on supervisor’s</td>
<td>I believe that the resume and reflection on supervisor’s observations are both meant to address the standard on professional development. I was able to learn and carry out the</td>
</tr>
</tbody>
</table>
Together, all of these items in my portfolio have allowed me to have a very thorough engagement with all 6 of the CSTPs. I think that the information volume is really large, and I will need time to process all of the work I have done this year before ALL of it gets incorporated into my teaching practice. But I feel that all of this work serves as a toolkit for good teaching and learning that I can draw in aligning my teaching practice to the CSTPs.
## Strengths and Areas for Growth around the CSTPs

<table>
<thead>
<tr>
<th>Standard #</th>
<th>Strengths</th>
<th>Areas for growth</th>
</tr>
</thead>
</table>
| **1. Engaging and Supporting All Students in Learning** | - high energy  
- lots of connections to topics students are interested in  
- very aware of how status is playing out in my classroom  
- modifying lessons for language learners and students with special needs | - sometimes that energy may be too high, need to figure out when to reel that energy in to create a calm, controlled, relaxed space for learning  
- need to support students towards standards  
- make progress in addressing issues of status in my classroom  
- continue to modify lessons and figure out ways to do this efficiently and sustainably. |
| **2. Creating and Maintaining Effective Environments** | - very high positivity  
- can/will address disruptive behavior with interventions that do not single a student out or make them feel called out  
- sometimes really orderly beginnings and ends to class | - can work on being more strict, to earn student respect, and trust  
- learn to balance authority with openness  
- keep a consistent opening and closing of class, avoid last-minute planning, set the tone of the class and don’t let the class set the tone for me |
| **3. Understanding and Organizing Subject Matter** | - can plan lessons and units  
- can introduce and scaffold material that is differentiated for all learners  
- disaggregates instruction | - need a way of thinking about how to organize units in a way that feels cohesive and relevant to students  
- need to figure out ways to remove scaffolding and allow for students to use new skills and content independently  
- differentiate and disaggregate so that all students are getting what they need |
| **4. Planning Instruction and Designing Learning Experiences** | - can use formative assessments and technology to take quick pulses of the class and adjust for misunderstandings and misconceptions  
- assessments have clear expectations, rubrics, and directions so that students know how they are being assessed. | - figure out really efficient, productive, and faster assessment systems so that feedback can get back to students quicker  
- plan summative assessments BEFORE designing individual lessons so that students know what they are being prepared for and I can adjust my instruction |
| **5. Assessing Student Learning** | - can use formative assessments and technology to take quick pulses of the class and adjust for misunderstandings and misconceptions  
- assessments have clear expectations, rubrics, and directions so that students know how they are being assessed. | - figure out really efficient, productive, and faster assessment systems so that feedback can get back to students quicker  
- plan summative assessments BEFORE designing individual lessons so that students know what they are being prepared for and I can adjust my instruction |
- students know that assessments are designed for their learning, and not to “catch them” for not having some right answer
- assessments emphasize choice, and allow students to choose how they show what they know.

| 6. Developing as a Professional Educator | - positive, helpful, complete various tasks on time
- involved with school community
- will ask for help and also support colleagues
- all about sharing materials and ideas and collaborating |
|-----------------------------------------|----------------------------------------------------------|
|                                         | - knowing how to navigate spaces that may seem tense, or where disagreements arise
- gaining a better understanding of the state of education and how it is affecting my school/district
- keeping up with ed research and also with my own content knowledge as a science educator. |

|                                         | to guide them toward learning what they need to know to complete the assessment. |
Strengths and Goals for Professional Development

GREATEST STRENGTH

I think my greatest strength, as a developing professional teacher is my excitement and energy around the profession and with students. It allows me to form really tight bonds with other teachers and also students. It allows me to network well and to build community. I think that it allows me to make really great connections between my content area, my interests, and my students’ interests. I think this part of me is what brought me to teaching. I love to connect and build and relate. I’m excited for a lifelong career of teaching and learning with lots of people and communities!

GOAL FOR FURTHER PROFESSIONAL DEVELOPMENT

My greatest goal for further professional development is patience and openness. I know that I will encounter many perspectives that I do not agree with. And, I know that making change through education takes a lot of time. I need to learn to be patient and open so that I do not burn out from the frustration of feeling like things will never get better. I think I have learned a lot this year about keeping the big picture in mind, and thinking about how I can do little things here and there every day to chip away at the darker things in that big picture. I also think that I am quite young, and I have many years of life to really identify the problems that I want to commit my life to solving, within school and within education. I think with time, how and where I can make the most difference will become clear.

For now, I am excited to focus on being the best biology teacher I can be, and I will be figuring out what that means with each day.
Situated for success:
How communities protect, nurture, and motivate students through the challenges of adolescent development and identity formation

A case study

EDUC 240
Shayna Sullivan
Kyle Beckham
December 12, 2014
Introduction

**PART 1 – Stevie as student**

*School and classroom context*

*Engagement and achievement*

*Cognitive development*

*Motivation*

Pulled in different directions: Stevie’s academic identity, his school context, and the context of current research and theory

**PART 2 – Stevie as person**

*Peer and family context*

Socio-emotional development
  *Psychosocial borders*
  *Socio-emotional learning*

*Gender, race, and physical identity*

Peer and family contexts as drivers of non-academic development, and supporting research and theory

**PART 3 – Intersections: The intersections of Stevie’s developing identities**

**REFLECTION**

**WORKS CITED**
Introduction

Who is Stevie? Where is he going? And what has he taught me about my own teaching practice, as a teacher new to the profession?

Over the past 2.5 months, I have gotten to know Stevie better than I have ever known any other student in an educational setting. When I first met him, prior to beginning a case study about him, I knew Stevie as a student. But I got to know him beyond his identity as a student and more as a human being at a time of intense development.

Over the course of this case study, I will introduce Stevie’s school and classroom contexts, as well as his cognitive developmental stage, how he engages and achieves as a student, and what motivates him. I will share reflections on how I see Stevie being pulled in different directions within the academic context. This more academic school and student perspective was after all the perspective through which I got to know Stevie. This is the perspective many teachers will get to experience, from the perspective of school to teacher to student. This will comprise part 1 of the case study.

The second part of the case study will delve deeper into Stevie’s identity and development beyond his role as a student within the school and classroom contexts. I will provide a look into this peer and family contexts, and highlight his socio-emotional development as well as the development of his gender, race, and physical identities. These areas of development are not as explicitly linked to academic contexts, engagement, and performance but they provide key insights into how Stevie is developing, growing, and changing. Ultimately these development areas – which are deeply informed by Stevie’s peer and family contexts – impact how Stevie is situated at school and provides a greater depth for understanding how Stevie navigates school and life.

Finally, I will take a third section to discuss how the intersections of Stevie’s various developing identities are manifesting themselves in his life. I believe that from these intersections, a sense of “where Stevie is going” emerges.

The process of learning about Stevie’s development as an adolescent enhances my teaching practice as I am able to see how Stevie must navigate mixed messages within the school context while allowing his peer and family context to mold and shape his socio-emotional development. He demonstrates the ways in which he and all of my students are having to cope with the dozens of variables, messages, and expectations in place for him.

The following is a truly unique window into the life of one adolescent to bears the same great burden that all adolescents must take on during their high school lives, and I have learned that as teachers we provide important support for students through this potentially overwhelming period of development.
PART 1 – Stevie as student

School and Classroom Context

Pinewood High School is situated around the border of Bluestone City and Pinewood. Being on the border, the local community is a mix of the more wealthy suburban Pinewood culture mixed with a more working class Bluestone City culture. The school itself serves many students coming from West Town and Bluestone City. In the city of West Town, the median income for males was $25,631 and the median income for females was $28,044 (according to Wikipedia) as opposed to the city of Pinewood. Median income for an individual in Pinewood was $62,222 (Locallabs, 2012). The population of West Town is also majority Hispanic/Latin@ (“City of East Palo Alto,” 2010).The population of Pinewood is almost 90% white (“Town of Woodside,” 2010).

I include this information as an indicator of the very distinct difference in socioeconomic background and racial background of the two largest groups I have seen at Pinewood and how these two areas – West Town and Pinewood – are environments that reflect and parallel the student population at Pinewood. Pinewood very much reflects the surrounding areas around it, but perhaps creates a space for a mixing of students from these two very different places. According to Phelan and Davidson (1991) there are important interrelationships between a student and their family, peer, school world, and larger community (Phelan, Davidson, & Cao, 1991). So much so, that at times, “schools require children to act in ways that are incongruent with what they have learned at home,” and sometimes problems arise that are, “related to the fact that differences in cultural knowledge and culturally learned patterns of behavior lead to different and often conflicting expectations and views” (237).

I find that within the school, students in higher tracked classes end to have a larger proportion of white students than in lower tracked classes. Although there is clearly a distinct gap between the achievement of students of color and white students at Pinewood, it is not a feature of the school that is often discussed. Most of the school’s educators are white, so it is possible that “acting white” may be privileged at the school, and students who do not act white may experience some of the cultural incongruence that Phelan and Davidson describe. Castagno provides further evidence in her study on how a general silence in talking about race legitimizes and privileges whiteness further in schools (Castagno, 2008). And so, students of color at Pinewood may need to do some additional navigation around reconciling their home cultures and identities with those they encounter at school.

I find that the general community to be really welcoming. The school has “8 conditions of success” that I think sort of capture the spirit of the school (“8 Conditions of Success,” 2014). They are: belonging, heroes, sense of accomplishment, fun and excitement, curiosity & creativity, spirit of adventure, leadership & responsibility, and confidence to take action. These conditions often get repeated, and can be reflected in the various social, athletic, artistic, academic, and community-building activities the school offers. Something I find really refreshing about Pinewood is the way in which these conditions ground the Pinewood experience, not necessarily academic excellence or rigor. From the
ways in which I have heard school leadership talk about the school, supporting students however they need help seems to be a bigger priority than necessarily pushing students academically at the expense of other experiences and opportunities. I think the work of Eccles and Roeser support a school atmosphere that is centered on supporting student development through experiences that are not strictly academic (Eccles & Roeser, 2011). They review literature on how (1) teachers, curricular tasks, and classroom environments as well as (2) aspects of schools as organizations and (3) district policies play a role in how students are developing intellectually and socio-emotionally. They describe how “adolescent’ perceptions of how caring their teachers are predict gains and losses in their feelings of self-esteem, school belonging, and positive affect in school” (229). I find that at Pinewood, the “8 conditions of success” are in every classroom and are regularly referenced with “Aspirations” periods where teachers facilitate sense of belonging activities that are meant to show investment from the school and from teachers in student self-esteem and student community.

From my own observations, it seems like students tend to clump into groups, by gender mostly, but by ethnicity as well. Pinewood is a Title I school; despite having a name that would suggest that its population were more affluent. Students with a lower socioeconomic status are bussed in from West Town and Bluestone City, and while I have not seen any specific student behaviors or interactions around class, the money that goes into the school grounds and donations by virtue of who’s paying the taxes in this area does not necessarily reflect the student body. The school described in Denise Pope’s book “Doing school” is very well financed due to its tax base and the high pressure environment parallels the culture of success and materialism in the surrounding area (Pope, 2001). However, many residents of Pinewood – although affluent – attend private schools in the area and more working class students from other schools attend Pinewood. Thus in this case, the demographics of Pinewood are not necessarily reflected in the school culture of Pinewood High School.

Stevie himself comes from a working class family that lives in Bluestone City. I will share more about his family in the later sections on peer and family influence on development.
Above, you will find a “social map” of Pinewood High School that Stevie drew. He seems to have friends all over the school – in the cafeteria, by the A wing, next to (but not inside) the “white jungle”, by the Quad with the “soccer crew”, and in other classes.
He knows many teachers from the E-wing. One of the first things I learned about Stevie was his love of soccer, and his map contains multiple locations where he plays soccer or references soccer. The **white jungle** is one part of the main quad where many white students spend time at brunch or lunch. The **soccer crew** is a group of friends that Stevie plays soccer with.

Stevie’s racial/ethnic and class identities as well as gender identity will be covered later in this case study. **For now, I will note that Stevie is Salvadorian, from a working class background, with mostly male friends.** I was not entirely surprised by the map. It confirmed my previous understanding of Stevie’s relationship to the larger social world, which is that Stevie’s life at school is stable, with a focus on academics and a supportive network of friends and teachers. In this map in particular, it is difficult to infer what dynamics or race, class, gender, and sexuality academic status are at play. There are no distinctions made to describe or group students by class, gender, or sexuality. **The only dynamic that is referenced is race, as indicated by the “white jungle” but Stevie’s insights as to why white students hangout with each other in this part of the quad is simple due to the fact that students tend to separate by where they went to middle school.**

I placed the map in this section of the case study, exploring Stevie as a student because Stevie seems to situate himself at Pinewood as a student as captured in referencing classes and classrooms. As I will share later, even Stevie’s friends are – for him – not just a “soccer crew” but also a source of academic support. As Stevie presents himself in the map, the following sections will further expand on who Stevie is as a student.

**Engagement and Achievement**

You now have a sense of where Stevie’s school is located, you know a bit about the school culture, and you have a picture of where Stevie situates himself at school. But how is Stevie engaging with school in his role as a student?

Something that immediately caught my attention upon working with Stevie in my biology class is his constant exclamation that things are too hard for him, that he is set up for failure. When his teachers just tell him to try something, he complains that he will fail. In biology, I try to tell him that it’s not about the number of points or “failing” a quiz or assignment, but rather about learning biology and feeling good about finding out new things. **Carol Dweck notes that students who have a fixed mind-set are, “worried more about looking smart and not making mistakes” but I think Stevie’s confidence in being able to ask questions and think freely when not under the pressure of assessments shows that he has a growth mind-set (Dweck, 2014, 27). Stevie has assessment-induced fixed mind-set. By this, I mean that when he is not under some pressure to gain a certain number of points to be able to get a good grade, he has a growth mind-set and he’ll ask questions and think really stretch himself academically. But when there is some pressure to do well on some assessment that will affect his grade, he enters a fixed mind-set and repeatedly says that he is destined for failure.**
For example, we recently sftarted a unit on the carbon cycle, and we were discussing a reading about atoms. At one point, he raised his hand and ask, “Can there be a limit to the number of atoms in the universe?” The teacher said that it was an interesting question, and other students followed up the discussion with more questions and he listened intently. Stevie knows that he is a strong student when comparing his grades with the grades of other students and he engages in his classes and is even critical of teachers at times, asking about the importance of certain tasks and assignments. This paired with his perpetual chant of “I’m gonna fail” shows that Stevie knows that he can learn but is also aware of the culture of “doing school” around him.

Stevie knows his strengths and his weaknesses in his various classes, but I have noticed that he shows more interest in classes in which the teachers are engaged and perceptive to students’ needs and questions. The classes in which teachers place emphasis on points, grades, and book work are boring and uninteresting for Stevie, and the classes in which teachers are fully engaged with students in terms of asking for student feedback and emphasizing learning are the classes in which Stevie shows the most amount of engagement.

When Stevie’s teachers are engaged, they demonstrate the value in the content they are delivering, and Cushman’s motivation equation states that a combination of value and expectation of success is what is key to motivating students (Cushman, 2013). Davidson and Phelan also note that when curriculum does not feel relevant to students, they may not show interest in whatever content teachers are delivering (Phelan et al., 1991, 265). When Stevie’s teachers are engaging, provide value in the content they deliver, and emphasize relevance to students’ lives, Stevie’s engagement and motivation are up. This behavior is supported by the literature cited above.

At around 7am one morning, Stevie e-mailed me to ask if we could meet to go over some of the material he missed in biology class while he was traveling in El Salvador with his family a couple weeks ago. He wanted to meet during 1st period. I had planned that morning to observe him in PE class, which he had expressed to me before was a very unpleasant class that he does not enjoy. I e-mailed back, asking him, “Don’t you have PE during 1st period?” I received no response.

When I arrived at school, I was wandering around looking for where PE takes place when I bumped into him. I said, “shouldn’t we go to PE? I wanted to come see what PE’s like today.” He answered, “No, I am allowed to miss three PE class periods, and I want to use first period to review stuff for the test.” I was really conflicted about whether or not to make him go to PE or to let him miss it to review for his test (as he authentically wanted to review for his test).

We ended up venturing back to our biology classroom where my CT firmly rejected his desire to use 1st period to review. So, I ended up following him to PE. His teacher was 10 minutes late, the students did not start working out until about half way through the period, and the behaviors that I observed in Stevie were highly uncharacteristic. He was not using the machines when his teacher kept repeating to the class that they needed to pick an exercise machine and to workout on it. He was talking and joking around with other students. He was not engaged.
Stevie shows interest in the classes where teachers show an interest in him, in the content, and in his learning, **all within a safe space and supportive community**. His PE teacher shouted at the students the entire period, and was very aggressive in his interactions with students. I understood what Stevie meant when he had said before that his PE teacher “just yells at us the whole time” and I could see the look on Stevie’s face when his PE teacher would yell at students. His facial expression was one of weariness, like he had given up and was just going through the motions of PE class. In chapter 1 of Cushman’s book on student motivation, Cushman notes the importance of making sure students feel safe in their learning environments (Cushman, 2013). However, clearly the yelling of the PE teacher is making Stevie and his peers feel unsafe. Cushman emphasizes the importance of social supports in a learning environment, however Stevie does not feel socially supported in his PE class and does not see the point of his PE class and focuses only on the teacher’s constant yelling and the teacher’s consistently late appearance to class.

I think school is important to the Stevie’s life and identity when it matters to his future. Stevie has identified PE as a class that doesn’t really matter to his future as a veterinarian, and for him it’s not worth the hassle of being yelled at for 30 minutes when he can be learning content and material that he feels is more important. Stevie is excited about learning when his teachers show excitement and when he and his peers are allowed to express themselves in their learning. I have seen the ways in which he lights up and asks lots of questions when he and his classmates are engaged in something a teacher shows excitement about teaching. And I have seen how he and his peers turn off when a teacher does not show an obvious outward excitement about seeing students learn.

Stevie is great at following directions and asking for help. Based on his standardized test scores, his knowledge and skills are at grade level. I find that his academic needs are as emphasized above – engaged teachers who will listen to students and create really engaging and dynamic classes that bring all students into activities and reflection for learning. His individual learning goals are linked to getting good grades, and not as much to learning for learning’s sake. Zins as well as the CASEL note that two important social emotional learning competencies are self-management and responsible decision-making (CASEL, 2014; Zins, Payton, Weissberg, & Utne O’Brien, 2007, 377). Stevie’s learning goals and commitment to getting good grades demonstrate that Stevie has developed a sense of responsibility for managing his behavior and his time in order to do what he feels is responsible – to work hard in school and to achieve as best he can. I think that despite not feeling 100% supported by all of his classes and teachers, Stevie can thrive in the classes in which he receives a lot of support and safety but he can also power through his classes in which he feels he has less support and safety. This comes from his social emotional competence to work hard and take responsibility and ownership of his actions.

The school environment is working positively to engage Stevie in that some teachers in the school environment teach in ways that Stevie feels are effective. Other teachers like his PE teacher and math teacher seem to turn Stevie off from learning. I believe that in general the school environment described in “Doing School” is in some ways represented in the school life that Stevie is surrounded by and he is most certainly grade-trapped (Pope, 153). In her
book *Doing School*, Denise Pope describes the culture of schools pushing and pressuring students to be more materialistic, focused on grades, and not on learning. Stevie is not calculating his GPA every 5 minutes, but he does care about getting every point he can get and thinks about how he can strategically portion out his time so that he can get the most out of school and his teachers in terms of getting the grades he needs to get into a four-year college and become a veterinarian.

Looking at Stevie’s cumulative folder, it seems that being an English learner did mean that for some of his academic career he was behind his peers in reading and writing. I think more generally this may have impeded his achievement in terms of having to both learn English as a language and also learn all of the content terms in his classes in the past. However, from the way in which Stevie’s middle and elementary school teachers describe him, they seem to recognize Stevie’s potential for academic success, and I think their support may have contributed to Stevie’s own internal sense of his own potential for academic success.

I think the school supports student development in offering support groups that are specific to identities and experiences. However, Stevie does not participate in any of these support groups. When I met with his counselor, she was not able to tell me much about him as she had only met him once or twice. The school does have a few days during the year where about an hour is set-aside for community building within the school, but other than that, Stevie does not participate in the school’s offerings for supporting student development. As Davidson and Phelan note the ways in which students experience borders between school life and outside-of-school life, Stevie seems to have the world of school in which he receives mostly academic support and his outside world in which he receives emotional and social support (Phelan et al., 1991). Although Eccles and Roeser stress the importance of supports for various areas of adolescent development in schools (Eccles & Roeser, 2011), Stevie is able to find support for his own development (whether or not he knows it) outside of school. But between Stevie’s in-school and out-of-school support, Stevie has input from his home community and his school community that is guiding him along development in all areas, where he is able to see value and also expect success, which Cushman believes are the variables for motivating students (Cushman, 2013).

Returning to Steinberg (Steinberg, 2013, 36) and the nature of adolescent moodiness and shifts, I find that the school environment does not actively provide support to help students recognize and identify and manage their moods. Stevie does pretty noticeably shift moods, often depending on what type of opportunity for engagement is available in a class. When a teacher is highly engaged and gives a class a really active and well-managed and designed activity, Stevie rarely talks over the teacher or jokes around with other students. However, as I observed in his other classes – PE in particular – if Stevie is not engaged he talks and goofs off with other students. Similarly, when he gets frustrated he raises his voice and moves his body with more force, he makes himself bigger and louder. I hesitate to put Stevie into a binary, but he really seems to have these two personalities: one that is really loud and big and take up a lot of space, and another one that is quiet, shy, and thoughtful. I am not sure if he recognizes these two personalities that he has, and I have not seen any of his teachers offer any advice or help on how to manage moods or impulses depending on
environment or context. As his teacher, I am not really sure how to maneuver this situation either. His counselor just says this is a part of development and that he will eventually mature and figure it out.

I think Stevie is effectively doing school. The most obvious manifestations of this are his strategic choices about how to spend his time in order to get the most points or the best grade. Stevie often complains about teachers who center their classes around points and grades and not around learning, and it comes as surprise when his teacher de-emphasize grades and ask that Stevie simply try his best and to openly inquire and to be creative about approaching content matter. From her observations of students, Pope noticed that, "students believed that they needed to achieve high grades, high test scores, and various honors to secure future success" (153) and goes on to call this association between grades and success a grade trap. Stevie is definitely grade-trapped and cares a lot about making sure he can get every point he can get so that his grade can be the highest it can be because he knows that it will be important when he applies to colleges which is part of his plan for success.

The students described in *Doing School* for the most part had something they were passionate about, from dance to community service, and I think for Stevie this is soccer and his involvement with the Green Academy. I think these activities ground him through this process of doing school, and with the Green Academy there is actually a focus to his academics, which will provide more connectedness and relevance as he moves from grade to grade.

Although Stevie is surrounded by a school community where students who do really well on various national standardized tests are recognized and awarded at all-school assemblies, where achievement and success is linked to grades and the difficulty of classes one takes, I think the Green Academy acts as a buffer. As I meet with Stevie’s other Green Academy teachers whom he has for English and history and horticulture, it is clear that these teachers invest their time in the Academy students in ways to connect the authentic learning happening in the classroom to real-world issues and opportunities. I have had a special look into the Green Academy at Pinewood, and have attended weekly meetings during which all of the Green Academy teachers come together and discuss how to connect students with real-world issues and their communities. The teachers plan field trips, facilitate student-run garden tours, and are connecting students with opportunities to build clean water systems in places around the world that need clean water. The teachers try to connect their class content to real-world connections, and are getting students into the community transferring the knowledge they gain in class in practical and productive ways.

The subtitle to Pope’s book after “Doing School” is “How we are creating a generation of stressed out, materialistic, and mis-educated students” and while I see and hear stories about certain teachers and certain students being really stressed out or learning environments not being centered around student learning, I think the Green Academy at least offers students a chance to see the importance of learning and information beyond materialism. In this community within a community, Stevie has to work together with
other students cooperatively to take care of the school garden. He and his peers are seeing how their learning and involvement in the community is an integral part of their education and in their learning about how they can make an impact.

**Cognitive Development**

The school and social context I provided in the previous section may appear limited. However, this is the background knowledge I would have had about Stevie had I not further explored his life and development more deeply. At a superficial level, I could understand the school environment, and situate Stevie within the physical campus.

One layer that I consider to be superficial from a teacher’s perspective is academic identity. And so, the following section goes one layer deeper than the previous section on school context, as I attempt to depict how developed Stevie is as a student and what this can tell us about him as a learner.

Psychologist Laurence Steinberg studies adolescent development. And in a chapter about cognitive development, he references the following types of cognitive development observed in adolescents: deductive reasoning, hypothetical thinking, metacognition, imaginary audience (self-consciousness), personal fable (belief that his/her experiences are unique), relativism (Steinberg, 2013, 57-61). I think Stevie has fully developed the skills to deductively reason and to think hypothetically, and I will focus on these two aspects of development in the following analysis of his schoolwork.

Below is a simple cognitive assessment task that Stevie completed. Using his prior knowledge about problem solving of this type, Stevie was able to deduce what the answer to the question about the pencil and the mirror might be. See the task and his answer below:
The following two assessments are both taken from biology quizzes. Stevie is able to recall content knowledge that is about complex relationships which requires the skills of thinking abstractly.

Below is a question that Stevie came up with about what he still wants to know about the carbon cycle. By asking “if there’s a faster way” of making fossil fuels, then Stevie is asking a hypothetical question and doing hypothetical cognitive work here. He is imagining what a future might look like if there were a faster way to make fossil fuels.
Adolescence is seen as an emotional transition from childhood to adulthood due to the adolescent’s changing neuroendocrine processes. Stevie is experiencing similar cognitive transitions which might also be attributed to neurological processes and development (Steinberg, 2013, chapters 1 and 2). He is developing higher order thinking skills and while he is not quite at a point where he is regularly practicing metacognition, I think Stevie is beginning to be critical of the world around him and he is questioning various natural phenomena – in biology class at least.

I enjoy thinking in the abstract and in my attempts to get Stevie to metacognate on his learning, he usually shrugs off my attempts to get him to think about his learning and he returns to being worried about losing points. Stevie spends a lot of time deductively reasoning about his grades, and hypothesizing about what will happen if he gets a certain grade on a certain test but I think his teachers including myself can continue to push Stevie to develop further in his metacognating and the relative importance of things in his life.

Compared to other students in his classes, I think he is at about the same place as his peers. I would say that I am not smarter than Stevie because of my cognitive ability. I think many people might look at my high school transcript, my Stanford B.S. in biology (with honors in education and in biology), and my current position as a Master’s student at Stanford and think that I must be really smart. But Stevie can speak Spanish fluently and he can translate between English and Spanish with little difficulty. Stevie is a skilled soccer player. Stevie would probably be able to get around in El Salvador easily while I would be completely lost.

I may have some skills that Stevie does not have (yet) but I am not sure if there is a universal definition of smart, and if smart-ness were defined by the possession of unique skills or skill level, then Stevie is smart in his unique ways, and I am smart in mine.

I am not entirely sure I understand how exactly Stevie learns. However, I have noticed that when the pacing of a class is relatively quick with multiple points of entry, Stevie tends to learn better. He likes teachers who give many different tasks and opportunities for success. Expectation of success if one of the key factors to increasing and maintaining student motivation, according to Cushman (Cushman, 2013).

Stevie’s parents, former and current teachers, and cumulative folder suggest that when Stevie has support from educators and adults and has a reward or goal in sight, he is able to focus and actively work to achieve academic and personal goals.

In Steinberg’s introduction of adolescent cognitive transitions, he mentions Vygotsky’s perspectives on how environment is critical to an adolescent’s intellectual development (Steinberg, 75). Vygotsky’s theories about the zone of proximal development and scaffolding suggest that students have a current developmental state, and state that is just beyond their skill-level. When an instructor or parents or peer is able to provide some kind of scaffolding or support for a student, they are able to enter this zone of proximal development, which allows the student to move forward in their developmental state or zone.
Vygotsky’s theories imply that environment plays a key role in an adolescent’s ability to move from developmental state to developmental state. I think Stevie – despite his status as an immigrant having to overcome additional cognitive challenges during his schooling – has had the support of teachers, family, and family friends to scaffold intellectual and personal development. Again, Eccles and Roeser emphasize the importance of a supportive school environment in which teachers and administrators actively work to support all areas of student development (Eccles & Roeser, 2011). Somerville stresses how salient social evaluation is to adolescents (Somerville, 2013) and I find that Stevie’s friend groups and classmates are generally in developmental stages similar to Stevie. They along with his family and teachers and school community are providing the scaffolding he needs to develop at a comfortable pace. According to Reyes, having supportive relationships with adults is critical to the development of resilience in Latino students in particular (Reyes & Elias, 2011) and the fact that Stevie’s parents, teachers, friends, and the parents of his friends surround and support Stevie confirms the claims presented by Reyes.

Motivation

Stevie does show engagement in his schoolwork and is achieving strategically in the classes that provide him with engagement and support. But what motivates him when he is acting strategically these classes? How and where did he learn to “do school?”

Stevie’s biology and horticulture classes are both taught by Green Academy science teachers. I am one of his biology teachers. I can confidently say that the biology class is one that involves lots of engagement and partner work and hands-on activity. Similarly, the horticulture class is very hands-on and involves working with plants and chickens and doing garden work.

The French class and French teacher were different from the general atmosphere of the biology and horticulture class, but the French teacher was having students tell stories using new vocabulary and grammatical structures. In none of the three I observed did I see Stevie sit through a lecture. From what Stevie has told me, it seems like his math, English, and history classes may involve more bookwork or lecture, but I have not seen these classes yet. Stevie’s other class is P.E. which he has every morning, but says that he really does not like.

In general the instruction going on in these three classes is similar in that students are expected to learn by practicing or doing some sort of hands-on activity or pair/group work. I think these types of instruction and the instructors in their attitude give students an opportunity to have a growth mindset and to make mistakes. I know in our biology class, we often talk about being a community of learners in which we “fail-forward” in that mistakes and little failures can be improved upon so that learning results in moving and learning forward. As mentioned previously, I find that Stevie does exhibit a growth mindset as described by Dweck when grappling with new content in our biology class (Dweck, 2014).
One additional note is that Stevie has his biology and horticulture class (this may be true for his history and English classes as well) with mostly other Green Academy students. The only class I have seen him in that did not have Academy kids in it is French. I have not seen Stevie act out or give up in these classes, but I wonder how he will interact with his English, math, and history classes as these are classes that (on his transcript) it appears he has struggled with before.

I think given the style of teaching these instructors have, Stevie as a learner has an opportunity to approach the material with a growth mindset (Dweck, 2014). However, I find that he consistently uses language that would suggest that he has a fixed mindset. He says “this is too hard” or “I’m gonna fail this” and even though he does appear to try and asks lots of questions of his teachers, I wonder how his use of fixed mindset language affects his motivation as a whole.

I found that Stevie’s performance in French class was the most different from the other two classes (biology and horticulture). And I wonder if it’s something about being with a lot more students that he does not know that shapes his experience. I find that in biology and horticulture, Stevie may feel more comfortable being distracted by friends, which results in lost opportunities for learning and understanding whereas in his French class there are fewer friends to distract Stevie from the learning.

However, the French class is less conceptual, and seems to focus more on the learning, practice, and repetition of language whereas biology and horticulture are more conceptual classes. I wonder if the nature of the content despite how the biology teachers try to frame it causes Stevie to be less confident in tackling more complex systems and using larger longer science words.

I would describe Stevie’s level of engagement in school generally as very engaged. He goes to all of his classes, he actively participates in class, and he is socially active and talks to and engages with other students. So it seems that he is surrounding himself with other students who are in this pursuit of learning and doing school that can support one another.

It’s hard to say just with these classes how his level of engagement changes, but in French, Stevie never once volunteered an answer or asked a question. However in biology, he is always asking questions (sometimes clarifying, sometimes content-related) and in horticulture he similarly asks questions and even critiques activities and assignments that are given. I found him to be more able to challenge the authority of teachers in biology and horticulture than in French. Again I wonder if the atmosphere of being with Green Academy teachers and Green Academy students the ways in which he engages and interacts with content, students, and teachers.

I believe Stevie is ready and willing to engage with his schoolwork and his peers. However, I think the “expectation of success” in the “motivation equation” presented in Kathleen Cushman’s book *Motivation Equation* is something that might help contextualize the struggle I see Stevie experiencing in his motivation formation. Cushman’s formula is this:
Value * Expectation of Success = Motivation (Cushman, 2013)

I am certain Stevie sees the value of what he is learning, particularly because he wants to attend UC Davis and become a veterinarian. **He says that, “I would love to attend to UC Davis because I want to become a veterinarian. My teachers have told me is the best school for it. I just love animals and would like to work with them when I grow up. I see many cases where animals are in danger and no one can do something about it - well, I would love to try and make the change.”**

As a part of the Green Academy, he had to demonstrate an interest in learning through the lens of sustainability and environmental science. So I think he has a relatively substantial amount of investment in the “value” variable of this motivation equation. But I think the “expectation of success” variable is where Stevie is potentially losing motivation.

Stevie once told me about his math teacher, saying that he can never seem to get 100% of the answers right on certain assignments. He said this was truly frustrating. Similarly he said that he found it frustrating that my CT and I take a quarter or a half point of certain assignments. He said it creates this feeling that he can never get that 100%, and never get that A. I think something I have been working on in terms of getting Stevie to re-define his “expectation of success” is to get him to think more about success as improving and learning. But I can see that he is in an environment where getting A’s and taking AP classes and having high academic success is what’s valued for getting into good colleges and universities. I wonder if his expectations of success are defined by high academic achievement, and if those expectations are defined in such a way, I wonder if this contributes to a fixed mindset. By this, I mean that if success is equated with getting 100% and A’s and “failing” is equated with getting any less than that, then if Stevie isn’t getting 100% and A’s then he might feel like he really is failing.

If this were true, it might explain his consistent use of phrases like “I’m gonna fail” and “this is too hard.” I worry that because his achievement has been relatively low (based on looking at his cumulative folder) he is in a constant negotiation with his history of lower achievement and his determination to improve and achieve at a higher level.

Coming back to the equation:

Value * Expectation of Success = Motivation

Perhaps the “value” variable is where Stevie’s motivation derives most of its value, and perhaps the “expectation of success” variable is where Stevie’s motivation risks losing value. If he is seeing value and placing value on his learning and education, but also caught in this world of school and in this greater world that privileges high achievement over improvement and effort, then this dynamic in his own motivation equation seems plausible.

Stevie does his work. When he was in El Salvador, he consistently e-mailed me wondering when he could make up missed work. He very clearly cares about school when he isn’t beating himself up jokingly or using self-denigrating language. I was able
to witness Stevie working with another student Mauricio to climb up a giant rope and log structure on a field trip to a ropes course. Similar to the ways in which Stevie self-predicts his failure, he kept saying, “I can’t do it, we’re not gonna do it right, I’m gonna fail” but once it was their turn to go, Stevie’s entire demeanor changed. He and Mauricio were calm, they talked to each other, and they lifted each other up to each of the rungs, and took turns pulling each other up.

This is the way Stevie operates both inside and outside the classroom, and I think it demonstrates an internal struggle and willingness and a desire to be resilient. Whether or not he sees it, Stevie is at odds with societal structures that are pitted against his success. And, I see him grappling with this feeling of being pulled in different directions in class, in the halls, and strung up 20 feet off the ground between two trees.

**Pulled in different directions:**
**Stevie’s academic identity and his school context**

Stevie rarely mentioned a social class issue at Pinewood even though it is clear that wealthier whiter students are tracked into higher-level classes and lower-income students of color are tracked into lower-level classes. In reflecting on how Stevie may not have been affected by this potentially stressful school environment in which academic success is in some way correlated with race and class in the school context, I direct my attention to Stevie’s involvement in the Green Academy.

Not only does the Green Academy provide a safe space for low-income students of color where students are provided with teachers and mentors and unique educational opportunities, teachers generally emphasize high quality, practical, productive learning instead of grades. I can see clearly how Stevie’s experience with Academy teachers differs from non-Academy teachers. When I met with Stevie and his parents and asked about whose decision it was to have Stevie be a part of the Green Academy, both he and his parents shared that it was a smaller, tighter-knit learning environment to provide support and community in a school as big as Pinewood.

In a piece on social class and student identities, Ellen Brantlinger says, “The stress felt by both affluent and impoverished youth originates, to some extent, from the same source: the stratifying and alienating aspects of their schools and communities. The divisive, differentiating, and humiliating school practices offered few rewards to low-income adolescents and resulted in their being angry” (157).

I think Stevie is able to navigate Pinewood and its grade traps and its various manifestations of social stratification by taking advantage of his friendships and relationships within the Green Academy. With the support of his teachers and friends within the school context, Stevie is able to focus on himself, his own cognitive development. The Green Academy promotes his engagement by providing real-world opportunities to learn and apply knowledge. I think this really allows him to take full
advantage of the motivation equation as he is provided ample value and expectation of success.

The Green Academy teachers also tend to provide multiple points of entry for students, allowing them to exercise their multiple intelligences (Gardner, 1993) and because they work with students from their sophomore year through their senior year, teachers are able to scaffold tasks cognitively to be increasingly complex as students develop cognitively (Steinberg, 2013, chapter 2).

What further motivates and what I think has allowed him to develop the interpersonal skills needed to navigate his academic journey is his family and peer support. The next part of this case study will connect Stevie the student, described above, to Stevie the developing human being. Stevie’s peers and family have allowed Stevie to develop emotionally and socially to be resilient, and to seek out supportive communities like the Green Academy to protect and nurture him as he pursues his academic and personal goals.

PART 2 – Stevie as person

Peer and family context

Peer context
Stevie says that he is in many different friendships. He says that, “I have friendships that I mess around, some that are respectful.” I have certainly seen this with a few of students in our 4th period biology class. He seems very close to a student called Kendra, but she has a bad ankle and he sometimes calls her a cripple. She is really afraid of spiders but he’ll go out of his way to find spiders to scare her with. They seem to be together all the time, and seem to care about each other so I wonder if this is what he means y having friendships (that can be close) that he can mess around in.

Stevie says he has friendships with boys, girls, teachers, adults, and others. He defines friendships as “two people communicating, hanging around, having fun, telling secrets to teach other and trusting each other.” He says that he is not really picky about finding a friend, and that he asks for respect, trusts, and for someone he can talk to anytime he needs them. I think I would need to observe Stevie more to see if this holds true, or if he is picky at times for certain reasons. I wonder if since he is in the Green Academy if he has more friends in the Green Academy or if he has friends elsewhere at Pinewood.

Stevie says that the difference between a friend and an acquaintance is that a “friend is going to be there for you for a long time” and I wonder what Stevie means by “a long time.” He juxtaposes this with acquaintances by saying that an acquaintance is “just someone you meet one day and probably are not going to see again.” Stevie says he has many friends and “can’t even count them.” I wonder if Stevie would consider himself “popular”? Stevie also says that his friendships have lasted for pretty long, that he doesn’t fight with his friends, and that he doesn’t have enemies. With his friends, Stevie likes to “mess around, talk, and play soccer at lunch.” At home, he and his friends do homework,
eat, or play videogames, or just have some fun. Out in the community he says they play soccer, and that to “hang out” means to have some bonding time, share thoughts, and “just act childish” around your friends. I wonder what Stevie means by “just act childish.” When I spoke to his counselor, she said that Stevie is in a place similar to many young male teenagers.

She spoke about maturity being a major area for growth for teenage boys, and I wonder if this “childish” nature that Stevie refers to that comes out when he hands out with his friends is the childish-ness that teachers and counselors pick up on?

Perry and Pauletti (Perry & Pauletti, 2011) explore many themes of gender and adolescent development, individual behavior, and group behavior. In a section on aggression (62), they note that male youths display more direct physical and verbal aggression toward same-sex others than girls do. This is true for Stevie and his friends compared to the girls and their friends at Pinewood. Stevie and his friends push each other and raise their voices at each other, usually playfully. They also note that this behavior is usually unprovoked, impulsive, and undeterred by danger or risk. Here I disagree with Perry and Pauletti. In a group of boys I observed Stevie in, a first aggressive gesture may have been impulsive. But if the group observes this first aggressive behavior from one boy, then other members of the group may be provoked to act aggressively.

Perry and Pauletti also cite the work of Tobin et al, and Tobin distinguishes five dimensions of gender identity: (a) membership in a gender category (b) gender centrality (c) gender contentedness (d) pressure for gender conformity (e) felt gender typicality (68). It seems that within same-sex groupings with close friends and mixed-sex groupings with peers, Stevie is secure in his gender category, it is not entirely central to his identity, he is rather content with his gender, adheres to gender stereotypes but may not being experiencing any specific pressure to conform, and is perceived by other male students to be male. In general though, Stevie seems to exhibit some of the masculine stereotypes and behaviors that Perry and Pauletti claim are typical in adolescent males.

Stevie says that in terms of dating, he isn’t dating anyone now, but that he used to date a girl that goes to Sequoia. I am very interested in asking Stevie more questions about this experience. He says that at Pinewood, people “huge, kiss, etc. Others respect those relationships and don’t go between them.” I found this really interesting because I was chatting with a couple of other students in Stevie’s biology class, and they said that boys cheat on girls all the time. I wonder how Stevie’s experience is similar to or different from their experiences, and I wonder what the dating scene really is like and what Stevie’s perception (as opposed to the perception those girls’ had) is like relative to what the dating scene is actually like at Pinewood.

Stevie says that his friends influence him by making him feel comfortable. He says that they usually like the same things, such as sports, games, clothes, shoes etc. So I wonder if this idea of not being picky about his friends is really true. He says he is friends with people of all ages and types, but they usually like the same sports and games and clothes
and shoes which seem like pretty specific criteria. I wonder if Stevie has a spectrum or gradient of friendships?

Of his friends, Stevie says, “they keep influencing me to be who I am because they like the true me.” I wonder who the “true” Stevie is. He says that he and his friends always talk about the tests that they will take and predict their grades. He says it’s “kind of our little tradition, but when someone says they got a bad grade, we usually try to help them out by studying so they can retake it and get a better score. I wonder if this is partially where Stevie’s drive to do well in school comes from. It sounds like he’s in a group of friends that is in some way pushing each other academically.

Stevie says that his family really likes his friends. He says, “we’ve never gotten in trouble and they aren’t bad people. Most of us, we just love to play soccer, talk about soccer, and just mess around. My friends are like family to me, we love each other and protect each other no matter what. My friends love my family. Every Friday we go to each others house and have dinner with their family. My friends find my family funny, exciting, and comforting.” I include this entire train of thought from Stevie because I think it reveals a lot about the types of out-of-school communities Stevie experiences. It sounds like a family and friends who value to their time together surround him. Even though Stevie talks about “messing around,” the time he spends with his family and friends sounds very wholesome or nurturing.

I remember once another science teacher who also has Stevie said she saw him on a Saturday night playing soccer alone at the park. I think in general Stevie is not out and about causing trouble but that he has a supportive home and friend life, and he isn’t surrounded by folks who pressure him to do things he doesn’t feel comfortable doing.

**Playing soccer with friends and family provides Stevie with an outlet. He says, “My friends and I love soccer so much. We just do, there really isn't an answer for it. Since we were little, our parents influenced us. They loved it and they also played it when they were younger. It feels like all your problems go away when you're playing. It's my stress reliever. Soccer is more like a job for us, we can't live without it.”**

Stevie is a loyal friend and that in general people in this life who support him and love him and do not judge him surround him. I think this lack of being judged in his day-to-day interactions with his friends and family translates into his experience on social media. Stevie has a Facebook and an Instagram. He says that he uses Facebook to text friends. Sometimes, he says, they meet and play soccer. He uses Instagram to post pictures of himself with his friends of whatever they’re doing. He also communicates with friends through the comments on pictures. He says he has not experienced cyberbullying. He knows of a friend who got messages out of nowhere saying “kill yourself” and “no one likes you” and he became depressed. But this friend asked for Stevie and the other friends to help. Stevie and his friends said to get away from social media for a few weeks. This bullied friend took the advice, and after a while, he went back on no one bothered him.
anymore and this friend was grateful for that. I think this further demonstrates how loyal Stevie is as a friend, and how tight he and his friends are.

Subrahmanyam and Smahel discuss adolescent online self-presentation and virtual identity. They refer to online identity “in a psychological sense – a sophisticated conceptualization of an individual’s online self or persona” and they refer to a virtual identity as the “thoughts, ideas, visions, or fantasies that users attribute to their virtual representations” (Subrahmanyam & Smahel, 2011, 62). I think that the online and virtual identities that Stevie describes are pretty close to how he perceives himself and how others perceive him. One area of interest that Subrahmanyam and Smahel offer is the claim that adolescents, “using photos to present oneself is more important for younger adolescents because at this stage, public visual displays of the self may drive their sense of self” (Subrahmanyam & Smahel, 2011, 66). I think that Stevie’s presentation of himself and his friends in forums like Instagram and Facebook could allow for him to really show his pride and how much fun he has with his friends, such that he can go back and look through and keep track of all the good times he has with his friends. It may also boost his confidence to know that others can see how well-supported Stevie is.

On page 158 of Steinberg, cliques and crowds are described. It sounds like Stevie might belong to a central clique, but from the way I have seen him interact with his peers, I think he may also have friendships with students in the Green Academy despite having his soccer/gaming clique (Steinberg, 2013).

Steinbeg describes cliques as “small groups of between 2 and 12 individuals – the average is about 5 or 6 – generally of the same sex and, of course, the same age. Cliques can be defined by common activities (for example, the football players or a group of students who study together regularly) or simply by friendship (e.g., a group of girls who have lunch together every day or a group of boys who have grown up together). The importance of the clique, whatever its basis, is that it provides the main social context in which adolescents interact with one another” (Steinberg, 2013, 158).

The boys that Stevie plays soccer with and checks homework with and whose families spend time together are the boys that comprise Stevie’s clique. These are the boys that provide social context for Stevie to interact with other boys his age. However, I find that the Green Academy acts as a sort of giant meta-clique for Stevie and his other Green Academy friends. Stevie and other students in the Green Academy might have their own non-Academy cliques of 2 to 12 individual students and even within the Green Academy there might be cliques. But I think that the Green Academy itself allows a chunk of about 60 students to distinguish themselves around some common activity – being in the Green Academy. And this differentiates them from other students at Pinewood and gives them a sense of uniqueness and belonging.

And so because Green Academy students have their own cliques wherein liaisons connect with other cliques, by virtue of being in the Green Academy, the student in the Green Academy are in a hub and act as liaisons among cliques. I think the Green Academy in many ways allows the supportiveness of the Academy itself and the types of students
within it like Stevie who have supportive communities to share that support around to students who might really need it. I do not think that the Green Academy functions as a crowd in the way Steinberg describes it, but the Academy does give the students a reputation and an identity within the school as students who care about the environment and sustainability.

**Family context**

Stevie has two brothers, both of whom are older and at college. Stevie lives with his two parents in an apartment in Bluestone City. Stevie was born in El Salvador, but his family moved to Redwood City when he was young and they’ve been in Bluestone City ever since.

I met with Stevie and his mom and dad at a coffee shop near downtown Bluestone City. They were both very soft-spoken, and had Stevie translate for them. I first asked them about what the family does together, and as Stevie had described a supportive family environment of sharing meals and spending time together, Stevie’s parents confirmed Stevie’s stories.

Stevie’s parents also mentioned a community of families whose members move back and forth between the Bay Area and El Salvador. It seems that within the community the families and the young people within these families exist within a supportive network.

Stevie’s parents shared some insights into Stevie’s upbringing and experiences. They shared out that they have high expectations of Stevie and expect him to “do more” with his life and to strive to be the best he can be. They mentioned challenges with Stevie when he was young. According to Stevie’s parents, he used to be hyper, and over time with help from counselors and teachers, Stevie has been able to grow and change and focus on managing his academic and personal endeavors.

Stevie’s parents highlighted his strengths as being thoughtful and being able to do anything when focused. I have seen this manifested in Stevie – I have seen how he can buckle down and focus on a task or on some future goal when moments before he might have seen unfocused or disruptive. I think Stevie’s parents have actively engaged with the schools and a community that Stevie has been a part of, and this has allowed Stevie to stay on track developmentally.

For example, Stevie’s mother repeatedly mentioned how important it was to her to have clear lines of communication with Stevie’s teachers. When I asked about the education Stevie was receiving at Pinewood, both of Stevie’s parents felt that Pinewood was doing a good job of educating and preparing Stevie, but if something every came up they felt that it was important to ask the school for change in order to support their student.

Stevie’s mother noted that the best teachers are always parents. She said that it is up to parents to be patient and to believe that their children will change and grow over time despite behavioral challenges. When Stevie was struggling with what they were
describing as hyperactivity and lack of focus, Stevie’s mother encouraged his teachers to reward Stevie for ideal or appropriate behaviors as this was what worked at home.

I think this philosophy that parents are the best teachers and have such a powerful and influential position in the life of a child has empowered Stevie’s parents to really feel that they can and should support him to the best of their ability. Stevie’s parents love him and care for him deeply. They feel that they are living good lives, and that teaching their son how to live a good life and to connect with him is part of having a good life.

I sense in Stevie’s parents a real sensitivity and willingness to listen and to be open to Stevie’s struggles and challenges while also having high expectations for him. Not only do Stevie’s parents provide the role of a mentor and teacher, but they are reflective in their practice as parents. When I asked what advice Stevie’s mom would give to parents who were struggling with challenges that their son or daughter might face, she said that it’s important that parents are reflective.

The ways in which Stevie’s parents have worked with him and with each other in a reflective and loving relationship seems to have created a very strong bond between Stevie, his parents, and his brothers. Within the family, I sense a deep sense of trust and belonging.

**Stevie describes spending time with his family and the families they are close to:**

“When we gather together, we mess around with each other, have fun, and enjoy time with each other. We talk about the society, all the problems, stuff like that, but we usually take about each other. How we are and how we are doing.”

I think that what this captures goes back to this idea of supportive, communicative, adults building safe and open home communities outside of school allows for Stevie to develop socially and emotionally despite harmful stereotypes in the media. His family and friend network provides Stevie with a buffer or cushion or protection so that as he grows and develops and tries new things and asks questions and makes mistakes, he can be confident in knowing that he has a lot of support and community behind him.

Resnick et al note the ways in which care and connectedness protect students (RESNICK, HARRIS, & BLUM, 1993). They emphasize how research has shown that “caring relationships between children and adults, including relationships within and outside the family” are key to the development of resilience in adolescents (S4). They also emphasize that three human desires in many Western cultures are (1) desire for community (2) desire for engagement and (3) desire for dependence (S4). These desires seem to be desires that apply to non-Western cultures as well, even though the sociologist Phillip Slater (who Resnick et al cite) did not studies those cultures in-depth.

Resnick et al found that family and school connectedness were the most powerful protective factors in terms of protecting adolescents against adversity or challenges during development. The fact that Stevie is surrounded by supportive adults and feels very connected to his family seems to confirm the work presented by Resnick et al.
Socio-emotional development

Psychosocial borders

From other conversations with Stevie and in watching him interact with other students, I do not usually see any inconsistency between the ways in which Stevie carries himself in the world and the demands of the contexts in which he lives. Something that I have noticed is that the other classes and spaces I have seen Stevie in have mostly contained students who speak the way he speaks and many of whom are students of color. I wonder if I saw Stevie in contexts in which he was the only person of color or one of very few if he would then feel an inconsistency between his roles and ways of being and a more white context.

Davidson and Phelan define psychosocial borders as ones that are, “constructed when children experience anxiety, depression, apprehension, or fear that prevents them from adopting the mindset and emotional orientation required and valorized by schools. Such borders disrupt or hinder students’ ability to focus on classroom tasks, participate fully in learning, or establish relationships with teachers or peers in school environments” (Phelan et al., 1991, 240). They go on to say that these borders are “temporal” and can lesson as circumstances change. I don’t know of any explicit psychosocial borders Stevie could be encountering. But after reviewing Stevie’s cumulative file, I think that his experience as an immigrant student could have – at one time – been a very salient border that still affects his experience.

Stevie often says that he is scared that he will fail a test or not do well even though he might understand new content without difficulty. In Stevie’s cumulative file, I found year after year of Stevie’s test scores in which he was performing below basic. His teachers wrote notes by their assessments of his performance in their classes where they often suggested as an area for improvement that Stevie complete his assignments and focus more in class. They described disruptive behaviors and lack of focus. When I met with Stevie’s counselor, she said this is typical of adolescent male students, but the other adolescent male students do say they will fail certain assignments or assessments as often as Stevie does.

And so I wonder if Stevie experiences a psychosocial border in his life at school that was first established when he moved here. One important question I would like to ask is how he was as a student when living in El Salvador. Suarez-Orozco et al (page 55 in Sadowski) says that, “for immigrant youth, how they negotiate different and often conflicting expectations play an important role in their adaptation and development, both during adolescence and beyond.” What Suarez-Orozco does not include in this claim is that this negotiation surely occurs during childhood as well. (Suarez-Orozco, Baolian Qin, & Fruja Amthor, 2008)

At a surface level, Stevie seems to have adapted well to what Davidson and Phelan describe as the emotional orientation required by schools. I would classify Stevie as a “type 2” student, experiencing different worlds with border crossings managed. They say that usually high-achieving minority students exhibit patterns common to this type. While Stevie is not a straight-A student, and has a pretty even mixture of A’s, B’s, and C’s, he demonstrates a
willingness to learn and to do his best in his classes despite any perceived difficulty of content. Perhaps over time, the psychosocial border around his immigrant identity has faded as circumstance has changed.

Stevie’s most prominent border is the linguistic border. Davidson and Phelan describe linguistic borders as ones that result when, “communication between students’ worlds is obstructed, not because of different languages per se, but because one group regards another group’s language as unacceptable or inferior” (240). Stevie’s first language is Spanish, and he is classified as RFEP. Although Spanish is not treated as inferior at Pinewood, it certainly is unacceptable to use Spanish, generally, to answer questions in classes other than Spanish class. When comparing Stevie to students with higher academic status who use a more elaborate English vocabulary – particularly science vocabulary – Stevie experiences linguistic borders at school.

However one interesting pattern has emerged that I saw twice this week with Stevie and another student, Tony. I believe it may be related to psychosocial borders Stevie may be facing, as well as a connection to Stevie’s peer network. For some background information, Tony is a student who is an English learner and in talking to some of his other teachers, he is often identified as a student who behaves “disruptively.” In my class, he simply does not do various activities, will make rude comments, and sometimes he will ask to go outside or go to the office and say that he is just feeling angry or overwhelmed.

Two situations involving Stevie and Tony caught my attention this week. The first occurred on Wednesday. This was Stevie’s first day back to school after having been in El Salvador for two weeks. He moved over to wear Tony was sitting so they could work on a test review together. The two were very disengaged when we were going over questions and answers as a class, which was uncharacteristic of Stevie. There were windows where I saw Stevie attempt to get Tony to focus when I waited for the entire class’s attention, so I think that in this moment Stevie was being pulled in two directions. His attentiveness towards me fluctuated, and his participation in Tony’s side conversations and his attempts to get Tony to pay attention also fluctuated.

I wonder if Stevie’s care and concern and friendship with Tony is in any way related to their shared experience of being/having been an English learner. I do not know if Tony is a recent immigrant or if his family recently immigrated, but to assume so might not be an unreasonable assumption. When teachers called Tony’s mom, Stevie had to translate for the teachers as Tony’s mom only spoke Spanish. I wonder if Stevie empathizes with Tony, and I wonder if Stevie senses any psychosocial barriers that Tony is facing. I certain see psychosocial barriers for Tony as he has even recognized that he gets frustrated and overwhelmed in class, and has not yet developed that emotional orientation required for schools.

Albert, Chein, and Steinberg write about how peer influence affects adolescent decision making, and they propose that, “the presence of peers ‘primes’ a reward-sensitive motivational state that increases the subjective value of immediately available rewards and thereby increases preferences for the short-term benefits of risky choices over the long-term
value of safe alternatives” (Albert, Chein, & Steinberg, 2013). I am not sure how true this is for Stevie. There are certainly times when Stevie might talk in class or mess around with Tony during class, in which case I can see how Stevie is willing to risk getting asked to be quiet in order to gain some rewards of being closer to Tony. But generally I do not see Stevie mirroring Tony’s other riskier behaviors. Stevie has defined for himself limits and responsibilities that protect him from the risky choices, and this protection may come from other supports that have allowed for Stevie to develop socio-emotional competences that Tony may not have developed fully yet (CASEL, 2014; RESNICK et al., 1993).

The second occurred on Thursday, and demonstrated Stevie’s deep care and concern for Tony and solidified my sense that Stevie and Tony have an important and meaningful friendship that I hypothesize may be a foil for Stevie’s relationship with his identities. I was just asking Stevie how his day was going, and he said he was very worried about Tony. I asked why, and he said that the previous day, he told Tony that he was not going on the field trip.

So, Stevie was worried that Tony had taken him seriously, and had decided he would skip the field trip too. Later when we were eating lunch, Stevie showed me that he had made Tony a sandwich and had brought Tony a special baked sweet treat. He said, “Tony’s my cousin, I gotta look out for him.” Remembering the previous day’s interactions when I had seen them in class together and watching Stevie have to choose between paying attention in class and being there for Tony, I asked Stevie how he felt Tony was doing. And Stevie noted that Tony sometimes got frustrated or angry in class, and just needed time and space to cool off.

What I found so interesting from these conversations is in seeing how Stevie sometimes gets frustrated or overwhelmed during class and says that he will fail this or that. I find that perhaps Stevie’s narrative is embedded and share with Tony, and their friendship is one that perhaps keeps Stevie’s borders between different worlds managed but not smooth. I think that Stevie can recognize the borders that both he and Tony face, and I look forward to learning more about their friendship and through this learning, I hope to learn more about Stevie.

**Socio-emotional learning**

Zins et al reference what the Collaborative for Academic, Social, and Emotional Learning (CASEL) have identified as core social and emotional learning (SEL) competencies. These are self-awareness, self-management, social awareness, relationship skills, and responsible decision-making.

I will provide two anecdotes about my student that I believe show signs of socio-emotional development that parallel two of these competencies: self-management and social awareness. The definitions of these two competencies are:

1. **self-management**: coordinating and regulating one’s emotions, cognitions, and behaviors to manage stress, control impulses, motivate oneself, and set and work toward the achievement of personal and academic goals
The first narrative involves information from examining Stevie’s cumulative folder, talking to his counselor, and talking to his parents. The second narrative is based on observations of Stevie and his friend Tony.

I met very briefly with Stevie’s counselor in order to gain access to his cumulative folder. She was not able to answer many of my questions, but I told her about some of my own observations of Stevie. I shared the ways in which I see him switch from being excited and loud and joking around and teasing others to being very calm, collected, and serious about academics within minutes. His counselor said that this was a natural part of his process of maturing, and I think this may also mean a maturing or a development of self-management.

In looking at Stevie’s cumulative folder, I found that many of his former teachers had noted Stevie’s ability to learn and focus was inhibited by his sometimes-disruptive behavior. Perhaps when Stevie was younger, he did was not developmentally ready to coordinate and regulate his emotions, cognitions, stress management, impulses, motivation, and goal-setting. However, since then, Stevie has developed social emotional learning competences in areas described by Zins et al and the CASEL (CASEL, 2014; Zins et al., 2007). It is clear from my observations and conversations with Stevie and his parents that both he and his parents are working together to make sure Stevie is developmentally on track.

Stevie’s parents have played a pivotal role in making sure Stevie gets the developmental support he needs to develop his self-management competency. When I met with his parents, they shared that Stevie was very “hyper” when he was younger. The family was given the option of putting Stevie on a medication, but this was not seen as a good option for the family. Instead, Stevie’s parents were able to help Stevie meet with a psychologist which Stevie and his parents agreed helped curb some of the hyper behavior and allowed Stevie to develop some of that self-management-related coordination and regulation.

Stevie’s mom said (translated by Stevie) that she has always strived for clear communication between herself and Stevie’s teachers, and encouraged Stevie’s teachers to reward Stevie when possible as a way to reinforce and celebrate Stevie’s successes in practicing self-management. Both Stevie’s parents agreed that it is important that parents have good connections with their kids, and that they model and explain how to behave appropriately and how to live a good life. I think Stevie and his parents have had clear and open communication about developing a strong competency in self-management, and with their help Stevie has been able to overcome previous challenges related to not being able to control some of his behaviors.

This second narrative about Stevie’s developing social awareness comes from observations of Stevie and his friend Tony. When I first met Stevie, he would say things
that weren’t true such as being born in Japan or related by blood to various students in our 4th period biology class. Once, he even claimed to be Tony’s cousin. While this is not true, I do believe that Stevie has very developed sense of empathy.

Stevie reflectively commented that all people are the same and that everyone should be treated equally. In watching him work with other students in our classroom (we have white, Asian, black, and one part-native student in our classroom) I have never seen Stevie treat any of his peers differently based on race – in our classroom at least.

I don’t see Stevie preferentially talk to some students and not others in our class. With Tony, I have seen Stevie really empathize as Tony has lately been struggling with some behavioral issues in my biology class and in his other classes. Stevie has taken to checking in with Tony, and even offering advice and support. On a field trip we went on, Stevie had packed an extra lunch and snacks for Tony. I later learned that Tony had not served his detentions and could not attend the field trip, and Stevie was worried and upset for his friend.

In the classroom setting, Tony had been very disrespectful to me and to his classmates, and I offered him and another student three choices: to help do some cleaning around the classroom, to write a reflection about how they want to improve upon and change their behaviors, or to have a detention. Stevie stood by waiting for Tony, listening in. Tony decided that he wanted to just do the detention and Stevie let out a sigh and said, “no, do one of the other ones!” but Tony shook his head. Then, the two friends left.

Although Stevie is a higher achieving student than Tony, he seems to really care deeply about Tony. I think in that moment he was empathizing with Tony and saw that to do one of the other two tasks would have been more strategic and respectful than just leaving and taking the detention. With help from his parents and teachers, Stevie has not only developed the ability to manage his own behavior (and by that same token, his academic behaviors and the ways in which he navigates school) but he has also developed the ability to empathize with students like Tony and feel compelled to offer advice and support.

The other three competencies CASEL offers are self-awareness, relationships skills, and responsible decision-making. I think Stevie has these competencies to a degree, but they have been instilled in him by his school and home environments and he has not internalized them or developed them in the same way that he has developed self-management and social awareness. I have previously cited research that indicates the importance of school and home support in allowing students to experience healthy development through adolescence (Eccles & Roeser, 2011; Phelan et al., 1991; RESNICK et al., 1993). Here as in previous commentary on the importance of home and family support, I again emphasize the importance of the family and teacher support and communication that Stevie and his parents have expressed. This has important implications for how students might vary in their social emotional learning as their home culture and supports systems vary (RESNICK et al., 1993).
Race, gender, and physical identity

Race

When I asked Stevie about his race and ethnicity, at first he kept saying that he did not understand the question and that it was hard to think about. I then modeled how I would answer it (stating my races, white and Asian, and then stating my ethnicities, Italian and Chinese). He then said that many people think he’s Mexican, but really he is Salvadorian.

Stevie was born in El Salvador, and moved to the U.S. when he was 7. He said that it felt both exciting and scary to have to move. Stevie said that he likes being Salvadorian and identifying with this group. He says that being in this grouping makes him feel different, but in a good way. He said that he thinks it is important to have groups with “a little bit of everything” included. At school, Stevie says that his Salvadorian identity does not affect him greatly, and that he is proud of his Salvadorian identity. He says there are other Salvadorian students at Pinewood, and he has had some of his classes with them. When I asked Stevie about how in general other people perceive his race, he said it seemed like some people don’t really care, other people show respect, and some people do not see other differently. When I asked Stevie about what he would do if he saw something racist happening, he said he would try to stop whatever was happening. He said that, “we are the same, but some people think they’re better than others.” Stevie says that he has lots of different friends of different races and ethnicities. From my observations of him in class, he does not seem to only speak to students of some races or ethnicities.

Tatum describes work by Phinney that captures the concept of biculturalism in Latino students navigating both a home culture and a school culture that is more reflective of dominant culture (Tatum, 1997, 139). Tatum also cites work by Nieto that notes that this biculturalism is more easily achieved when there are programs present in schools that try to bridge the gap between school and home culture (Tatum, 1997, 139). Although Stevie does not actively participate in various programming offered by Pinewood geared towards supporting and celebrating Latino students and culture, Stevie does receive support from teachers, school community, and various school references such as interviews with EL students or profiles on Latino comedians during morning announcements. Stevie is successfully bicultural as he performs a more white identity at school in order to fit in with the dominant culture (Castagno, 2008) while still retaining his Salvadorian identity at home and with friends and family. Given that Pinewood is almost half white students and half Latino students, it seems that there are many students like Stevie who have developed a sense of biculturalism.

Noguera describes how racial identity becomes more salient for adolescents as they develop (Noguera, 2008, 26-27). While this might be outwardly true as Stevie spends more time with Salvadorian friends and family, it does not seem like the development of racial identity is significantly salient for Stevie. He has a sense of awareness about his own race and the race of others that can be attributed to his social and emotional learning (CASEL, 2014; Zins et al., 2007). However I do not think that his biculturalism and his
tendency to have friends who are male and Latino are driven by his racial identity formation. His peers and family have socialized the way Stevie performs gender roles. Stevie’s proximity to Latino communities seem like the reasons for why Stevie more closely associates with Latino communities. Noguera notes how English learners are often grouped together (Noguera, 2008, 26) and perhaps it is this grouping that Stevie experiences in his elementary and middle school experiences that simply carried over into his experience as a high school student. Stevie does not show any clear signs of marginalization based on his race, and most of his classes are comprised of students of his race and of other races and I have not observed any race-based micro-aggression in his classes.

Stevie says that he hasn’t seen racist behavior at Pinewood, but if it happened at Pinewood then he says the administration would make sure that the behavior would be stopped. I asked about a program at the school called KLEAR that I know a student (in a different class period from Stevie) had been recommended for because he made a racist comment in class. Stevie and his friend Kendra said that the program was more for behavioral issues and not focused specifically on stopping racism at school.

Stevie says that racism is not a good idea. He says he believes that there are no differences between one person and another. When I asked Stevie about how to solve the problem of racism, he says that if everyone cooperates that we can solve racism. I then asked Stevie some questions about how race shapes how people group up at school. He shared with me that, at the school in the quad, there is a “white jungle” and there are groups that reflect the racial breakdown of middle and elementary schools. He said that people tend to hang out with people they knew and hung out with in middle or elementary school. They used to hang out so they hangout with the same people and don’t meet new people.

Other students, Stevie says, do hang out with everyone. At one point, when talking about a school in the area and how many white students attended it, Stevie said, “I don’t want to sound like a racist!” I told him that he was not being racist by noting the concentration of white folks at that school, and then I then asked him, “why don’t people feel comfortable talking about race?” And he said that people just do not know what to say (Kendra also nodded in response).

I then returned back to the question of how he developed a sense of his racial identity. I told him that in our class (ED240) we are learning about how teenagers develop and grow in their identities. I asked him about how we know about our race if no one told us? He said that you just already know, and that people at school tell you. I then asked him how we know we are all equal? And he said that it’s common sense, and that we need to treat everyone equally.

Stevie and his family immigrated to the U.S. from El Salvador, and he says that he and his family take great pride in being Salvadorian. In the way that he talks about school and his race and ethnicity and his immigrant identity, the pride that I experience emanating
from him as well as his ease and confidence in the classroom leads me to believe that these factors are not a major part of his experience as an immigrant student.

Something that Suarez-Orozco et al. cite is this notion that “immigrant girls are less likely to perceive and internalize racism from the dominant society and are less likely than boys to develop an “oppositional relationship” with the education system” (58). Here I am struggling with how to think about Stevie in this light. He does this thing where he will say, “I’m quitting the Green Academy” or “I’m not coming to class today” after arriving 10 minutes early. He has these sort of empty threats, but he never really follows through with these threats. He also, while in the classroom, does speak in a loud voice, can capture the “machismo” that is sometimes associated with Latino men. I wonder if there are people in Stevie’s life that model this type of behavior for him? When he’s just one-on-one with me, he speaks more quietly and his body is more relaxed. At other times, his shoulders are set and he speaks more loudly.

In general, I don’t think Stevie has many discussions about race and ethnicity, and he says my questions confused him (I had printed him out a copy). But I think that Stevie does have a sense of self that is associated with race and/or ethnicity in his Salvadorian identity. I wonder though where his openness towards students of other races comes from. His views on race were very open and liberal, when he said that all people are the same, and that it was sad that there are people who don’t believe this to be true. I also wonder if he said these things to impress me? I am not sure. From whom he associates with though, especially in the Green Academy, I think Stevie truly is open and accepting. My class is quite heterogeneous with representation from all major racial groups. He does not ignore anyone, and I have seen him interact (never negatively) with students in our class at least once.

Gender and physical identity

I think that Stevie’s presentation as a cisgender, straight, male-identified person (and I assume that he is perceived as straight as other indicators about the school would suggest that heterosexuality is the norm and is assumed at this school and more generally in society) gives him some amount of power in his interactions with peers, particularly in relating to smaller boys in his class and definitely in relating to girls. I have seen Stevie at times challenge smaller boys or girls with rude or teasing comments. But with boys who are bigger than him or who may have more academic or social status, I have not seen Stevie challenge them. In fact, when I was going to have a larger boy in our class, Frank, move to a seat near Stevie, Stevie exclaimed, “PLEASE NO!” as if it would be distracting or if he felt threatened.

Stevie’s voice is quite deep and very distinctive. He talks a lot. This is something I hope to ask him about. He also usually has some facial hair, and I would say he looks older than his age. In terms of physique, he is beginning to “fill in” in terms of his musculature. He does not really slouch, and I have never heard him or read anything he’s written that would indicate that he has any sense of discomfort around his body. He loves to play soccer and while I have not seen him play, it seems like he’s pretty good at the sport. I wonder if his
athleticism contributes to a sense of confidence about his body, and if this is in any way associated to his sense of masculinity.

Chavis reviews a study by researchers at West Virginia University that explores how sports for both male and female adolescents play a role in satisfaction and overall well-being (Chavis, 2010). She says the study shows that sports participation is linked to physical and mental health benefits – regardless of gender. Especially considering Stevie’s comments on how he and his friends feel a need to play soccer in order to survive and to live, I find the study reviewed by Chavis convincing and in line with how Stevie describes his identity as an athlete. He does not associate it with needing to get fit or look good. He only really talks about it as a way to feel good, a way to relax, and to reap the physical and mental health benefits of exercising and participating in team sports.

There are three behaviors that I have found notable:

1. a constant talking with other students about soccer/FIFA
2. hitting his desk/table when frustrated and exclaiming
3. working differently with male students than with female students

1. soccer/FIFA: On a survey on the first day of school, Stevie noted that he likes soccer. But it wasn’t until I observed Stevie in French class when I also learned that he spends some of his free time playing a FIFA videogame on his phone. There are a couple of boys in his class that almost the entire class at any opportunity, Stevie would whisper or talk in a low voice about various players and jerseys and strategies of the game. While I hesitate to associate this behavior with femininity or masculinity, I did not see Stevie discuss this game with any girls in the class, and the playing of video games is often associated with teenage boy behavior.

2. hitting his desk/table when frustrated and exclaiming: I found this behavior surprisingly aggressive, when contrasting Stevie’s behavior with the behavior of other students. Similar to the reasons for why I noted video-game playing above, Stevie being the only student to show express his frustration with a loud physical response made me wonder if that behavior is in any way associated with his gender identity. In my own experience in schooling, male-identifying students tend to take up more space, speak louder, and use larger/louder/more noticeable body language. I think Stevie’s performance of this behavior does reinforce his overall masculine gender performance.

3. working differently with male students than with female students: I have seen Stevie work with girls in his 4th period biology class, and got to see him work with two different male students in French. One other interaction I saw in French was a girl who came over to Stevie, said nothing, flicked him with a hair tie or rubber band, he exclaimed, “Ow!” and then she walked away. I have no ideas as to what this could mean, but it felt important to include.

When working with girls in biology, I have seen Stevie challenge them more often and speak in an elevated tone. With boys in French, Stevie seems to speak in a lower tone, and challenges them less. I am not sure if working with students of the same gender is more comfortable or if Stevie trusts boys more easily, but there is a notable difference from observation of how Stevie interacts with boys and girls.
I know that Stevie would like to go to college at UC Davis and study to become a veterinarian. I think that while Stevie may not be aware of it yet, his sense of confidence in his academic ability particularly in science is tied to male privilege in STEM fields. I don’t think that any negative experiences around gender identity will affect what Stevie thinks is possible for his future.

Gender and sexuality are not policed to the extent described in Pascoe’s book “Dude, You’re a Fag.” In the first 51 pages of Pascoe’s book, Pascoe depicts a school in which gender and hetero-normativity are actively taught and policed. The environment is hostile for any type of nonconforming gender identity or sexuality. Race and other identities are similarly policed and particular racial and gender identities are privileged over others (Pascoe, 2007, 1-51). All members of the school community were reproducing problematic and harmful representations of gender and sexuality (52). Pascoe notes the ways in which rituals allow a society to “reaffirm shared morality and values” and when schools ritualize hetero-normative gender differences they “affirm its value and centrality to social life” (40). Pascoe explains that the same goes for harmful stereotypes about race and class.

I have not actively seen teachers policing gender or race or class at Pinewood in the extreme sense that it was policed at the school Pascoe describes in his book. However, I think that students may certainly continue to police gender through things like school dances and dress codes. However, I have not seen students who dress in nonconforming ways receive any flack from other students in the classroom at least. Most of the rude comments I have heard in the classroom have been more around race. On Fridays however, football players all wear their jerseys and cheerleaders all wear their cheerleading outfits to school during the school day. During rallies, cheerleaders and dancers dance. Football players are honored before their game. So, I would say, on Fridays the gender binary is most pronounced and public at Pinewood, but not at the expense of non-conforming gender expression.

I think Stevie’s family and peers and the media (including social media) as well as the Pinewood High School environment probably inform Stevie’s ideas about gender and sexuality. Interestingly, Pinewood High School has GSA posters all around it, so it seems like the school is/has made an effort to combat homophobia at the school. I have however seen fewer resources for trans* students at the school.

As mentioned above, I do not think Stevie is in a school environment exactly like the school described by Pascoe, but there are some similarities (football players versus cheerleaders on Fridays). As Sadowski suggests, I wonder if a presence of out students as well as a GSA at Pinewood has shifted the school culture such that the football/cheerleader culture can exist alongside safe space for folks who don’t conform to traditional high school stereotypes of gender roles? I think that Stevie fits many of the gender stereotypes and fits the story of gender differentiation as told by Perry and Pauletti (Perry & Pauletti, 2011, 62-68). He plays video games and takes up space with his voice and his body. I also consider points raised in Kimmel, who writes about aggression in male students. I would agree with Kimmel that aggressive behaviors may arise from socially constructed gender expectations, but I am not sure if Kimmel’s connections between race and gender expression match the way Stevie’s
race and gender intersect. And finally, the Galley piece on how boys and girls answer differently in the classroom is certainly true when I view Stevie relative to girls in his classes, he has very specific academic needs and behaviors that span between him and his male peers.

Peer and family contexts: drivers of non-academic development, and supporting research and theory

I think that Stevie is exactly where he should be developmentally because he has been so well scaffold-ed by his family, teachers, and friends. In Tatum’s chapters on critical issues in identity development (137) she draws the reader’s attention to familism which is “the importance of the extended family as a reference group and as providers of social support” that I would like to expand to not only extended family but an extended network of families. This is a trait that Tatum says is shared by many Hispanics (Tatum, 1997).

Stevie is close to his parents and the families of his peers. While other adolescents might be out Friday night, Stevie spends his weekends with his families and with other families. He is surrounded by adults and peers who can support him and model various behaviors that provide a constant life and academic scaffolding that I think allows Stevie to stay on track developmentally. I find that not only does this sense of familism exist within Stevie’s home and family and peer life, but it also exists within the Green Academy. Stevie and other Green Academy kids will often say “brah!!!” loudly as a greeting or an exclamation. This idea that the students are each other’s “brah’s’” or bro’s or brothers I think goes back to a sense of familism. Stevie will often say that he is a cousin with this student or that student jokingly. While these might be moments where Stevie is joking around, I think underlying these words is a true sense of connectedness to the other Academy kids.

Scholar Pedro Noguera describes how his son had always been a good student, but in the 10th grade he all of a sudden his son became angry and irritable and was not achieving at as high a level as he used to (Noguera, 2008). Noguera says his son Joaquin’s friends were dropping out of school and were experiencing academic failure without support. Noguera says that this sudden shift in behavior came from a place of figuring out what it means to be a young black man, from a need to be tougher in order to be accepted. Later on, Joaquin was able to tap back into his own support network to get back on track academically and socially while ending the phase of more risk-taking and self-destructive behavior.

I think that because Stevie has so much support from his family, and because he is in an Academy of predominantly lower-income, lower-skilled students that is on track to succeed and to gain practical and productive academic experience that Stevie is actually in environments that defy stereotypes. There may be other pockets within Pinewood that are not on Stevie’s social map where black and brown students are not getting the support they need. But I think the Green Academy and Stevie’s parents and his extended network
of supportive Salvadorean families are actually acting as a buffer between him and the stereotypes and racism that may exist in other parts of his community.

PART 3 – Intersections: The intersections of Stevie’s developing identities, and how our understanding of Stevie helps us reflect and become better teachers

In an interview, Bill Quinn said, “To me, identity is based on many things, but two things are most important. One aspect of a student’s identity is, ‘How do I experience myself given all my capacities? Am I defined by what I can do academically? What can I do athletically?’ That part of them is the center of their own experience is a major part of identity. But another major contributing factor in my identity is, ‘who do the people outside of me say I am? Who does my family say I am? Who does the school say I am? And what does the larger culture say I am?’” (Bessette, Lowe, & Quinn, 2008, 166)

I think this quote is perfect for re-centering my exploration of Stevie’s life in this case study. I hope that I have been able to show some of the ways that Stevie views himself in his own experience, but also how his family and school and culture view him. I think to take Quinn’s quote one step further, I hope I have demonstrated the ways in which I think how Stevie is seen by family and school and culture has allowed Stevie to develop healthy experiences in terms of how he sees himself.

Although larger structures might situate Stevie as the son of working class Salvadorean immigrants attending a tracked title 1 school, looking a step closer shows that Stevie is actually a part of a network of supportive community-oriented network of Salvadorean families attending a comprehensive high school while also participating in a small supportive learning community focused on environmental science and sustainability.

Sonia Nieto and John Raible (Raible & Nieto, 2008) share that; “Human beings are constantly evolving and redefining themselves over the course of a lifetime. Adolescence is a particularly significant phase of life, during which young people try to figure out who they are. The great task of adolescence is learning to express one’s multiple identities in personally meaningful and socially acceptable ways.”

Stevie has to navigate expressing his identities as a student, a son, a soccer player, a young man, and a Salvadorean often mistaken for being Mexican. In schools, as teachers, we might only really see students for their identities as students – from the cognitive development they show in their work and their grades. But Stevie is developing as a son, an athlete, a man, and a person of color.

How do I as a young and new teacher acknowledge and cultivate this intersectional growth of multiple identities during adolescence? I think that Stevie, his Green Academy teachers, the Green Academy students, and myself are lucky that we are a part of the Green Academy, which also has clear communication to parents. Moving forward, I feel that I have a new sense of awareness of the importance of academic, familial, and peer support in the developing adolescent, particularly in students who might need some kind
of barrier or buffer to scaffold resilience in a world that is unkind to working class people of color.

As teachers we are professionally responsible for facilitating learning in students who are in a state of constant development, and as Nieto and Raible suggest human beings in general are in a constant state of re-defining themselves. Individual organisms cannot actually evolve, in the biological sense, but human beings and their communities may experience cultural evolution and change. We are professionally responsible for identifying behaviors and questions that are connected to individual change in students, and to provide them with the personal and academic scaffolding they need to develop in physically, emotionally, and spiritually healthy ways.

This requires teachers to be well-informed about the challenges and specific cultures of the various communities from which our students come. This requires teachers to be able to identify and explain certain theories of adolescent development, but also to simply listen to students and their families to identify needs. Teachers are working with administrators and coaches and counselors and families in order to provide safe and open learning spaces for students.

Concluding remarks

Here our journey ends. We have followed Stevie through his experiences and development as a student in an academic setting – the school setting. We then took a look at his peer and family environments, his interpersonal development and development of certain social identities, and engaged the question of how Stevie’s family and peer environments interact with the school environment to produce the developmental stages that Stevie is currently experiencing.

I am deeply grateful to Stevie, his parents, his friends, his teachers, and Woodside High School for allowing me to get to know Stevie. To me, this opportunity represents an incredible opportunity to really explore the school and neighborhood context through the lens of a single student. While I may never have the opportunity to follow a student as closely, Stevie has not only taught me about himself but he has taught me about the ecology of schools and the communities connected to schools. I now fill one role in the ecological web of the school setting and environment, and Stevie fills another.

From his perspective, I have been able to deepen my understanding of how students and their parents navigate relationships with schools and classrooms and teachers. Moving forward, I have a newfound respect for teachers who make efforts to build community and connection between the school and the home and the neighborhood. I admire teachers and administrators who make an effort to get to know the hundreds of students they are responsible for.
I have learned that it’s worth the extra effort.

Although adolescents are developing and might be feeling overwhelmed by the various social, academic, and physical changes they are experiencing, they notice the effort that their families and schools and teachers make to support them. I feel reinvigorated and excited to further explore this type of student-teacher-family-school mutualism, so that all students can be receiving the support they need in the same way that Stevie and his family feel they are being supported.

**REFLECTION (LOG 10)**

*Provide a personal reflection on the various course themes and materials read in class. What theme and text (give a short quote from the text) that you felt particularly moved or inspired by in the course.*

The themes by which I divided this case study are as follows:

1. School and classroom context
2. Engagement and achievement
3. Cognitive development
4. Motivation
5. Peer and family context
6. Socio-emotional development
7. Gender, race, and physical identity

Each of these themes came with a slew of readings from which I learned. But, the readings did not answer many of my questions. I find myself questioning the power of data to truly capture many of the phenomena they sought to explain.

A larger theme of the class, one that I felt we did not fully flush out, is this notion that the themes of each week are interacting. Yes, they are interacting, but how? And why? And do they actually exist on their own in isolation?

I keep coming back to this quote, which will serve as the text by which I will reflect on this theme of interaction. I shared this quote in my case study, it is by Sonia Nieto and John Raible (Raible & Nieto, 2008) who share that; “Human beings are constantly evolving and redefining themselves over the course of a lifetime. Adolescence is a particularly significant phase of life, during which young people try to figure out who they are. The great task of adolescence is learning to express one’s multiple identities in personally meaningful and socially acceptable ways.”

The key here is this idea of “multiple identities” that I believe are intersecting and tangling and dividing and re-joining while weaving in and out of the personal and the social. The themes of each week discussed gender identity, racial identity, class identity,
academic identity, and so on and so forth. But I am still struggling to really make sense of how these identities intersect, and I don’t think I was able to really flush out how the multiple identities of my case study student intersect, and interact with the personal and social spheres.

Biologist Robert Sapolsky (with whom I took a class) made a very similar analogy when describing how human behavior is studied. Neurologists will say its neuroscience that can be used to explain behavior. Evolutionary biologists will say its evolution that can be used to explain behavior. Epigeneticists will say its epigenetics that can be used to explain behavior. And he attempts to teach a class on human behavior by teaching students content from what he calls main “buckets” of biology. And it is the interaction of these “buckets” on varying scales simultaneously when we can begin to explain complex social behavior of humans.

Similarly, in this class, each reading and theory and conversation for each theme gave me a bucket. I could draw from a “gender” bucket or a “race” bucket or a “cognitive development” bucket. But in the same way it is difficult to describe the evolution of a nerve it is difficult to describe the interaction of two of the theme buckets we have for explaining and describing adolescent development.

Perhaps it is the nature of both science and social science to be constantly grappling with uncertainty about how phenomena interact. What worries me is that audiences that are not critical of the work that is written and published by “experts” such as the writers we read will simply accept these theories about adolescents without questioning the validity of claims presented.

I’m not sure if the readings helped or hindered my deepening understanding of my case study student, Stevie. I feel almost as if I am a pawn, stuck in a tug-of-war between the authenticity of simply watching Stevie and letting him reveal bits of himself to me, as a whole person, a tangled ball of identities. On the other side, I am pulled into questioning my observations, developing biases by simply trusting the literature I am presented with, having to decide whether or not my student fits into the cookie cutters provided by the literature.

And what happens when he doesn’t? And should he ever? Is it just change that he happens to fit into frameworks for certain themes? And even within a theme, can he fit into some characteristics but not others?

Raible & Nieto remind us that humans are constantly evolving and so must the literature. While this idea of classifying and compartmentalizing in order to have deeper and more specific analyses into certain themes or buckets seem inefficient. Biologists like Sapolsky are beginning to study patterns in biology not as linear models, but as complex systems, systems with interacting parts, systems that require thinking across themes in order to reach any sort of understanding.
Are social scientists afraid of chaos? Because in the same way that biological systems are increasingly not able to be modeled deductively, it seems that adolescence may be similar to complex biological systems where the behavior can only be observed when studying the interactions of parts or themes.

What researchers of adolescent development do not need to do anymore of is trying to compartmentalize adolescence. Adolescence is complicated and messy and nonlinear. It cannot be understood through the lens of one theme at a time. The product of adolescence is the sum of its many, many components interacting. Treating the themes as these buckets is even problematic. By treating “gender” as a theme or “class” as a theme we leave out so much of the history of gender and the history of class and struggles for power.

Our students and their experience of development are not isolated to this time and space. It is not isolated to each of the individual categories that we spoke with them about. They are product of various histories and themes, physical, social, and spiritual that are battling for attention and relevance in their lives.

If I have learned anything from completing this case study is that I will never fully understand adolescent development, and that I will need to simply stay informed, humbled, and respectful of the work that is being done. And, when I am not feeling 100% trusting of the research being produced, I may always fall back on my own gut feelings and perceptions in working with students, trusting my desire to help students learn and grow in order to support them as well as I can.

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Winter Practicum  
Colin Haysman  
Assessment and Grading Policy Plan

**Goals/rationale for what I value and why**

The three main goals that I will place value on in my classroom are:

1. **An awareness** of what science is, and why science is important to society  
2. The skills of **explaining** scientific processes, **designing** scientific investigations, and being **critical** of science knowledge  
3. The skill of **working independently and with others** in ways that are productive, safe, and effective

These three things that I value will allow students to:

1. **Participate** in decision-making processes as citizens when issues related to science are relevant to the future of a student’s town, city, state, country, or our world  
2. Be able to **identify** basic scientific processes that will present themselves throughout their life, use the **skills** of scientific investigation to whatever types of work or home life they have, and be able to be **critical** of science knowledge and other types of knowledge to remain well-informed to life safe and healthy lives  
3. Wherever students end up, they will have to **work with others** – from their families to future employers and fellow employees. They will need to have these skills of working together in productive, safe, and effective ways to survive our modern job market and to have healthy relationships personally and professionally

**Activities, how grades will be calculated, focus on standards, emphasis on revisions and engagement (implications for sustainable and consistent effort from students)**

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<tr>
<th>Formative assessments</th>
<th>Summative assessments</th>
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<td>Tests</td>
<td>Performance assessments (group projects and presentations, lab investigations)</td>
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<td>Warm-up and Cool-down questions</td>
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***a large range of assessments are offered to give students ample opportunity to show what they learn and also to learn how to learn in different ways (Omrod)**

Formative assessments (70%)  
**Some but not all formative assessments will be graded credit/no credit. To receive credit on an assessment, students must show understanding of at least 80% on that assessment, and they will be asked to revise if that percentage of understanding has not been reached. I'll need to receive that revision by the end of the quarter or semester in order for that revision to be factored into their final grade.**
Summative assessments (30%)
All summative assessments will be scored and given a grade based on rubrics, see section below on Standards-based grading and use of rubrics. Some examples of performance-based summative assessments include but are not limited to:

- individual research projects that draw on content knowledge
- in-class discussions that pull together themes and content knowledge from a unit
- models, skits, posters, and blog posts

[Standards] The formative assessments and summative assessments above are designed to help students learn to read, write, think, explain, and do like scientists. The Next Generation Science Standards (NGSS) place a large emphasis on students not only knowing certain biological processes, but also that they can speak and read and write and design scientific investigations. Reeves says that, “The best way to grade what a student is able to know and do is to report specific student performance relative to an objective standard.” And so, in taking advice from Reeves, I have chosen the NGSS standards as high standards that I can use as objective standards that my students either are or are not meeting at any given time.

[revisions and engagement] On all formative assessment, students can earn full credit if they are showing that they have a level of understanding that meets the NGSS standards for some lesson. They may revise any and all formative assessment until they have reached that standard. I will utilize graphic organizers in order to make sure students are engaged during pair work and class discussions as a way to have written records of student engagement that I can then give students full credit for.

[sustainability and effort] I believe that this framework can give every student an expectation of success, and they are getting content and skills that are valuable. Motivation is often associated with a combination of students valuing whatever they are learning and also an expectation of success. So, I believe that students will put forth an effort in my class knowing that with a little effort and respect, they can really learn a lot and grow as scientists and as people.

Assessment of VERSUS assessment for learning

My main intention in assessing students will be more for learning, and not necessarily of learning. The formative assessments are designed such that students can see what they have not yet understood and can have a chance to revise and to try to gain that understanding. These types of assessments and my involvement in helping students grapple will also give me a sense of what students are understanding or not understanding such that I can modify my curriculum to support students where they are experiencing areas for growth (Black et al, Stiggins).

Stiggins says that, “formative assessment helps low achievers more than other students and so reduces the range of achievement while raising achievement overall.” For me, I hope to see the achievement gap in my classroom decrease over time. I hope that using formative assessment for learning will allow me to get all of my students to meet high standards, especially my lower achieving students. Stiggins also says that, “you can enhance or destroy students’ desire to succeed in school more quickly and permanently through your use of assessment than with any other tools you have at your disposal.” I have designed this assessment plan with an attitude and lens where I want students to feel empowered by the types of assessments I give, and for them not to feel like I’m out to “give them a bad grade” or “fail them” but rather to use assessment as a way to see what they know and understand and to figure out ways to help them learn and gain deeper understanding relative to the NGSS standards.

Standards-based grading and use of rubrics

All rubrics for summative assessments will look like the one below, which is a rubric for a lab report on which students would be allowed to work on in class, at home, with multiple opportunities for feedback from the teacher before submission. Unlike formative assessments, there will not be opportunities to revise summative assessments. However, there will be plenty of time in class for students and their teacher to
Work around exceptions. For example, if a lab goes horribly wrong or students within a group are having some interpersonal issues, there will ALWAYS be opportunities for students and their teacher to adjust learning tasks and rubrics to make sure individual student learning is being assessed over other things (accuracy of lab technique, group dynamics).

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<td>Title shows that your group investigated how the body uses homeostasis to regulate heart rate and breathing rate during exercise.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hypothesis shows how your group thought about how exercise might affect how the body regulates heart rate and breathing rate.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Procedure includes the steps that you and your group created to test your hypothesis. I should be able to re-create these steps.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Results include your GRAPH with a clearly labeled TITLE, HORIZONTAL AXIS, and VERTICAL AXIS and a description of what your graph shows.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Conclusion should answer the two questions provided.</td>
<td></td>
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</tbody>
</table>

There are three main categories. Missing, approaching the standard, and meets the standard (where the standard is described in detail). Students will have ample time to work on performance assessments in class, so it is my hope that students do not have whole pieces of a project or presentation or lab investigation missing. If a student were to be missing a significant portion of a performance assessment, I may wait until the students has work that is mostly approaching or meeting the standard before grading it. For example, were a student to submit a summative assessment in on time, and I was able to meet with this student to individually go over what exactly they need to do to approach/meet the standard, I would prioritize any opportunity to get a student to show understanding.

I have decided to place a large emphasis on performance assessments as they really allow for students to engage with material in-depth (Nitko and Brookhart) which will allow students to deepen their understanding and also scientific skills and abilities emphasized in the NGSS.

Peer and self-assessment

Self-assessment and peer assessment will be used in the following ways, by activity:

<table>
<thead>
<tr>
<th>Self-assessment</th>
<th>Peer assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tests/test revisions</td>
<td>Graphic organizers</td>
</tr>
<tr>
<td>Quizzes/quiz revisions</td>
<td>In-class activities and pair-work</td>
</tr>
<tr>
<td>Guided inquiry exercises</td>
<td>Reading and annotation</td>
</tr>
<tr>
<td>Writing</td>
<td>Cornell notes</td>
</tr>
<tr>
<td>Performance assessments</td>
<td>Guided inquiry exercises</td>
</tr>
<tr>
<td></td>
<td>Class discussions</td>
</tr>
<tr>
<td></td>
<td>Writing</td>
</tr>
<tr>
<td></td>
<td>Performance assessments</td>
</tr>
</tbody>
</table>

Self and peer assessment are important and effective because they gives students and opportunity to reflect on their own learning and understanding and also to compare and contrast their work with the work of their peers in order to learn and grow from each other and to share ideas and approaches to doing certain assessment or tasks. By sharing understanding and reflecting, students can gain deeper understandings in their learning through self and peer assessment.
**Function/methods of feedback**

For formative assessments, minimal and very specific feedback will be given particularly when getting students closer to achieving an understanding and getting credit for an assignment (*Brookhart, William*).

For summative assessments, more detailed feedback will be given for performance assessments WHILE students are working on those assessments so that they can get as close to meeting the standard as possible. For example, as students are working on an essay for example, I might include comments on where certain demonstration of understanding is missing. Similarly, if a student is working on a poster, I might provide feedback on what’s missing or how they can better show understanding.

For both formative and summative assessments, I will not give students a grade with their feedback. Black & Harrison say that, “a numerical mark or grade does not tell you what to do: if it is high, you’re please but have no impetus to do better, if it is low it might confirm your belief that you are not able to learn the subject.” I want students to always feel an impetus to do better, and I don’t ever want students to believe that they cannot learn the subject.
Hello!

My name is Ms. Q, and I will be teaching your student about biology this year. I have three main goals I hope to achieve through learning and growing with your student this year. I’d like your student to develop:

1. An awareness of what science is, and why science is important to society
2. The skills of explaining scientific processes, designing scientific investigations, and being critical of science knowledge
3. The skill of working independently and with others in ways that are productive, safe, and effective

What kinds of activities will your student do?
Students will be doing the following types of activities so that they can learn (and see what they understand or don’t understand) and so that I can see how much students have learned and how I can get them to learn more:

- Tests
- Quizzes
- Graphic Organizers
- In-class activities and pair-work
- Drawing activities
- Webquests
- Reading and annotation
- Cornell notes
- Guided inquiry exercises
- Class discussions
- Writing
- Laboratory activities
- Warm-up and Cool-down questions
- Performance assessments
- (group projects and presentations, lab investigations)

How will their grades be calculated?

Classwork (70%)
Some but not all classwork will be graded credit/no credit. To receive credit on classwork, students must show understanding of at least 80% on a task, and they will be asked to revise if that percentage of understanding has not been reached. I’ll need to receive that revision by the end of the quarter or semester in order for that revision to be factored into their final grade.

Unit Projects (30%)
All unit projects will be scored and given a grade based on rubrics.

Will they be able to revise their work?
On all classwork, students can earn full credit if they are showing that they have a level of understanding that meets the Next Generation Science Standards. They may revise any and all classwork until they have reached that standard. Students will not be able to revise unit projects. However, we will be working on these unit projects together in class. I will give them feedback and time to improve their projects before turning them in. If something exceptional happens to a student or their project, I am willing to work with individual students in these cases to make sure their learning is assessed and not other factors (group dynamics or problems with lab technique or accuracy).

How will you motivate my student to work hard and to get the best grade they can possibly get?
I believe that every student can be successful. I hope to motivate them by teaching them valuable information so they can learn and feel successful in their learning. The reason why I am teaching with so many different types of activities and focusing on revision and standards is so that I can make sure there are multiple ways for students to show me their learning so that I can help them learn. I know that when students feel they can be successful in learning and if the topics are interesting and valuable, they will feel motivated to learn.

Thank you for reading through this assessment plan! I hope to work closely with you and your student this year to learn and grow together!

With gratitude,

Ms. Q
Assessment and Grading Policy Assignment Grading Criteria

DIRECTIONS:
1) FOR ROUGH DRAFT: In the Self Assessment column, write evidence and commentary about what is present and what you are still working on in your assignment, as it relates to the criteria.
2) FOR FINAL PLAN: Using a separate color or font to distinguish between your draft and final plan self-assessment, write any additional evidence or commentary in the Self Assessment column.

The assignment includes:
✓ A clear policy for assessment and grading and a rationale for your choices
✓ A one page statement that you will use with your syllabus/letter home, informing your students and their parents about the assessment practices and grading policy in your course

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Criteria Description</th>
<th>SELF ASSESSMENT Evidence and Comments</th>
<th>INSTRUCTOR ASSESSMENT Evidence and Comments</th>
<th>Met the Standard?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range of assessment strategies discussed in policy</td>
<td>A range of assessment strategies is discussed and the reasons for their choices are well-founded.</td>
<td>1st draft: I think I do a good job of including a range of assessment strategies. But, I’m not sure if I provide enough reasons. And I’m not sure if I need to add more, and if so, I feel like I’ll really be going over the word limit…</td>
<td>1st draft: No need to add more – this is at the standard</td>
<td>2nd draft:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2nd draft: Yay!</td>
<td></td>
</tr>
<tr>
<td>Integration of readings and class activities</td>
<td>The readings and class activities clearly inform the final policy decisions and the main issues are addressed.</td>
<td>1st draft: So, I cite a bunch of readings, but I need to figure out a way to like, incorporate those readings better.. I think I’ll find some quotes or paraphrase some things to sort of pull out what it is from the readings that is informing my plan.</td>
<td>1st draft: Yes – do find some actual quotes but good use of the readings</td>
<td>2nd draft:</td>
</tr>
<tr>
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</tbody>
</table>


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<th>Met the Standard?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alignment of policy with statement to parents and students</strong></td>
<td>The statement for students and parents matches the statement of policy and rationale, giving the readers a clear, concise, and logical overview of how assessment will work in your class.</td>
<td>1st draft: I think my statement is really strong! I think one thing I may add is a simple definition of formative assessment and how/why it works well.</td>
<td>1st draft: Just what I wrote in my comments to you. Maybe reword the last paragraph.</td>
<td>2nd draft: I went through and read the comments, and I changed a lot of the language in my letter home. I am pretty sure I made adjustments in all the places where they were suggested in the comments.</td>
</tr>
<tr>
<td><strong>Writing style</strong></td>
<td>Both parts of the assignment are written clearly, succinctly and in a well-structured form. The statement for students and parents is written in an appropriate format and style. Both parts are proofread carefully.</td>
<td>I think I did a pretty good job of writing clearly and succinctly, but I wonder if it’s too succinct. I think the statement for parents and students is in a nice format and style.</td>
<td>Yes – well structured and well written.</td>
<td>2nd draft: yay!</td>
</tr>
</tbody>
</table>

**Final Comments:**
1. Teaching Philosophy Statement ................................................................. 3
   What is the role(s) of the teacher? How will you teach your students? ....... 3
   How does your identity influence your ideas about teaching? .................... 3
   How have any theoretical perspectives shaped your thinking on CML? ....... 3
   Summing it up: my role as a teacher, how I will teach, and why ............... 4

2. Creating an Effective Learning Environment & Building Community ...... 4
   What does an effective and equitable classroom community look like? ...... 4
   How will you design the physical space in your classroom and how will this
   design facilitate an effective learning environment as well as build community?
   .......................................................................................................................... 5
   How will you ensure that your classroom is an effective learning environment?
   And, how will you create a classroom community? ................................. 6
   The first few days of school, in Ms. Q’s biology class! .............................. 6
   CLASS PERIOD 1 – establishing and creating mutual respect ............... 6
   CLASS PERIOD 2 – building a culture of resilience and support ............. 7
   CLASS PERIOD 3 – getting organized! ..................................................... 9

3. Classroom Expectations, Rules & Procedures ...................................... 11
   What expectations are necessary for a productive classroom and what will be
   the expectations? .......................................................................................... 11
   How will you teach and reinforce rules & routines? How will you teach norms
   and procedures for participation and discussions? .................................... 11
   Consequences for behavior in your classroom? ........................................ 11
   School community and families ................................................................. 11
   What are the routines and procedures you will institute for effective
   participation and learning in your classroom? ........................................... 12
   How will you start/end class? How do students leave/enter the class? ...... 12
   What will be your policies on homework, late work, bathrooms etc? ...... 12
   What techniques will you employ when managing challenging behavior and
   which will you not .......................................................................................... 12
   How will you encourage and respond to positive student behavior? employ? 13

4. Reflections: .............................................................................................. 13
   What are you confident about? ................................................................. 13
   What questions or uncertainties do you still have about your plan? .......... 14
   What are your next-steps in implementing, thinking about, and updating your
   plan? ............................................................................................................. 14
1. Teaching Philosophy Statement

**What is the role(s) of the teacher? How will you teach your students?**

In William Glasser’s book “Choice Theory in the Classroom” it is recommended that teachers should be like modern managers in classrooms, where they are, “willing to share power” (90).

I agree with Glasser that teachers should *not* be traditional managers, but I also find that this term “modern” is still problematic in that there does not yet exist within this era a form of management that exists outside of other problematic systems of power that privilege certain behaviors and backgrounds over others.

Instead, I much prefer approaches shared by Stanford researcher and science educator Bryan Brown. He says that teachers are learning coaches. Coaches take on many roles such as that of counselor, friend, mentor, their main goal is to work on a specific set of skills with their athlete in order for that athlete to improve and be successful in whatever sport they are being coached in.

As a teacher, I will similarly fill a role for my students as a counselor, friend, and mentor. But my main goal will be to coach my students as learners, to come up with collective and individual strategies that help my students learn, so that they will be able to learn independently in the future and to be resilient as people and as learners.

**How does your identity influence your ideas about teaching?**

Parker Palmer in his work “The Heart of Teacher” says that, “teaching is always done at the dangerous intersection of personal and public life” (10). I find this rather alarming. Why should work done at the intersection of personal and public life be considered “dangerous”?

I chose teaching precisely because my personal and public identities cannot be separated. My queer, mixed race, female, and Catholic identities are both personal and public. They are constantly at odds with my identities as a teacher and a biologist. I hope to be transparent about my identities, how I am struggling and growing with them, and I hope my students feel safe and open in my classroom to talk about their own journeys with their multiple identities.

**How have any theoretical perspectives shaped your thinking on CML?**

Theorist of education Paolo Freire says in “Pedagogy of Freedom”:

“Respect for the autonomy of every person is an ethical imperative and not a favor that we may or may not concede to each other.”
Freire’s theories in general resonate with me as an educator. But this quote in particular has shaped my thinking on CML. No matter how much research or evidence shows that a controlled classroom facilitates learning, I would not sacrifice the autonomy of my students in order to create a sense of order. I also believe every human being has a right to live and love and survive in the world without being discriminated against or judged.

Freire’s work and theories motivate my desire for my classroom to be one where autonomy, possibility, respect, and resilience guide our learning and interaction.

**Summing it up: my role as a teacher, how I will teach, and why**

I believe teachers have tremendous power as learning coaches to teach students how to learn, both **academically, socially, and emotionally** and that this is a part of giving students from all backgrounds the skills they need to live **resilient and respectful lives**. A common theme that will run throughout this classroom management plan is a focus on teaching resilience and respect. I chose the teaching profession because of my belief in its capacity for creating safe and open spaces for learning and progressive change. I hope my classroom management reflects all of the values expressed above.

2. Creating an Effective Learning Environment & Building Community

What does an effective and equitable classroom community look like?

The two main characteristics of an effective and equitable classroom community are:

1. **Clear, concise, and accurate instruction designed so that all students can learn and are expected and supported to achieve high standards.**
2. **Culturally Relevant Pedagogy**

In order to fulfill the role of being learning coach as described in the previous section, which is the primary role of a teacher, an effective and classroom community must be created. This community **must** be one in which students receive clear, concise, and accurate instruction so that they know what exactly is expected of them and how they will be supported. Secondly the community **must** have in place culturally relevant pedagogy, which maintains that, “teachers need to be non-judgmental and inclusive of the cultural backgrounds of their students in order to be effective facilitators of learning in the classroom” (Toward a Conceptual Framework of Culturally Relevant Pedagogy, 66).

Particularly in classrooms with low-income students, the culture of poverty myth should be identified and actively dismantled. The culture of poverty myth is the idea that, “poor people share more or less monolithic and predictable beliefs,
values, and behaviors” (page 1 of Goralski’s “The Myth of the Culture of Poverty). Referring back to my teaching philosophy, part of building respect and resilience is dismantling harmful stereotypes and creating culturally inclusive communities.

In order to meet the two main characteristics of an effective and equitable classroom community listed above, teachers themselves must actively work on educating themselves and examining any internalized classism, racism, sexism, homophobia, or any other form of discrimination that even in the smallest subtlest forms can make students feel unsafe or unsupported.

Students will learn more effectively in environments with teachers who are active allies for all students, where a student does not feel threatened by any stereotype associated with their identity, or can at least know that there’s someone in the room with every intention of resisting stereotypes and stereotype threat.

An effective and equitable classroom looks like a classroom where student learning and student identity is celebrated and cultivated in ways that are relevant and meaningful to students.

**How will you design the physical space in your classroom and how will this design facilitate an effective learning environment as well as build community?**

This will probably depend on the shape of the room, and whether or not the lab space and classroom are combined or if I have a lab space separate from the classwork space. In general all students should have a similar view of the smart board or white board or whatever I’m presenting material on. Students should be able to easily move in their seats to turn around to talk to the people around them for quick pair-share activities. This way, students can learn from each other easily and also be talking to each other in order to learn about each other in the building of our classroom community.

It is important to me to have a lot of art, both scientific and social in nature, that was created by scientists and artists from underrepresented backgrounds so that even from walking into my classroom and looking around the room, it is clear that my classroom will be a space in which dominant stereotypes about science (as being a space for predominantly white heterosexual men) are consciously challenged.

I also hope to have up quotes and art up about growth and learning with representation from artists with underrepresented identities again to create a colorful, vibrant, warm space where even the walls are encouraging learning and growth and cooperation.
How will you ensure that your classroom is an effective learning environment? And, how will you create a classroom community?

In this section, I will also address the question of “how class expectations will be established and shared with the class community and the wider effective learning environment as well as build community.”

Wong and Wong (1998) note, “The first days of school can make or break you. Based on what a teacher does or does not do, a teacher will either have or not have an effective classroom for the rest of the year” (3). The following is a walkthrough of the orientation and activities I will have my students do (taking as much time as we need) in order for students to create and understand the learning environment I hope to achieve, and also to build our classroom community.

The first few days of school, in Ms. Q’s biology class!

CLASS PERIOD 1 – establishing and creating mutual respect

[Coming in, sitting down, getting settled] Students will walk in and have to find a name card. The cards will be arranged around the room in alphabetical order so that students can quickly find their seats and we can get started with class (and also avoid status issues with people wanting to sit next to cool people or their friends etc)

[introductions] I will welcome the class, and explain to them that they are in biology with me for the year. I will share a little about myself and about the class, and then have the students introduce themselves to whoever they are sitting next to sharing out (1) one thing they are excited about for the academic year and (2) one thing they are nervous about or challenged by about the academic year.

Then, we will go around the room and each student will say (1) their name and (2) their preferred gender pronoun (PGP). If students ask why we are doing this activity, I will explain that often we make assumptions about people’s gender identity and we assume that they conform to gender – this idea that people are either men or women. Since my class will be one in which I want students to respect one another by not making assumptions about each other’s identities, we are making sure we know what pronouns people use so that they do not feel unsafe or at risk of being mis-gendered.

We don’t usually refer to people by their race or class while in a classroom, but we do use pronouns such as she/her/hers and he/him/his all the time. “She answered the question. He drew a diagram.” And so giving a chance for people to share out what pronouns they prefer will give them a chance to start building that safe space together.

[rules and norms, establishing and creating respect] I will share out about how I believe different teachers have different teaching philosophies. Then, I will
share out my own. I will tell them that I hope to be for them a learning coach, but that in biology we will also take time to develop skills such as working with one another and learning and changing academically, physically, and emotionally together. I want to acknowledge that any student who came to my class that morning got out of bed and got dressed and either took the bus or walked or had a guardian drive them to school made an effort. Once they got to school, they came to my class, and I want to thank them for being committed in this way.

That being said, I want them to take some ownership around their education and in the creation of our learning environment because they know what environment is most effective for them. This starts with making sure we are respecting each other equally. So, I will give students the bulk of the class time to first work individually and then work in groups of 4 (with roles facilitator, recorder, materials manager, harmonizer) to come up with rules and norms for our class and then to share those out. This will be our first time practicing using roles, so that everyone knows what to do and so that everyone relies on each other to get things done.

At the end of the activity once the groups have shared out their norms (on white boards), I’ll have a volunteer create a poster of our class norms for extra credit to be done outside of class time.

I’ve chosen this way to set up the rules and norms in my classroom as a way to give students some autonomy over what behaviors are acceptable and not acceptable in my class. My reading of the work of Alfie Kohn informs this choice. He cites psychological theory and research that shows that universal needs are: autonomy, relatedness, and competence. Here we see a clear connection between my drawing from Freire’s words on autonomy and more evidence of the power that autonomy gives to students. Kohn goes on to say that “autonomy refers not to privacy but to self-determination, the experience of oneself as the origin of decisions rather than as the victim of things outside of one’s control” (9). In allowing my students to create the rules and norms for our class with me, I am giving them their power to self-determine, to be the origin of our class decisions.

[Class logistics and checking-out for the day] I will end class with a quick overview of my policies on homework, going to the bathroom, how I will grade (Credit/No Credit on most assignments except for large projects), and how I will test (for understanding only, will not affect grades as tests create unnecessary anxiety which I want to avoid!). Then I’ll do a quick re-cap of what we did that day, and let students know we’ll continue to build our classroom community and environment next class.

CLASS PERIOD 2 – building a culture of resilience and support
[Coming in, sitting down, getting settled] students will sit in the same seats as before, in alphabetical order

[figuring out why we are here, and where we are going] As a class, we will watch this short video clip:

Oprah There Are No Mistakes: http://youtu.be/dGgb1PwH7mo

I will also provide students with a transcript of the audio in this clip, so that students who learn best from audio or visuals or texts all have an equal chance to make sense of the material.

Then I’ll ask the students to discuss it with their partners and answer the following prompts with their partner: How can people learn from their mistakes? What supports do you have in your life to help you identify and learn from mistakes? Where in your life do you wish you had more support?

I’ll be walking around the room as they share with one another and will pick a few students to share out with the whole group to get a group discussion going. I’ll introduce my favorite phrase learned in STEP to: FAILFORWARD and I’ll explain that if they are every struggling with something and getting frustrated, I might just say to them “failforward” to remind them that struggling through difficult challenges is a part of becoming better learners and better people.

[reflecting and preparing to learn] In this next activity, I want students to do some self-reflection. They’ll each get this graphic organizer, and I’ll have them fill in the following four sections:

<table>
<thead>
<tr>
<th>Subject/Life Area</th>
<th>How can I make the most if this?</th>
<th>How is it useful?</th>
<th>Some areas for growth (challenges) and how you can overcome them</th>
<th>Some areas of strength (things that you are doing well)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


[checking-out for the day] I'll remind students of the focus of the day, this idea that we need to fail forward and learn from mistakes and to be optimistic about how our experiences can help us learn and be more resilient. I'll let them know next class we'll do a bit more scaffolding for the year and then hopefully start a little content.

CLASS PERIOD 3 – getting organized!

[setting up student log book] This will be a book where each day a student can choose to write in the agenda from the day, and also include any handouts in the back of the folder. Then, absent students can check the logbook and get any handouts they missed. I'll just explain what this is and how to do it.

[filling in digital getting to know you survey] Then, I'll have the students do a quick 15 minute getting to know you survey that will look a lot like this one:  
http://tinyurl.com/JQ-getting-to-know

[setting up class notebooks] After this, I'll give students notebooks or binders (depending on the class) and start setting those up so that students can stay organized. I will give each student and go over how I hope they’ll develop as learners using this guide I created in my science Curriculum and Instruction class. Then, we’ll get started on content! And again conclude class with a recap of our day setting up notebooks, going over learning, and starting a bit of learning.

Learning Newsletter
Learning biology with Ms. Q!

WE WILL NOT:
1. MEMORIZE
2. Say “we haven’t had that yet!”

Why? Memorizing material won’t help us practice using our knowledge in new contexts. When we try new problems, we build on what we know already!

WE WILL: approach new problems and contexts knowing that what we learn throughout the year will help us understand other ideas in biology.

Why? Practicing new concepts and ideas in new contexts will help you become a more independent scientist.

How? You will create your own labs, do big projects, and read and write so that you can master the many skills and practice of science on your own.

COGNITIVE APPRENTICESHIP
1. In our classroom, we create a culture of learning
2. You will work with me in an apprenticeship, where I facilitate your learning about biology so that you can develop skills to learn and do biology on your own (without me!)

Why? I love biology and I know that we will have a great year together. But when you leave my class, I want you to be able to go on to an AP or a college biology class with the science skills you need to ask questions and to be critical without my help.

How? I will be assessing you with exams and classwork to see how you take concepts we learn together and transfer those concepts into other contexts that I provide and that you also seek out to explore. That way you can leave my class having the confidence to do and understand science wherever life takes you!
3. Classroom Expectations, Rules & Procedures

What expectations are necessary for a productive classroom and what will be the expectations?

Teachers should expect (or teach students so that they can expect) a community of students that will respect one another and support one another in learning. These are the expectations that I will have for my students.

How will you teach and reinforce rules & routines? How will you teach norms and procedures for participation and discussions?

I won’t teach students the rules; they will create the rules themselves (See previous section on “the first few days of school.”) Students will have a chance to practice pair/share discussions, group discussions and white-board share-outs with roles, and also a whole-class discussion.

Consequences for behavior in your classroom?

I really hope to be at a school that does not give detentions. If I do end up at a school that gives detentions, I will do everything in my power not to give a detention or a referral. Instead, if a student acts disrespectfully by talking while I’m talking or while another student is talking (I will make this a rule but I’m pretty sure the students will come up with a rule like this on their own when we’re creating our class rules) multiple times during a class period, I will ask that the student stays after class.

They will have an option to:
1. help me with a task in our classroom or for the class
2. write a reflection on what they think they did wrong and how they might improve, or if something bigger motivated what they did, then identifying whatever that is and reflecting on how to overcome whatever challenge the student is facing
3. if the student would rather have a detention and not do the two tasks above, I may assign one (very begrudgingly)

School community and families

Routines I would like to establish in order to (1) to engage with the school and greater community and (2) to connect with families are:

1. call all parents at the beginning of the year, and throughout the year
2. to do an activity with students where they write down non-school and school communities that they are a part of
3. send positive post-cards home to each students at least once during the year
4. when there are larger issues and topics that cause a stir at school or in our local community or even national community, I will take the time to check in with my students about what’s going on and make sure that forum exists in my classroom when timely.

What are the routines and procedures you will institute for effective participation and learning in your classroom?

- hand-raising, when asked
- whole-class say-outs
- lots of pair/sharing
- roles for group work and conversation
- selecting students to share out or calling on students when they’ve had a chance to pair/share before-hand

***one can get a sense of this from the way the first few days are described in previous sections***

How will you start/end class? How do students leave/enter the class?

START: Each day I will expect that students come into the room, take out their class notebook, something to write with, their planner, sitting in their assigned seat. I will start the class after any school announcements or sustained silent reading by welcoming them with an agenda slide. We may or may not begin with a do-now activity, depending on the objectives for that class period. ***I’ll remind them to do this during our first few classes until they get into the hang of it***

END: Each day I will end class with a check-out activity like an exit slip or have a brief recap discussion of what we did that day.

What will be your policies on homework, late work, bathrooms etc.

There will be no homework given in my class. Late classwork will be accepted up until some date (with exceptions made in outstanding cases). I will let students go to the bathroom whenever they want to. They may simply ask when I am not giving direct instruction.

What techniques will you employ when managing challenging behavior and which will you not

Classroom management expert Bill Rogers offers several techniques that I hope to employ when managing challenging behavior. These techniques are:

- when students exhibit primary behaviors and secondary behaviors that are distracting, focus on addressing the primary behavior before anything else
- anytime a student behavior needs to be addressed, the teacher should choose an action that is as non-intrusive as possible. Students should not be addressed so that other students are observing.
- Teachers should always first present a **choice, then a warning, then a consequence** so that students are not immediately given a consequence and instead have a chance to take responsibility for their behavior and correct their own behavior.
- **Tactical ignoring** should be implemented for minor attention-getting behaviors to avoid having to engage with students and further distracting the class on tangents.
- **Distraction and diversion** can be utilized when students are doing something distracting. Giving students something else to do or diverting their attention away from whatever problematic behavior they are exhibiting in order to re-focus them, and to get them back on task.
- **Don’t argue, agree partially.** Teachers should never argue with students. Instead, teachers should partially agree with what a student is saying to avoid an argument. Engaging in an argument with a student runs the risk of escalating the interaction.
- **When then statements** are helpful for when a student wants something or to go to the bathroom, to say to the student when you have completed task A, then you can go and do task B.
- **Take up time** is so important so that students can process any request the teacher makes particularly after giving students a choice if they’ve exhibited a problematic behavior. The student has a chance to think through a choice or through how they should behave.

**How will you encourage and respond to positive student behavior?**

I will respond to positive behaviors with gratitude. I hope to create a classroom culture where members of the community hold each other accountable, including themselves. I hope that creating a culture of respect and striving for resilience together will make it such that positive student behavior is the norm!

**4. Reflections:**

**What are you confident about?**

I feel pretty confident about my plan. I really feel confident about implementing my first few days (with minor changes between now and next fall, of course). I’ve been able to infuse my teaching philosophy into how I’m setting the tone of my class to be one that is transparent and student-driven. It is so important to me that students feel that I care about their learning and development as people. I don’t want students to only think that I am their biology, and therefore all I care about is their learning of biology.
I think that the presentation of the first few days of school in my classroom capture a classroom culture designed for the student to feel safe and to feel supported as learners so that I can focus on student challenges, strengths, and other aspects of their lives. It is not a culture of consequence, but a culture of understanding. I hope students develop the skills to work and learn respectfully, and to be able to develop independence and resilience beyond my classroom space.

**What questions or uncertainties do you still have about your plan?**

I am nervous about violent or unexpected or re-occurring problematic behaviors. I do not feel equipped to deal with more serious behaviors associated with mental health and wellness, and I hope that at my school there is some really clear protocol for what to do if I feel a student might need extra help or resources. Even now, I struggle with how to support individuals who have so much stress coming from other parts of their life. I constantly am reflecting on how classroom management practice and also instructional practices reinforce opportunity gaps, and I am still searching for combinations of techniques that exist and maybe don’t exist yet to try and lead my classroom in ways that actively resist reproduction of social gaps and inequities.

**What are your next-steps in implementing, thinking about, and updating your plan?**

I hope to continue thinking about and updating this plan between now and next fall, especially as I fail forward with my independent student teaching. Honestly, I learn the most when I am at school, in my classroom with my CT trying out different things and reflecting on what works, what doesn’t, and learning more and more about who I am as a teacher. However, I do hope that there will be opportunities in my future to have conversations about best practices and techniques for classroom management. Having the chance to think deeply about this topic and to combine theory with practice has been very helpful in gaining clarity about developing my own classroom management style.
Winter C&I  
March 17,  
2015 Unit Plan

**Essential Question**  

**Context description**  
- 30 second story  
- Description of learners  
  - PRE-ASSESSMENT TO ELICIT PRIOR KNOWLEDGE AND FINDINGS  
  - Rationales  

**Learning Goals**  
- CONCEPTUAL  
- SCIENTIFIC PRACTICES

**Final Performance Task & The Assessment Guide**

**Lesson Plans**  
- Lesson plan 1 introduction to the relationship between chromosomes and DNA  
- Lesson plan 1 materials  
- Lesson plan 2 chromosome chaos  
- Lesson plan 2 materials  
- Lesson plan 3 – alien genetics (data, inquiry, and technology in this lesson)  
- Lesson plan 3 materials  
- Lesson plan 4 – final performance assessment
Essential Question

Why are DNA and chromosomes important to living things, and what are some of their social and political implications for our species?

Context description

30 second story

DNA and chromosomes are often thought of as containing the unique recipes for an individual organism that allows them to look and act a certain way. In this unit, students will be able to explain what DNA is, what chromosomes are, and why it they are important to living things, and what some of their social and political implications are for our species!

DNA is a challenging idea to teach because we can’t see it, and yet it has a lot of scientific and social implications that affect everyday life. Does our DNA determine our intelligence? How do we make sense of race and gender as social constructs relative to some theories of race and gender and biological constructs based on DNA? How have people conflated the social and scientific value of DNA to hinder or help certain groups of people within human societies?

A pretty awesome thing about DNA is how the same 4 base pairs are used for the DNA of all living things. And that evolution is the mechanism by which we have all descended from the same ancestor. The genetic biodiversity of life on earth was a product of many DNA mutations over the span of millions of years. What’s interesting is the way humans have tried to really distinguish themselves from the rest of the living things on our planet. However, we are all genetically related to all of the living things on the planet in that we all have DNA.

Description of learners

SCHOOL: comprehensive public school, population about 1700 students
DEPARTMENT: science
TIME OF YEAR: spring, students have just finished a unit on biotechnology (gene connection)
STUDENTS:

**Strengths**

This is a fantastic group of kids. All of them at some point or another have expressed a desire to do well in this class. They participate when I ask them to try to answer questions. Many of them know each other as they are in a program called the “Green Academy” which means they take many of their classes together and take courses with a focus on environmental science and sustainability. We have quite a few athletes in the class, a few dancers, and with a relatively small class size (19) we have a pretty tight classroom community. The students are very respectful to me, and ask questions when they are confused. Some students require more support than others, but they will ask for help (and we constantly remind the students to ask for help and support). In general, I think something about this group is that they just smile a lot (and manage to make me smile!) and have a really positive energy.

**Interests**

I think the students are interested in learning, and they seem to be engaged when we have a mixture of teacher-centered and student-centered learning opportunities. At times, I think too much pair work or group work exhausts them – especially if they feel the task is “too hard.” We sometimes do whole-group activities that the teacher facilitates, and I think this engages students. They seem to also enjoy video clips and movies. I think interactive lectures work well for this class, where I lecture a bit and then the students do a quick activity or pair/share. But pure group/pair work sometimes gives them enough freedom that there’s a chance they might lose focus, whereas an interactive lecture that requires their participation keeps them accountable.

Content-wise, the students are interested in making connections to real-life relevant contexts. I think since so many of the students are in the Green Academy, they have chosen an academic path that emphasizes the connections between content covered in class and the practical applications of the knowledge they gain in school.

**Challenges**

My CT and I talk about this 4th period class as being lower skilled, compared to the other sections of biology she has this year. Reading comprehension and writing are two major areas for growth. Many of the students also do not do their own homework, and express difficulty with group projects. With about half of the class being English learners are RFEP and with about 3/4 of the class being title 1 there seem to be some challenges for our students inside and outside of their classes. I think many of these students are really resilient in other areas of their lives, and they are all motivated to do better in school. I would like to draw on these aspects of their personalities and also channel their energy into productive energy when completing activities and classwork.
Variation – charts based on data provided by a school database called Infinite Campus

We are a biology class of 19 students, 18 sophomores, and 1 junior.

I have two students with special needs who need extra support academically in having preferential seating and frequent checks for understanding, and one with a 504 plan for anxiety.

Given the information above, my group of learners is diverse in terms of race, gender, English proficiency, and income-level. From various pre-assessments from the beginning of the year, I also know that the students have a variety of different career goals from probation officers to veterinarians to marine biologists to computer programmers. The students readily bring their life experience to class, and I think that their different backgrounds and perspectives provide lots of interests for me to draw on as a teacher but also many challenges associated with particular aspects of the diversity in my classroom, particularly income level and language demands.
**PRE-ASSESSMENT TO ELICIT PRIOR KNOWLEDGE AND FINDINGS**

I asked students 6 questions:
1. What is DNA made out of?
2. What are chromosomes made out of?
3. How are DNA and chromosomes related?
4. Why is DNA important?
5. Why are chromosomes important?
6. What is one question you have about DNA or chromosomes?

I used this assessment because I wanted to see what prior knowledge students have already when it comes to DNA and chromosomes, and I also wanted to see what questions students have about these topics.

<table>
<thead>
<tr>
<th>DNA</th>
<th>cells</th>
<th>molecules</th>
<th>idk</th>
<th>fingerprints</th>
<th>atoms</th>
<th>organic matter</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
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<td>1</td>
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<table>
<thead>
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<th>chemical s</th>
<th>cells</th>
<th>proteins</th>
<th>dna</th>
<th>chromosomes</th>
<th>idk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>2</td>
<td>7</td>
<td></td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>related?</th>
<th>in bodies</th>
<th>idk</th>
<th>both have dna</th>
<th>make dna</th>
<th>organic matter</th>
<th>genetic material</th>
<th>work together</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>7</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>dna</th>
<th>solve problems</th>
<th>identity</th>
<th>idk</th>
<th>in bodies</th>
<th>codes to cells</th>
<th>related to ppl</th>
<th>testing</th>
</tr>
</thead>
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<tr>
<td></td>
<td></td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>2</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>chromosomes</th>
<th>idk</th>
<th>needed in cells</th>
<th>gender</th>
<th>genetic differences</th>
<th>proteins needed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>11</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>


1. What is DNA made out of?
   For the most part, students answered molecules or atoms. A few didn’t know, and a couple thought DNA is made out of cells. **IMPLICATIONS for planning:** I will make sure to include some notes on the fact that DNA is indeed made of molecules, and also will make sure the students who thought DNA is made of cells gain some clarity in terms of cells containing DNA.

2. What are chromosomes made out of?
   Most students said that chromosomes are made out of DNA. Some said they are made of chemicals, and two students mentioned proteins. No student said it was a combination of the two. **IMPLICATIONS for planning:** I’ll be doing an activity where students make a model of the chromosomes where there are parts representing proteins and DNA, so they’ll really get a sense of what chromosomes are made out of.

3. How are DNA and chromosomes related?
   Most students responded “idk” to this question. A few of them found things in common: dna and chromosomes are found in the body, and they are made of organic matter. One student said that they work together. **IMPLICATIONS for planning:** I think that since this is the meat of the NGSS standard, I can really work on getting students to understand this relationship.

4. Why is DNA important?
   Students had a range of answers that were all correct: solve problems/crimes, identity, codes to cells, relates us to people. **IMPLICATIONS for planning:** I think students have probably heard of DNA quite a bit and know that it is significant in its impact on human life. We also just did a unit on biotech so they have been working with DNA to solve crimes.

5. Why are chromosomes important?
   Most students responded “idk” to this question. **IMPLICATIONS for planning:** I think in general, students don’t really have a sense of what a chromosome actually is. I’m excited to explore this with them so they have a firm sense of what actually a chromosome is.

6. What is one question you have about DNA or chromosomes?
   - What are these?
   - Who discovered DNA and chromosomes?
   - What are they made out of?
   - How do egg donors spread DNA?
   - How can you get DNA out of something?
   - What do DNA and chromosomes do?
   - Can you split a chromosome?
   - What does chromosome mean?
   I think I can try to use these questions in the list of topics students can choose from for the summative assessment!
**Rationales**

**WHY TEACH SCIENCE? Why teach students about DNA and chromosomes?**

Shamos says that the public needs to be in support of science education because (1) science and science education communities receive support from the public and from public officials and (2) so that the public and participate in decision-making processes on issues that have a scientific base.

It’s important for science and science education communities to receive support from the public and public official because the public and public officials have a lot of control of environmental health and human health systems. The public – which includes my students – should be able to participate in decision-making processes that affect environmental health and human health systems!

DNA and chromosomes are more related to human health systems. As I teach this unit, I am facilitating connections for my students – connections to the science and science education communities who study DNA and chromosomes and also connections to human health issues that are directly related to DNA and chromosomes.

**HOW COULD THIS TOPIC BE ENGAGING FOR STUDENTS? Why might student find learning about these concepts relevant to something they want to do? WHY WOULD STUDENTS WANT TO LEARN THIS?**

Driver et al describes how students learn. Students learn when they have individual experiences that interact with that individual’s preconceived notions. Those notions are called schemes. They come with these “schemes” that are comprised of an individual’s ideas about certain phenomena, sensations, complex reasoning, attitudes, relationships, friendships, activities, and more. I can really engage students by drawing on the schemes they come with to create that interaction and to help those students learn.

I hope to really engage students in learning about these topics by drawing on their schemes. From the pre-assessment I already know that students are associating DNA and chromosomes with notions of family, belonging, and gender. I may be able to get students to question and push themselves to a deeper understanding of what DNA and chromosomes are in relationship with their prior experiences to produce new understandings.

By approaching engagement this way, I hope that students will be able to draw connections between the content and practice, and what they might want to do in the future. Falk & Dierking advocate for out-of-classroom science learning in helping students develop out-of-classroom science knowledge. And while I agree with them that students can have these experiences, they can also engage with citizen science and other types of advocacy if they are also getting time in school to learn science content and skills.
Students should want to learn about DNA and chromosomes and may use this information in the future because it is linked to human health in really salient ways. I hope to help my students recognize the importance of being able to participate in decision-making processes on issues that have a scientific base, especially those that require some knowledge of DNA and chromosomes.

Learning Goals

CONCEPTUAL

LESSON 1: Students should be able to describe what a chromosome is, what its relationship to DNA is, and why it might be important to our everyday lives.

LESSON 2: Students should come to gain a better understanding for what chromosomes are in terms of where they are located and what they can tell us about the health and traits of a human being.

LESSON 3: For students to understand and explain how parents’ genes affect their offspring.

LESSON 4: For students to understand and explain the relationship between DNA and chromosomes as instructions for traits passed from parents to offspring.

SCIENTIFIC PRACTICES
( obtained from the NRC report)

LESSON 1: Students will explicitly be using a model of a chromosome using toothpicks and string. They will have a chance to question the validity of the model. These are important skills that they require abstract thinking that will really get students at a higher order of thinking.

LESSON 2: In this activity, students will be developing and using their own model in the sense that they are creating their own versions of karyotypes. They are then given opportunities to construct explanations using their karyotypes. This will benefit students in giving them further practice with models and also to work on explaining a model and their thinking and coming up with explanations for what they are thinking and doing.

LESSON 3: Students are going to be analyzing and interpreting data, carrying out an investigation via inquiry, using a bit of mathematics/computational thinking, and also constructing explanations based on the data they collect. They will be engaging in all of these practices, and these practices in many ways cross over into other academic and cognitive skills that will come in handy for these students in future problem solving related to or outside of the realm of science.

LESSON 4: In this final activity, students are encouraged to ask questions, and to also construct explanations and also to communicate information and obtain and evaluate that information in the research process. In doing individual research, students will have a chance to practices these skills, and these skills will benefit students when they are trying to inform themselves and also to explain their thinking in the future within and outside of science.
Final Performance Task & The Assessment Guide

DNA and Chromosomes Final Project!

1. Choose a topic, and do some research on it!
   - Find out who discovered DNA and chromosomes
   - Sperm donors
   - Egg donors
   - DNA extraction (when you get the DNA out of something...)
   - Cloning
   - Genetic engineering
   - Genetic disease (you can just pick one!)
   - [propose your own: __________________][need teacher approval!]

Some tips for doing research:
- start with a google search!
- ask friends, family, teachers what they know about your topic
- visit the library, ask the librarian for resources
- if you get really stuck, ask a friend or a teacher for help getting started!

2. Choose a method
   - essay
   - poster
   - comic strip
   - song
   - skit
   - children’s book
   - video
   - blog post
   - model
   - [propose your own: __________________][need teacher approval!]

3. Make sure you answer ALL of these questions somewhere in your project!
   - Where is DNA found? What is it made out of? Why is it important?
   - Where are chromosomes found? What are they made out of? Why are they important?
   - How are DNA and chromosomes related?
   - What are genes made of? Where are they located? What happens when you have people with different versions of the same gene? (recall what happened with the aliens!)
   - How do genes get inherited?
   - What’s happening to DNA, chromosomes, or genes in your chosen topic?
<table>
<thead>
<tr>
<th>Topic</th>
<th>Missing (0 pts)</th>
<th>Level 1 (3 pts)</th>
<th>Level 2 (4 pts)</th>
<th>Level 3 (5 pts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNA</td>
<td></td>
<td>Correctly answers one of the questions.</td>
<td>Correctly answers two of the questions.</td>
<td>Correctly answers three of the questions.</td>
</tr>
<tr>
<td>Chromosomes</td>
<td></td>
<td>Correctly answers one of the questions.</td>
<td>Correctly answers two of the questions.</td>
<td>Correctly answers three of the questions.</td>
</tr>
<tr>
<td>How they’re related</td>
<td></td>
<td>Gives one accurate explanation for how they’re related</td>
<td>Gives two accurate explanations for how they’re related</td>
<td>Gives three accurate explanations for how they’re related</td>
</tr>
<tr>
<td>Genes</td>
<td></td>
<td>Correctly answers one of the questions.</td>
<td>Correctly answers two of the questions.</td>
<td>Correctly answers three of the questions.</td>
</tr>
<tr>
<td>Inheritance</td>
<td></td>
<td>Addresses one of the following: Mentions parents and offspring, discusses the role of each parent, and relates inheritance to chosen topic.</td>
<td>Addresses two of the following: Mentions parents and offspring, discusses the role of each parent, and relates inheritance to chosen topic.</td>
<td>Addresses three of the following: Mentions parents and offspring, discusses the role of each parent, and relates inheritance to chosen topic.</td>
</tr>
<tr>
<td>Connect to topic</td>
<td></td>
<td>Gives one accurate explanation for how DNA, chromosomes, or genes are related to chosen topic.</td>
<td>Gives two accurate explanations for how DNA, chromosomes, or genes are related to chosen topic.</td>
<td>Gives three accurate explanations for how DNA, chromosomes, or genes are related to chosen topic.</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>24</td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

0 to 6 = F  
7 to 12 = D  
13 to 18 = C  
19 to 24 = B  
24 to 30 = A
Lesson Plans

Lesson plan 1 introduction to the relationship between chromosomes and DNA

Rationale:
Students will have just finished a unit on biotechnology. Biotechnology exists in many ways as a field in which DNA is engineered to get nature to do what we want it to do. But what does this DNA look like on its own in nature? Where does it come from? What purpose does it serve in an organism’s body? This lesson on chromosomes and DNA gives students a way of understanding where DNA comes from and gets them to begin to think about why it’s so important.

Total Time:
50 minutes

NGSS Standard: (from NGSS):
HS-LS3-1. Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring. [Assessment Boundary: Assessment does not include the phases of meiosis or the biochemical mechanism of specific steps in the process.]

CA standard: Genes are a set of instructions encoded in the DNA sequence of each organism that specify the sequence of amino acids in proteins characteristic of that organism.

Conceptual learning goal: Students should be able to describe what a chromosome is, what its relationship to DNA is, and why it might be important to our everyday lives.

Content Learning Objectives:
- identity and explain what the chromosome is and how it is related to DNA
- understand the meaning of and correctly use vocabulary we use to describe DNA and chromosomes

Language Objectives:
- use language to describe the relationship between chromosomes and DNA
- ask questions to clarify the relationship above

Scientific practices
Students will explicitly be using a model of a chromosome using toothpicks and string. They will have a chance to question the validity of the model. These are important skills that they require abstract thinking that will really get students at a higher order of thinking.

Academic Language Forms

Content-specific vocabulary:
Cell division
Nucleus
DNA
Supercoiling
Formal and Informal Assessment

Formative Assessment
During my brief slideshow introduction, I will have students repeat the words as I say and define them and their role in cell division and supercoiling. I’ll have students review the vocabulary and record their notes in a graphic organizer for new vocabulary. Later when I have students explaining the relationship between DNA and chromosomes, I will formatively assess them based on how they are able to draw on the content and support vocabulary in communicating their ideas.

Summative Assessment
A larger summative assessment on DNA and genetics will be coming later in the unit.

Resources and Materials

Smart board
Computer (for teacher, attached to smart board)
Google drive slides
Handouts/instructions for the chromosomes, graphic organizer

Summary of Learning Activities

<table>
<thead>
<tr>
<th>pacing</th>
<th>teacher</th>
<th>student</th>
<th>resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAY 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(11:00 – 11:05)</td>
<td>Put dvd on the channel to tune in for announcements, and check in with students who might need help</td>
<td>Listening to announcements, getting ready to go</td>
<td>Smart board/computer</td>
</tr>
<tr>
<td>announcements on smartboard, letting students write down homework and get settled in</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(11:05 – 11:25)</td>
<td>Show students slides that describe what DNA is, and how when cells need to divide, they make a copy of the DNA so that it will get passed on to the cells that get created. Pause</td>
<td>Take notes on the slides, pause to practice saying the new vocab and practice saying the definitions out loud.</td>
<td>Smart board/computer</td>
</tr>
</tbody>
</table>
so that students can write down and practice reading/saying the definitions of new vocab

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Instructions</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:25 – 11:35</td>
<td>building the toothpick chromosome</td>
<td>Pass out instructions and materials and let students build their models of their chromosomes. Remind students to READ THE DIRECTIONS</td>
<td>String&lt;br&gt;Toothpicks&lt;br&gt;Markers/crayons&lt;br&gt;Ruler&lt;br&gt;Index cards</td>
</tr>
<tr>
<td>11:35 – 11:55</td>
<td>chromosome model discussion</td>
<td>When students are done, have them work with their partner to answer some questions about the content, using the graphic organizer included to guide them.</td>
<td>Have a discussion based on the questions in the graphic organizer included.</td>
</tr>
</tbody>
</table>
**Lesson plan 1 materials**

### HOW ARE CHROMOSOMES AND DNA RELATED?

**Part 1: Anticipation guide:**

<table>
<thead>
<tr>
<th>Question</th>
<th>Circle yes or no</th>
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<tbody>
<tr>
<td>DNA is made of molecules</td>
<td>Yes   no</td>
</tr>
<tr>
<td>DNA is made of chromosomes</td>
<td>Yes   no</td>
</tr>
<tr>
<td>Chromosomes are made of DNA only</td>
<td>Yes   no</td>
</tr>
<tr>
<td>Chromosomes are made of both DNA and proteins</td>
<td>Yes   no</td>
</tr>
<tr>
<td>Chromosomes can be found in the nucleus of a eukaryotic cell (like a human cheek cell or an elodea cell)</td>
<td>Yes   no</td>
</tr>
<tr>
<td>Before cells divide, they have to first make copies of their chromosomes.</td>
<td>Yes   no</td>
</tr>
</tbody>
</table>
Part 2: key vocabulary and background

While listening to the slideshow, record the meanings of key words in this organizer! Some of them are already filled in.

<table>
<thead>
<tr>
<th>Key words</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell division</td>
<td>When a cell makes a copy of everything inside it, and then splits into two cells.</td>
</tr>
<tr>
<td>Nucleus</td>
<td>The part of the cell where chromosomes are in eukaryotic cells.</td>
</tr>
<tr>
<td>DNA (genetic material)</td>
<td></td>
</tr>
<tr>
<td>Supercoiling</td>
<td></td>
</tr>
<tr>
<td>Chromosome</td>
<td></td>
</tr>
<tr>
<td>Replicate</td>
<td>To make a copy of something. Example: Ms. Ighanian painted a picture of an alpaca. I want to replicate her picture, so I am going to paint my own picture of an alpaca.</td>
</tr>
<tr>
<td>Condense</td>
<td></td>
</tr>
<tr>
<td>Model</td>
<td></td>
</tr>
<tr>
<td>Gene</td>
<td>A gene is a section of DNA that has information about one kind of trait a living thing has. Example: Everyone has a gene for eye color. Everyone has that section of DNA, but that section might look different for different people. That’s why different people have different eye color.</td>
</tr>
</tbody>
</table>
PART 3: read and diagram!

Read: Before a cell can divide, it must replicate its DNA. Once the DNA is replicated, the long stand of DNA must be condensed in order to fit inside the nucleus.

Because the length of DNA can be thousands of times that of a cell, packaging this genetic material into the cell or nucleus is difficult. The DNA goes through a process known as Supercoiling.

Supercoiling of DNA allows for a lot more DNA to be packaged. The final product of DNA supercoiling is known as a Chromosome.

To form the chromosome, the DNA wraps itself around proteins. Then, the proteins fold and coil to create an X shape that we usually think of when we think of chromosomes.

Label the diagram! Use the following words in to label:

DNA  Gene  Proteins

DNA wrapped around proteins  chromosomes
PART 4: Build a chromosome model!

Materials:

- 30 cm of string (this will be the DNA)
- 1 toothpick
- Markers or crayons
- Ruler
- One 3x5 card

Procedures

1) Obtain a 30 cm long string from your teacher.
2) Lay the string flat on your table and measure and color the string according to the following instructions:
   a) 1st 6 cm do not color
   b) 2nd 6 cm color red
   c) 3rd 6 cm do not color
   d) 4th 6 cm color green
   e) 5th 6 cm do not color
3) Once your string is properly colored, wrap the string tightly around the length of the toothpick. **DO NOT OVERLAP THE STRING, USE AS MUCH LENGTH OF THE TOOTHPICK AS POSSIBLE.**
4) Tape the end of the string down so that it won’t unravel.
5) Tape your string and toothpick structure in the middle of the 3x5 card.
6) On your card, label the section of colored string as Gene, the toothpick as proteins, and the string as DNA.
Part 5: Answer these questions with your partner!

<table>
<thead>
<tr>
<th>Questions</th>
<th>Your response</th>
<th>Your partner’s response</th>
<th>Your shared understanding</th>
<th>What do you still want to know?</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is DNA supercoiling and why might it be important?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What are some things about your model that are probably not the same in real chromosomes? How might you be able to prove it?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What are some things about your model that are probably the same in real chromosomes? How might you be able to prove it?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Part 6: Would you change your answers to the questions you answered at the beginning?

<table>
<thead>
<tr>
<th>Question</th>
<th>Circle yes or no</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNA is made of molecules</td>
<td>Yes</td>
</tr>
<tr>
<td>DNA is made of chromosomes</td>
<td>Yes</td>
</tr>
<tr>
<td>Chromosomes are made of DNA only</td>
<td>Yes</td>
</tr>
<tr>
<td>Chromosomes are made of both DNA and proteins</td>
<td>Yes</td>
</tr>
<tr>
<td>Chromosomes can be found in the nucleus of a eukaryotic cell (like a human cheek cell or an elodea cell)</td>
<td>Yes</td>
</tr>
<tr>
<td>Before cells divide, they have to first make copies of their chromosomes.</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Lesson plan 2 chromosome chaos

Rationale: Students will have just completed a lesson on chromosomes and DNA. But what do these chromosomes really look like? We had made a model, but how many of them do we have? What do they look like in the cell? How do we recognize chromosomes? In this lesson, students will come to understand and explain how chromosomes are organized, and what they can tell us about the health of a human being.

Total Time: 50 minutes

NGSS Standard: (from NGSS):
HS-LS3-1. Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring. [Assessment Boundary: Assessment does not include the phases of meiosis or the biochemical mechanism of specific steps in the process.]

CA standard: Genes are a set of instructions encoded in the DNA sequence of each organism that specify the sequence of amino acids in proteins characteristic of that organism.

Conceptual learning goal: Students should come to gain a better understanding for what chromosomes are in terms of where they are located and what they can tell us about the health and traits of a human being.

Content Learning Objectives: Students should be able to explain where chromosomes are located, and have a sense of how they may be organized by scientists and doctors to learn more about the health and traits of a human being.

Language Objectives: Students will have to explain their thinking in terms of how they used inquiry in order to organize the chromosomes the way they choose to with their partner. They also need to use language to explain their thinking in answering the analysis questions.

Scientific practices:
In this activity, students will be developing and using their own model in the sense that they are creating their own versions of karyotypes. They are then given opportunities to construct explanations using their karyotypes. This will benefit students in giving them further practice with models and also to work on explaining a model and their thinking and coming up with explanations for what they are thinking and doing.

Academic Language Forms

Content-specific vocabulary:
Chromosomes
Nucleus
karyotype
Formal and Informal Assessment

**Formative Assessment**
The analysis questions serve as a formative assessment for this lesson.

**Summative Assessment**
A larger summative assessment on DNA and genetics will be coming later in the unit.

**Resources and Materials**

Smart board  
Computer (for teacher, attached to smart board)  
Google drive slides  
Handouts

**Summary of Learning Activities**

<table>
<thead>
<tr>
<th>pacing</th>
<th>teacher</th>
<th>student</th>
<th>resources</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DAY 1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(11:00 – 11:05)</td>
<td>announcements on smartboard, letting students write down homework and get settled in</td>
<td>Listening to announcements, getting ready to go</td>
<td>Smart board/computer</td>
</tr>
<tr>
<td></td>
<td>Put dvd on the channel to tune in for announcements, and check in with students who might need help</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(11:05 – 11:25)</td>
<td>Walk around while students read through instructions and complete activity</td>
<td>Complete activity with a partner</td>
<td>handouts</td>
</tr>
<tr>
<td>(11:25 – 11:55)</td>
<td>Check in with students, and present a couple slides on what karyotypes are and how scientists and doctors use them. Then, have students walk around and complete graphic organizer, getting students to compare how they organized their chromosomes, and also how they answered the analysis questions.</td>
<td>Listen to a brief lecture on karyotypes and how scientists and doctors use them. Then, walk around and complete graphic organizer to compare karyopases and analysis question answers</td>
<td>Slides Graphic organizer</td>
</tr>
</tbody>
</table>
Lesson plan 2 materials

There are 46 chromosomes in every single one of your body cells (skin cells, muscle cells, heart cells, etc.)! When they are in your cells they look like a jumbled mess (like the sheet of chromosomes you’ve been given). Scientists can tells lots of things from looking at someone’s chromosomes, so it’s necessary to sort and reorganize the chromosomes.

Your Task:
✓ Cut out all 46 chromosomes from the handout very carefully (if there is a Y or any other label near a chromosome include this).
✓ Sort by size, shape, coloring, etc.
✓ Organize in a way that you think would help scientists and doctors learn things about this specific patient.
✓ Glue chromosomes down and then answer analysis questions.

All finished organizing and gluing down your chromosomes? Answer the following questions on the back of your paper in COMPLETE SENTENCES.

1. How did you and your partner choose to organize your chromosomes? Why did you choose this method?

2. Why do you think your new way of organizing chromosomes will be beneficial to scientists and doctors?

3. Do you think these chromosomes came from a man or woman? Why do you think this?

4. Do you think this individual is healthy? Can you tell from looking at just their chromosomes? Why or why not?
<table>
<thead>
<tr>
<th>Question</th>
<th>Partner 1 name:</th>
<th>Partner 2 name:</th>
<th>Partner 1 name:</th>
<th>Partner 2 name:</th>
</tr>
</thead>
<tbody>
<tr>
<td>How was your karyotype similar and different?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How was your answer to question 1 similar or different?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How was your answer to question 2 similar or different?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How was your answer to question 3 similar or different?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How was your answer to question 4 similar or different?</td>
<td></td>
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</tr>
</tbody>
</table>
Lesson plan 3 – alien genetics (data, inquiry, and technology in this lesson)

**Rationale:** At this point, students now have some background knowledge on (1) DNA and chromosomes and (2) the context for where those chromosomes are. But now I want to start getting students to a point where they can understand what genes are and what this has to do with inheritance (per the NGSS standard, how are characteristic traits passed from parents to offspring). This will set them up nicely for the final summative assessment which is to apply all of this learned knowledge to some real world topic that interests them.

**Total Time:**
Two 100 minute periods (200 minutes)

**NGSS Standard:** (from NGSS):

HS-LS3-1. **Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.** [Assessment Boundary: Assessment does not include the phases of meiosis or the biochemical mechanism of specific steps in the process.]

CA standard: Genes are a set of instructions encoded in the DNA sequence of each organism that specify the sequence of amino acids in proteins characteristic of that organism.

**Conceptual learning goal:** For students to understand and explain how parents’ genes affect their offspring.

**Content Learning Objectives:** Students should have be able to understand and explain some basic vocabulary used by scientists to talk about genetics, and be able to understand and explain how parents’ genes affect their offspring.

**Language Objectives:** Students will need to use language in order to (1) talk about data using claims and evidence and also (2) to discuss patterns and explanations of inheritance.

**Scientific practices:**
Students are going to be analyzing and interpreting data, carrying out an investigation via inquiry, using a bit of mathematics/computational thinking, and also constructing explanations based on the data they collect. They will be engaging in all of these practices, and these practices in many ways cross over into other academic and cognitive skills that will come in handy for these students in future problem solving related to or outside of the realm of science.

**Academic Language Functions and Linguistic structures that support the academic language function:**

**Academic Language Forms**

**Content-specific vocabulary:**
Genes
Alleles
Inheritance
DNA
Protein
Offspring

Support vocabulary:
Code/coding
Determine
Chance
Trends
Analyze
Interpret
Sample size
Trait

Formal and Informal Assessment

Formative Assessment
The discussion questions, analysis questions, and whole-class data discussion will provide opportunities for formative assessment. The graphic organizers on day 2 also act as a formative assessment.

Summative Assessment
The analysis questions are in some way a summative assessment for this lesson in particular, but a larger summative assessment on DNA and genetics will be coming later in the unit.

Resources and Materials

Smart board
Computer (for teacher, attached to smart board)
Google drive slides
Handouts
Envelopes with coins and alleles
Computer cart

Summary of Learning Activities

<table>
<thead>
<tr>
<th>pacing</th>
<th>teacher</th>
<th>student</th>
<th>resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAY 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(10:55 – 11:05)</td>
<td>Put dvd on the channel to tune in for announcements, and check in with students who might need help</td>
<td>Listening to announcements, getting ready to go</td>
<td>Smart board/computer</td>
</tr>
<tr>
<td></td>
<td>announcements on smartboard, letting students write down homework and get settled in</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(11:05 – 11:15)</td>
<td>Brief introduction to how DNA codes for different proteins that determine what kinds of</td>
<td>Listen to introduction</td>
<td>Smart board/computer</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>slides</td>
</tr>
<tr>
<td>Time</td>
<td>Activity</td>
<td>Resources</td>
<td></td>
</tr>
<tr>
<td>-----------------</td>
<td>------------------------------------------------------------</td>
<td>----------------------------</td>
<td></td>
</tr>
<tr>
<td>(11:15 – 11:35)</td>
<td>Read through instructions together as a class, model a few times how to actually collect the data</td>
<td>Smart board/computer Slides</td>
<td></td>
</tr>
<tr>
<td>(11:35 – 12:05)</td>
<td>Collect data!</td>
<td>handouts</td>
<td></td>
</tr>
<tr>
<td>(12:05 – 12:35)</td>
<td>Have students do the discussion questions and analysis questions for their own data. If there’s time, compare with another group!</td>
<td>handouts</td>
<td></td>
</tr>
</tbody>
</table>

### DAY 2

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>(10:55 – 11:05)</td>
<td>Put dvd on the channel to tune in for announcements, and check in with students who might need help</td>
<td>Smart board/computer</td>
</tr>
<tr>
<td>(11:05 – 11:15)</td>
<td>Re-orient students to what exactly we worked on. Tell students how they will enter their data onto class datasheet.</td>
<td>Smart board/computer</td>
</tr>
<tr>
<td>(11:15 – 11:35)</td>
<td>Give students time to enter their data on to the class data sheet.</td>
<td>Laptops for all students</td>
</tr>
<tr>
<td>(11:35 – 12:05)</td>
<td>Have students discuss the discussion questions and analysis questions using the class data, fill in graphic organizer</td>
<td>Data displayed on smart board, and graphic organizers</td>
</tr>
<tr>
<td>(12:05 – 12:35)</td>
<td>Provide students with a debrief slideshow giving a name to some of the themes we saw, introducing terms such as allele and inheritance.</td>
<td>Computer and slides Graphic organizer</td>
</tr>
</tbody>
</table>
Alien & Mating & Analysis & Data Collection

"Tally" the number of times that each alien mating combination results in each offspring type.

Offspring's Genes

Parents' Genes

Class & Data Set: We'll pool our data as a class to have stronger evidence for our discussion and analysis.

Discussion Questions (discussion only)

1. What trends or patterns do you notice in the data table?

2. Describe how parents’ earwax color affects their offspring’s earwax color.

3. Could two parents with orange earwax ever produce an offspring with purple earwax? Why or why not?

Discussion questions (discussion only)

1. Describe the relationship between an alien’s genes and their physical traits.

2. Describe how parents’ earwax color affects their offspring’s earwax color.

3. Would alien siblings always have the same earwax color?

Challenge question (up to 3 points extra credit)

If an Ee alien mates with an Ee alien and has one offspring how likely is it that the offspring will:

a) Have orange earwax? Purple earwax?

b) Have an EE gene combination? ee? Ee?

Challenge question (up to 3 points extra credit)

If an Ee alien mates with an Ee alien and has one offspring, how likely is it that the offspring will:

a) Have orange earwax? Purple earwax?

b) Have an EE gene combination? ee? Ee?
Everything you need to know about Alien earwax.

1. Aliens have only two possible types of earwax: orange earwax and purple earwax.

2. Earwax color is determined by the interaction of two pieces of Alien DNA. These pieces of DNA are the same shape and size.

3. Each of these DNA pieces contains a gene that codes for a protein affecting earwax color. *However, that gene could either code for a protein that leads to orange earwax or a protein that leads to purple earwax.*

4. Your DNA piece is labeled with a **capital E** if it has the version of the gene that codes for orange earwax protein and a **lowercase e** if it has the version of the gene that codes for purple earwax protein.

5. If your alien has two orange coding genes (EE), your alien will have orange earwax.

6. If you have two purple coding genes (ee), your alien will have purple earwax.

**But here's the twist....**

7. If you have one orange coding gene and one purple coding gene (Ee), your alien will have orange earwax. *The purple gene does not make any protein when this happens!*

8. Two aliens can reproduce to have alien offspring (babies!). Alien offspring get one earwax DNA piece from each parent. This means that alien parents only pass on one of their own earwax DNA pieces to their offspring. The gene that gets passed on is determined entirely by chance.
Essential Question: How do parents’ genes affect their offspring’s?

1. Have one partner close their eyes and pick out two pieces of DNA from your envelope to create the first alien.

```
Your Alien
```

2. Have the other partner close their eyes and pick out another two pieces of DNA from your envelope to create a mate for the alien. Line up the DNA pieces on your desk like in the image below.

```
Your Alien    
```

```
Your Alien’s mate
```

3. Have one partner flip a coin for the first alien parent to determine which of its DNA pieces gets passed on to the offspring. If you get heads, the DNA piece on the left gets passed on. If you get tails, the DNA piece on the right gets passed on.

```
Your Alien    
```

```
Your Alien’s Mate
```

**Heads** = left DNA piece gets passed on from first alien

**Tails** = right DNA piece gets passed on from first alien

4. Have the other partner flip a coin for the alien mate to determine which of its DNA pieces gets passed on to the offspring. If you get heads, the DNA piece on the left gets passed on. If you get tails, the DNA piece on the right gets passed on.

```
Your Alien    
```

```
Your Alien’s Mate
```

**Heads** = left DNA piece gets passed on from alien mate

**Tails** = right DNA piece gets passed on from alien mate

5. Record your results in your data table. So if your Alien was EE and mated with an ee alien, after EE x ee in the Parents’ Genes column (the “x” signifies that the aliens mated), **put a tally mark under the offspring gene combination that resulted.**

6. Put the DNA pieces that did not get passed to the offspring back into the envelope. (Keep your offspring in tact!)

7. Your alien offspring is now ready to mate. Close your eyes and pick two new DNA pieces from the envelope to create your alien’s mate. Like before, flip the coin for each alien parent to see which DNA piece gets passed on to the new alien offspring! Record the results in the data table.

8. Continue to repeat steps 6-8 to collect as much data as you can until we call the class together.
<table>
<thead>
<tr>
<th>Question</th>
<th>Your answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>How is the class data similar to your data?</td>
<td></td>
</tr>
<tr>
<td>How is the class data different from your data?</td>
<td></td>
</tr>
<tr>
<td>What does the class data show us that your data does not?</td>
<td></td>
</tr>
<tr>
<td>Why do you think scientists find data more reliable with a larger sample size? (When they use more data collected by more people?)</td>
<td></td>
</tr>
<tr>
<td>Vocabulary word</td>
<td>Definition</td>
</tr>
<tr>
<td>----------------</td>
<td>------------</td>
</tr>
<tr>
<td>Allele</td>
<td></td>
</tr>
<tr>
<td>Inheritance</td>
<td></td>
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<tr>
<td>Protein</td>
<td></td>
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<tr>
<td>Offspring</td>
<td></td>
</tr>
<tr>
<td>Trait</td>
<td></td>
</tr>
<tr>
<td>Sample size</td>
<td></td>
</tr>
</tbody>
</table>
Lesson plan 4 – final performance assessment

MATERIALS FOR THIS LESSON CAN BE FOUND IN THE SECTION TITLED “Final Performance Task & The Assessment Guide”

Rationale: Students have now had a chance to explore (1) how DNA and chromosomes are related (2) a sense of how scientists and doctors use DNA and chromosomes as indicators of human health (3) how genes/alleles are inherited. Now it’s time to apply this new knowledge to some real-world contexts in a performance assessment.

Total Time:
100 minutes

NGSS Standard: (from NGSS):
HS-LS3-1. Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring. [Assessment Boundary: Assessment does not include the phases of meiosis or the biochemical mechanism of specific steps in the process.]

CA standard: Genes are a set of instructions encoded in the DNA sequence of each organism that specify the sequence of amino acids in proteins characteristic of that organism.

Conceptual learning goal: For students to understand and explain the relationship between DNA and chromosomes as instructions for traits passed from parents to offspring.

Content Learning Objectives: Students should use content knowledge and vocabulary to communicate the relationship between DNA and chromosomes as instructions for traits passed from parents to offspring using a context/topic of their choice.

Language Objectives: Students are expected to use the vocabulary and some of the grammatical structures that we’ve used throughout our unit.

Scientific practices
In this final activity, students are encouraged to ask questions, and to also construct explanations and also to communicate information and obtain and evaluate that information in the research process. In doing individual research, students will have a chance to practices these skills, and these skills will benefit students when they are trying to inform themselves and also to explain their thinking in the future within and outside of science.

Academic Language Functions and Linguistic structures that support the academic language function:

Academic Language Forms

Content-specific vocabulary:
DNA
Chromosomes
Genes
Support vocabulary:
Genetic material
Code
Determination
Change
Trait

***students will probably encounter new forms of content/support vocabulary as they research***

**Formal and Informal Assessment**

**Summative Assessment**
This is the summative assessment for the unit!

**Resources and Materials**

Smart board
Computer (for teacher, attached to smart board)
Google drive slides
Materials for projects: laptop cart, art supplies, posters

**Summary of Learning Activities**

<table>
<thead>
<tr>
<th>pacing</th>
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</tr>
</thead>
<tbody>
<tr>
<td>DAY 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(10:55 – 11:05)</td>
<td>announcements on smartboard, letting students write down homework and get settled in</td>
<td>Put dvd on the channel to tune in for announcements, and check in with students who might need help</td>
<td>Listening to announcements, getting ready to go</td>
</tr>
<tr>
<td>(11:05 – 12:35)</td>
<td>I will introduce the final performance task/summative assessment to the students. We will read through the instructions together.</td>
<td>Engage in introduction and discussion about project expectations.</td>
<td>Work on task to complete assessment in class.</td>
</tr>
</tbody>
</table>
I will also give students a timeline of how I think they should divide up the time.

I will remind them periodically when they should start.

Anything that does not get finished in class must be completed for homework and submitted by the next class period.

Anything that does not get finished in class must be completed for homework and submitted by the next class period.
Assignment #2: 1st Teaching Assignment
Video of a sheltered content instructional strategy (Science section)

PAPER: Due 2/6/15 by 11:59 pm to Coursework Dropbox
VIDEO: Due 2/6/15 by 11:59pm to box.stanford

START VIDEO AT MINUTE 28! And watch through the end!

Write a 2 page (around 1000 words) write up in which you address the following:

1. What was your learning goal or objective for this lesson?

   A. Next Generation Science Standards:

      **HS-LS1-1:** Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms

      **LS.A:** Structure and Function:
      - systems of specialized cells within organisms help them perform the essential functions of life
      - multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.

      **HS-LS1-3:** Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

      ***This lesson also meets many of the “practices” standards in the NGSS!***

   B. Goal for understanding:

      Students will be able to show and explain an understanding of how living things regulate biological processes when placed in new environments via the process of homeostasis.

   C. Activity: I will show slides and have interactive lecture with students.

      - Introduce idea of balance/imbalance, link to homeostasis
      - Introduce circulatory system, respiratory system, and how they work together
      - Split students into groups, in preparation for group work that will be done in the next class period

   D. Content Objectives: Students will begin a homeostasis investigation in which they will have to **show and explain** the idea of homeostasis using **evidence** they collect. They will have to **use data and interpretations** of data to demonstrate their comfort levels with **science practices** and to also to use **scientific data to create scientific claims and arguments**.

   E. Language Objective:

      Students should be able to **discuss and explain** (1) how multiple body systems work together to keep an organism alive and (2) how homeostasis might keep our bodies in balance **using everyday language and** (with scaffolding and an eventual release of scaffolding) **science language**. Students will be using a lot of new academic language structures in order to **discuss and collaborate** in the creation of an investigation. Many of these conversations and opportunities for writing will have **language support scaffolds**.
2. What made the lesson a sheltered content lesson?
This was a sheltered content lesson because there were a lot of scaffolds in place for English language learners and also for students who have a lot of areas for growth in their proficiency with academic language. Students were almost always working in groups OR had opportunities to check work with a partner OR were working with content using everyday language FIRST and then getting slowly and gently introduced to some of the academic and content-specific language around homeostasis.

3. Identify the strategy (or strategies) you chose and where you learned about it (in this class, from your CT, additional training you attended, etc.)
I drew upon three main strategies:

1. Academic listening and speaking in small groups and pairs (the importance of this is emphasized in Zwiers chapter 6)
2. The use of visual support in that I provided students with detailed diagrams, videos, and a picture of myself exercising with labels for the respiratory and circulatory systems (Coelho 202) and key visuals in the graphic organizer (Coelho 217).
3. Disaggregated instruction in which I first introduced content with everyday language (balance versus imbalance in paints and in hot chocolate) and then transferred students’ prior knowledge into balance with more technical science content terms in thinking about the respiratory system and circulatory system and homeostasis.

I learned about these strategies in LPP, but had originally heard about these strategies from my previous STEP courses in the summer and fall.

4. Explain why you chose this strategy for this assignment. Why do you think it’s useful for meeting the goal or objective you identified?
I chose these three strategies because I felt that they really allowed students to interact and to learn from one another in a less pressure-filled way. They also gave English language learners multiple points of entry such that they weren’t relying so much on their language ability but more on their conceptual understanding of the science content. My goals for this lesson were not so much related to really elaborate use of scientific language. Rather, they were focused more on being able to use their prior knowledge and experience and creativity in designing investigations and relating the science to their lives in order to explain and show understanding of what homeostasis is. These strategies allow me to assess student learning without placing too much of an emphasis on academic or English language proficiency.

5. Describe the class (or group) where you conducted this lesson (grade; subject; class or group size; number of ELLs in the class/group; English language proficiency levels of the ELLs).
This lesson was conducted in a general biology class of 17 sophomores and 1 junior. There is a large range in vocabulary and levels of complexity of language use. I have 8 students proficient in English, 5 RFEP students, and 5 EL students. Of the students who are proficient in English, I have some students who are in advanced English and others who have expressed feeling challenged by academic language and with their English classes. Below is a table containing the English language proficiency levels of my ELLs.

<table>
<thead>
<tr>
<th>ELL learner</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proficiency level</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

6. Reflect on how the lesson went:
a. In what ways was the strategy successful in promoting student learning? How do you know--what is your evidence?
I think the strategies I used were successful because my supervisor overheard a student say “oh, that’s easy!” when I introduced homeostasis after first using the idea of mixing paint or making hot chocolate in order to get students to think about balance and imbalance. So, the disaggregation of instruction helped students to really connect their intuitive sense of balance to this scientific idea of homeostasis. Also, giving students a space to talk to each other and also to record their thoughts and ideas in their own words allowed students to reflect and also provided me with written and spoken evidence for how students were sense-making and learning.

b. In what ways was the strategy not successful in promoting student learning? How do you know--what is your evidence?

I think in showing the video about the circulatory and respiratory system, I would have liked to have FIRST shown the video in complete silence and given them a chance to make sense of the visuals on their own. The audio that goes with the video is pretty academic and dense relative to the language abilities of my learners, and at times they seemed to zone out while watching the video. Whereas they may have been more engaged had I given them a chance to interpret the visual of the video without all the academic language.

c. If you were to do the lesson over, what would you do differently? Why?

I think I might spend more time in terms of scaffolding and providing language supports specifically in introducing the respiratory and circulatory systems. I was very careful in disaggregating instruction in introducing the concept of homeostasis, but I could have been more careful and intentional in the ways I introduced terms and concepts of the respiratory and circulatory systems.

d. What would you not change? Why?

I would not change my disaggregation of instruction and academic discussion in my introduction of homeostasis, and I stand by the visual support and key visuals I used later in the introduction of the respiratory and circulatory systems. I think these really were helpful for students in terms of providing less academic language loaded points of entry for students and instead gave them more direct access to the science content.

7. If you were to teach this lesson as an ELD lesson, what would you change and why?

If I were to teach this lesson as an ELD lesson, I think I would really change this lesson around and turn it into a guided inquiry activity. I don’t think I would introduce any of the academic language. I might start with this idea of balance and imbalance, but then give them heart rate and breathing rate and see if they could design their homeostasis investigation, see a pattern, think about which parts of their body might be producing that pattern, and then giving those body parts and systems names. I might also have access to the body system names in the students’ native language, and have simpler language. I might not show the video with audio, and only with the visuals so that students can see the respiratory system and circulatory system in action but not feel like they don’t understand the language.

<table>
<thead>
<tr>
<th>Evaluation Criteria</th>
<th>Score</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video shows chosen strategy/strategies implemented.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Write up identifies clear objective (question 1) using the instructional objectives template provided in class (TSW…).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Write up addresses questions 2-7.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
I. **Teacher language**

After reviewing my transcript on my own through coding and also with my small group through reflection and discussion, I see two very clear patterns that have emerged in the way I use language: lots of NREP and lots of INV-T/INV-I.

T = teacher, other letters indicate each of my four students

<table>
<thead>
<tr>
<th>Examples of NREP</th>
<th>Examples of INV-T/INV-I (all said by T)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 - V – makes him in love maybe?</td>
<td>86 – What do you think V, brawl?</td>
</tr>
<tr>
<td>5 - T – makes him in love?</td>
<td></td>
</tr>
<tr>
<td>30 - G – you hold each other?</td>
<td>121 – C why aren’t the females brawling?</td>
</tr>
<tr>
<td>31 - T – you hold each other?</td>
<td></td>
</tr>
<tr>
<td>47 - J – like mate like personal mate</td>
<td>146 – G why don’t you think all the males are cheating?</td>
</tr>
<tr>
<td>48 - T – a personal mate?</td>
<td></td>
</tr>
<tr>
<td>59 - C – maybe they like each other?</td>
<td>11 – What do you know about love G?</td>
</tr>
<tr>
<td>60 - T- they like each other?</td>
<td></td>
</tr>
</tbody>
</table>

The table above shows 4 instances of NREP in my transcript and 4 instances of INV-T/INV-I. Not only did I find these when going through and coding the transcript, but the members of my small group also noted the enthusiasm with which I NREP-ed with my students. I think those two things, NREP and INV-T were things that I learned how to name in this course, and got to practice. The first time I did a reading with my students, G and C did not speak as often as V and J did. But I think I really tried to NREP and INV so that C especially could hear the ideas being presented several times. NREP really provides an opportunity to repeat information in case other students in the group didn’t catch it the first time.

As indicated above, I NREP-ed across students, and tried not to show any bias in terms of whose ideas I was re-voicing to the group. Similarly, I utilized the INV in order to involve G and C more in this conversation in the last. At line 146, even though G was in disagreement with the other students, I opened up a chance for him to share out. Here’s more context:

T – so are all the males cheating?
V – no
J – yeah
C – yeah mhm
V – cause it’s all males?
T – it’s all males, you don’t have to agree with them (G) why don’t you think all the males are cheating? UA/INV-I/INV-T
G – because well other males might not change their skin?

I think this a big moment for me as a teacher and for G as a student, because my conscious use of INV here resulted in G getting his question heard by the group.
Unfortunately all of this NREP and INV might have made the conversation choppy, and my language may have affected the students’ language. In my small group STEPpie conversation, folks noticed how many of the students’ responses ended with a sort of questioning inflection (in the transcript, this is reflected in there being lots of question marks at the ends of students’ sentences). One member of the discussion group described this as the students potentially fishing for answers, and noted that all of the NREP could be interpreted as evaluative. While there is no way to know if the students believed I was being evaluative or not, I’m certainly struggling with this trade-off between lots of NREP and INV in order to involve all students or to focus more on uptake and authentic questioning to get the students to go deep quickly – even if that means leaving some students behind.

_How are you thinking about teacher language now?_

At this point, I’m wondering how exactly I can be providing opportunities for faster-paced dialogue for students like V and J while still making sure students like C can keep up. It’s completely reasonable to think that had I not NREP-ed and INV-T-ed to bring C into the conversation, he may have just sat back and not asked any questions – as he did in discussion 1, with the spider reading. Even in larger class settings, my CT and co-TC and I all structured activities to make sure C could grapple with concepts and share ideas through drawing and writing and speaking. And in class discussions we could consciously call on him so that his voice was heard. His learning is as important as that of the other students. So I am hoping to try to figure out a balance such that I can be inclusive of students like C but also make sure students like V and J have ample opportunity to dialogue to the greatest depth they can reach.

**II. Student sense-making**

_a. how is the focal student making sense of the social context?_

_i. Student engagement with peers and you_

More often than not, the focal student, V, would more often answer questions or speak after I spoke instead of responding to peers. I’m not sure if this means she wasn’t engaged with peers, but V may have interpreted my questions as test questions or is more used to responding to a teacher in a small group situation. What’s also interesting is that she was the only female student in the group. The other three students were male. Of the 14 students in the class, she is one of three, and the three of them often try to stay together for group activities.

I wonder if the focal student’s ability to engage with her peers had anything to do with gender. It came up in my small group discussion (with the other STEPPies about my short video segment/transcript) that V did make a comment about brawl sounding like bra (line 86). Would V have said this if I was a male teacher and she was with the same three males in her reading group? In the small STEPpie discussion, we also noted the ways in which V would challenge and engage with other students. For example, at line 111:

111 - J – Cause maybe they might catch each other
Here, V directly builds upon and challenges a thought that J has. And yet we also discussed in our STEPpie discussion group that V would sometimes shuffle through her backpack and draw on her folder (I ask V about drawing on her folder at around line 65). One member of the STEPpie discussion group thought that these might have been activities V did in order be more comfortable or to try and diffuse any awkwardness of being the only girl. So we have evidence of V feeling open enough to share and challenge ideas but also evidence of some potential awkwardness with the shuffling and seeking of comfort through drawing or going through her backpack.

ii. What’s important to the student

In a brief exchange with V, we may gain some insight into what’s important to V. At line 65, I ask the students, “Does the drawing help you concentrate?” At that point V had been drawing on her folder with pencil. But she responds, “I hear, I hear” which could indicate that she is hearing the conversation and that the drawing might potentially help her concentrate. Knowing that V is willing to share out that she is listening and that she is taking the conversation seriously may show that the conversation is important to her. At least every 20 lines V has something to contribute, and so the reading and conversation and exchange of ideas does are in some way important to V.

iii. Social context, your role and relationship with the student

This was mentioned in II.a. and I return to it here because it seems like the social context we are in is one that looks like this: I’m a happa female teacher sitting amongst four latino/a students, three of whom are male. V is the one female student. The two other female students that V usually associates with are not in the room. V has worked with male students for group and partner projects.

I noted this in my first discussion and reflection, but V has a really interesting way of presenting herself. She wears leather jackets and vests and jeans and leather boots, she sometimes has a sort of “tough” persona about her. We also learned from her teacher last year that she did have some things going on in her life that were affecting her at school. Having been a female student who also would wear clothes that most female students would not wear, like sports jerseys and such, and also dressing in pants and men’s button-up shirts and leather Clarks everyday of summer school, I wonder if V viewed me as someone she could trust in that small group setting, which would allow her to speak openly and honestly about the various gendered interactions of cuttlefish and spiders.

I would say that the culture of the classroom that we created (with students and CT and co-TC) was one of respect and openness and I think V really trusted me as a teacher in the context of our classroom and in the context of our small reading group. I think all of the students in my small group felt that way, but perhaps they still viewed me as the teacher figure fishing for answers and not as a sounding board for ideas.
I think V and J in both the spider and cuttlefish discussions would have moments like this one where they would respond to and/or challenge each other:

111 - J – Cause maybe they might catch each other
112 - V – they might like a girl!

Since it’s possible that other students’ contributions could be pivotal to V’s sense-making, something I might change to my participation patterns might be to participate in ways that encourage these two to respond directly to each other. Some INV-I specifically geared toward getting them to challenge or question each other’s ideas would draw upon their strengths in their willingness to participate. J wouldn’t go more than 20-30 lines before participating again. Both he and V participated consistently throughout discussion 1 and 2.

I think I did a good job of trying to include G and C but would definitely consider shifting how I affect the context such that I can reinforce V’s strength as a regular participator and also challenge her to take her comfort with speaking in the discussion and turn that into some kind of leadership where she could be bringing G and C into the conversation. There was another student in our classroom this summer who spoke often, and our CT encouraged us to encourage this student to be aware of his ability to share out in conversations and to have him bring other students into the conversation. This is something I could try with students like V and J to help them see me as less of an authority figure and more as a participant of the discussion. As our CT described it, you want your kids to be “on the same team” as you, and to be in this learning endeavor together.

b. How is the focal student making sense of the text?

i. What the student appears to believe the text is saying

At the very beginning of my transcript where I ask the students to describe how a female could disrupt a male’s concentration, at around line 4, V answers the question tentatively by saying the female “makes him [the male] in love maybe?” After some ping ponging in which I try to get the students to describe what that love is, V suggests “romance” as that type of love. Later on, at around line 111, we are discussing why the males would fight, and V brings the conversation back to this idea that the male cuttlefish might like a girl and that males fight to see who’s tougher and that these males are awesome and that the girl cuttlefishes do not fight.

V appears to believe that the text is saying that cuttlefish engage in romantic drama involving competition among males for female attention. In some ways, V is anthropomorphizing the cuttlefish narrative and appears to believe that the text presents an anthropomorphic story of cuttlefish.

ii. What brought the student to this understanding

V appears to be following along as we read and discuss the text. At around line 70, I had forgotten where we were in the reading and V is able to provide the next paragraph we need to read. V also at line 90 remembers reading about something having to do with color changing, which shows that she has been following along – the reading is about cuttlefish changing colors. But I also
think V is bringing some sense of what relationships between males and females might look like from outside of the text.

It’s not clear from the reading why or how a female would disrupt a male’s concentration. But when I asked a question about how this could happen, V suggested that a female making a male “in love” might disrupt a male’s concentration. She also transfers this knowledge in the section near line 111 mentioned above where she infers that males fight because they like a girl and want to see who’s tougher. V may have encountered people she knows fighting for the “love” of someone and might be transferring something she has seen in the human context into the context of the cuttlefish. So V is drawing from the text but also from outside experiences to find importance and shape her understanding of the text.

### iii. What characterizes the student’s affect (how is the student relating to the text, having an emotional response) toward the text?

To build on the answers to part i and ii above, these various pre-conceptions about gendered interactions characterize the student’s affect toward the text. Nowhere in the cuttlefish text does it state that females act a certain way and that males act a certain way because of their female-ness or male-ness. But V’s prior knowledge about male and female interaction (females make males in love, males fight because they like a girl and want to see who’s tougher) allows her to make sense of the cuttlefish behaviors.

These issues of gender, sex, and sexuality that are alluded to in the cuttlefish reading also bring out potentially uncomfortable emotional responses from V. Returning to this example:

111 - J – Cause maybe they might catch each other
112 - V – they might like a girl!

V really does sort of exclaim and raise her voice here. We can juxtapose this with she time isn’t really looking at anyone in the group, and is drawing on her folder (around line 68). So V appears to maybe, at times, be comfortable talking about the social interactions between gender groups. But at other times, when we were talking about something more explicit like the definition of mating (where one students suggested that mating could result in formation of families and the creation of babies, around line 59) then V might retreat in a sense by drawing on her folder and avoiding eye contact.

### iv. When student discusses text, what does that look like?

As mentioned in II.a.i. it seems like V would most often speak after I spoke and less often speak after another student spoke. However, I did to a certain extent exacerbate some ping-ponging so the way in which she discussed the text was not too different from the way other students were discussing the text. When discussing the text, there are five times in the discussion where V and I have a brief back-and-forth. If you look at the color patterns in my transcript, I’m referring to the five times in which there is a pattern of T to V to T to V etc. which it basically where there are lines highlighted in yellow and lines not highlighted in yellow, alternating. This shows V’s ability
to converse even if it is mostly with me. There is an even mix of where V provides a yes/no answer such as:

138 - T – so are all the males cheating? UA
139 - V – no

But also instances where V brings her own ideas into the conversation:

113 - T – they might like the same girl? CL So why do they have to fight about it? UA
114 - V – they wanna see who’s tougher
115 - T – well they can’t both have the same girl? (blank stares) Why not? UA And 116 – 116 - why aren’t the females fighting? UA
117 - V – cause they’re not fighting.

It seems that V is using personal experience to illustrate for me and the group why she thinks the cuttlefish behave as they do. She is also willing to engage with me in a sense-making conversation where I can provide a question for her to then answer. But I think those answers show a sort of thinking-out-loud for V. In lines 113 – 117 shown above, she provides explanations for why the things the way they are, which gives us a look into why V thinks things are the way they are. So I think that how V “looks” when discussing the text is giving explanation and defending ideas based on prior knowledge.

v. How does context of discussion build on the student’s sense making?

I think that the text provides some opportunities for V’s sense making to be connected to the other students’ sense making. Again, she is the only girl and provides that perspective in a group of only boys when talking about the interactions of male and female cuttlefish. Her sense making certainly provides an opportunity for the boys in her group to hear her perspective on gender roles, as V is able to make that gender connection from cuttlefish to humans. V is able to make connections to prior knowledge throughout the discussion but at line 90 she does return to the text in her statement about “changing color” which was a cuttlefish phenomenon that was introduced in the text.

vi. How can your discussion facilitation build upon this student’s textual sense making? (hypothetically)

My STEPpie discussion group noted that around line 76, I could have really taken the opportunity to further question the reading with the students on why it might be risky for the male cuttlefish to split their coloration. I didn’t really provide an opportunity for the students to explore this idea. Instead I spent time with the group defining the word “brawl” for J. But the conversation about risk and why the split coloration would be risky would have been a better route as “defining a word together” is less open-ended than exploring the idea of risk and design and coloration in the behavior of these animals.

Similarly around line 91, when I ask J if our attempt to explain and define brawl was helpful, I could have instead turned that into an authentic question or uptake question to ask J something
like: having heard some of these ideas, how are you thinking about brawl and what does the brawling tell about the cuttlefish in what you just read? And I could return to the text J was reading, and try to ask my authentic question about the risk factor in having split coloration and the relationship between this risky behavior and the males fighting, and further ask the students why these males cuttlefish would need to fight at all.

III. (3 pages) Critique, explore, and grapple with aspects of sense-making and related pedagogy that the course readings brought up for you. PICK TWO DIMENSIONS OF SENSEMAKING AND RELATED PEDAGOGY THAT EMERGED FOR YOU AS IMPORTANT AND/OR CHALLENGING

There are two course readings that stand out to me as ones that I think I will carry with me for some time. The first is the article by Daniels, Zemelman, & Steineke (2007) on writing to learn and the second is the article by Warren, Ballenger, Ogonowski, Rosebery, & Hudicourt-Barnes (2001) on diversity and the learning of science. I would like to argue that the strategies Daniels et al bring to the table are precisely what actual scientists do. Every day, scientists write and they scratch and they draw graphs on whiteboards to think through things and to make discoveries – to make sense of scientific phenomena. And, if that argument stands, then I can further argue that in order to achieve goals laid out by Warren et al to foster a relationship between science and diverse students, then formal and informal scientific writing must be a part of science classrooms.

Writing is essential to the doing of science, and to the communication of new ideas to the scientific community (which really everyone should be a part of). This makes perfect sense, as scientists need a way to think through different ideas and argumentation in the scientific process. Daniels et al says we are able to sense-make when we write things out. In fact, Daniels says that we use really basic types of writing to, “find out what’s inside our heads, to dump ideas down on a page so we can play with them, move them around, make connections, figure out what’s important, cross some out, and highlight others. In other words, we are thinking” (21). This is something every biologist I know does when they are working on a project – from building a protein complex to digest cellulose to describing behavioral plasticity in harvester ant colonies.

In my own experience as a biological researcher, I did not “become” a scientist or really learn how to do science until I had a chance to start incorporating reading and writing into my scientific practice. My undergraduate major adviser, Deborah Gordon, got me started on a couple projects studying ant behavior. By my junior year, she would ask me questions about what I thought the ants were doing, and I wouldn’t be able to answer. So she would say, “draw a picture, draw a graph, write out what exactly what you did and what you observed when you were watching this film of an ant nest” and I would then be able to come up with completely original ideas and contributions that allowed me to grow as a scientist and as a student an scholar.

Daniels et al suggest that having students writing and drawing allows them to better retain information and experiences in the classroom. This undoubtedly maps onto the study and practice of science. Formal and informal scientific writing forces a student to make sense of what they’re doing, independently.

Warren et al make a strong argument for having students learn science by doing science, and they provide case studies in which students are verbally sense making with each other in flexible, safe
and open environments. However, their case would be even stronger if they drew upon the suggested “writing to learn” perspective that Daniels et al provide, to really achieve a sense of continuity and collaboration between scientific and classroom communities.

Warren et al identify a need for science to shift such that we value, “Understanding the productive conceptual, meta-representational, linguistic, experiential, and epistemological resources students have for advancing their understanding of scientific ideas” (531). Warren et al also suggest that educators confront the line between what “children do” and what “scientists do” and instead let the kids be scientists. To illustrate the effectiveness of this perspective for student learning of science, Warren et al present two case studies in which students are talking and sharing out and designing scientific experiences in order to learn by doing. Warren et al demonstrate student potential to make sense of science in their own terms, in their own language, in student-centered spaces. But, I would argue that in order for students to truly engage with science and meaning making in science they also need to be writing.

What does it mean to truly engage in science and meaning making? Well the kids described by Warren et al are sense making by talking to each other and collaborating in designing and interpreting scientific experiences. But we can see evidence from Daniels et al that writing and talking provide students more of an opportunity to remember what they’re learning. Daniels et al cite Dale’s formulation, which says people generally remember, “70 percent of what they say and write,” and they remember, “90 percent of what they say as they do a thing” (26). Real scientists capitalize on Dale’s formulation and are able to work out their thoughts and ideas through processes of writing and presenting their work informally in their labs and formally in publications or at conferences.

So, I would argue that all students must write and be talking to one another in their science experiences to truly engage with science. If they aren’t doing this writing or dialoging, they aren’t go to remember as much, according to Dale’s formulation. The field of science requires that scientists write up their findings and communicate them to the scientific community or a larger audience. If students don’t like writing or if it’s challenging, then thinking of creative ways for writing to be fun or less challenging is on the teacher. But in a collective endeavor such a science, and an endeavor in which information is passed from generation to generation, then writing is an absolute must for science education. Science if a process of collective human sense-making to understand how different parts within living systems are interacting in complex ways. And it will take a lot of writing, recording, and sense-making for these scientific endeavors to be fruitful and productive – for professional scientists, and for student-scientists.

I return, again, to personal experiences working on biology thesis. I learned how to write informally for myself, when asked to explain something. I could draw graphs to explain my sense making, but that wasn’t enough to graduate with honors in biology. I had to learn how to write in what my adviser describes as the “crispy” language of formal science. The scientific community has standards of communication, and I moved from informal writing to learn into formal writing to communicate my work to other scientists. I had to prove to my department that I had really struggled with harvester ant behavior, made sense of it, came up with original ideas, and wrote up my ideas to defend them. There’s no reason why elementary, middle, and high school students can’t be doing this now, in their own language, no matter the grade level. In fact, the more we can
get students doing this now, the less distance they will feel between the “us” of science and the “them” of everyone else. Certainly I have felt a shift in the way I see myself as part of a scientific community, and I want my future students to feel that their scientific sense making is legitimate and valued.

But, there are larger structural barriers that might be out of my control as a high school teacher that must be overcome in order to create the continuity Warren et al seek. We actually have students who are doing science, such as a 6th grader who did some really important work on lionfish and water salinity (Greenblatt, 2014). But this 6th grader’s work was brutally critiqued by “real” scientists. A problem that neither Daniels et al nor Warren et al address is what about science needs to change so that people-besides-scientists can be doing science and be taken seriously? Only by learning by doing was I able to understand what exactly science is, and what exactly scientists do. And my undergraduate thesis will soon be merged with another undergraduate thesis and sent to a scientific journal.

But I was fortunate enough to land a position in an established lab that is highly respected for its quality “up-to-standards” work. Why is it that some “science” is taken more seriously than other “science”? Science is simply way of thinking about natural phenomena, it is a skill, a muscle that can only develop over time with student-scientists really working out those muscles to be able to run with their own ideas, independently.

But as long as social structures tell kids or women or people who are doing really important citizen-science that they don’t belong to the more formal scientific community, then no matter how we shift the ways in which we teach science for optimal sense-making, those structures will continue to privilege some perspectives over others. The hierarchical nature of who has power and legitimacy in science makes it such that other ways of thinking about and expressing view about natural phenomena are illegitimate. I honestly do not think that high school biology teachers have a lot of agency in resisting traditional science education because science is a top-down field (with high school biology teachers often not even considered “real” scientists). And it will take change at the top, at the university and corporate level to see some real change in the ways we have philosophical scientific dialogue about natural phenomena. While I understand why standards of experimental rigor are important, there is no reason why scientists should view new or creative approaches to science from women, people of color, and children as unscientific.

References for III:


IV. insights, questions, future plans

Two weeks is not enough “time” to learn about “literacies” it just really isn’t. I think Lewison et al really hit the nail on the head when they said, “We believe that no curricular practice are neutral and unproblematic” (9). That could not ring any truer at this time for me. The main insight that I have gained from being in this class is that the platonic ideal of teaching literacy is unknown and that we have tools for what we think might be effective ways of getting diverse learners to make sense of the world they’re living in being able to read and criticize and glean information from text, and to demonstrate understanding through speaking and writing.

Before coming to this class I really had NO SENSE of what literacy meant in the deepest sense of the word. I thought it was that statistic you sometimes hear about on various human development indices. But it is so SO much more than that! The main question I have is – what can I continue to do to achieve my future plans which are to try to learn more about sense-making and how to get my students to sense-make and then to try and assess that sense-making.

I think what I learned from my students was really how their behavior shifts when we compare how they act when they’re in a large group setting and how they act when they’re in small groups. In the small group I really got to watch my students. Re-watching them and transcribing the video/audio really helped me dig deep into how they were sense making in ways I would never have imagined. I learned so much about V in particular, and think I might try to develop this sort of close study of my students into my teaching practice. It could even mean keeping a little journal where I write about all of my students, at least a few times throughout the year to reflect on their behaviors and how I’m interacting with them in order to better understand how they’re sense-making, and how I’m making sense of their sense-making.

I’m excited to learn more in E&D about these more macro or structural components that prevent or deter unique and individualized sense making. Daniels et al and Warren et al provide opportunities in their suggestions that align well with Lewison et al’s critical literacies approach. But what isn’t clear is how we teach students how to be critical without putting them in jeopardy or in positions of hopelessness. For example, I could encourage my students to find something they were interested in, in their community, and have them design some type of scientific or social collaborative approach to solving some problem.

What if we discovered something really horrible while testing the water in our schools? What if we started digging deeper into evolutionary histories and discover eugenics? Can teachers and students be using their sense-making critically and also be able to deliver on the ideas and knowledge and discoveries they make? Or does the low-status position of teachers and students in society doom us to social reproduction and replication over which students and teachers have no say in influencing?
Introduction

Hallie was born on June 18, 1999. That means she is currently 15, and will be 16 in June. She is part Italian and part Native American. She often references her ethnic backgrounds, and I think she has a particular affinity with her identity as being part Native American. She is currently a sophomore in high school. She attends a high school of about 1700 students, of which the students come from families with a mixture of income backgrounds. Hallie herself is a title 1 student. The school is about half white students and half latin@/chican@ students with a small number of black and API students. Hallie is part of the Green Academy at our school, and has most of her classes with the same group of students.

In terms of the special education legal process, Hallie has an IEP for visual processing and in particular she has some challenges with visual processing in math. So, Hallie has experienced consistent SST and IEP meetings. Hallie has not “fallen through the cracks” but is getting the attention she needs with supportive teachers and a very supportive study skills teacher who is also the case manager for her IEP. Because Hallie is part of the Green Academy she has many teachers who know her and how she interacts with students. Hallie is artistic, kind, and compassionate, asks great questions, and will often come up with unique solutions and ways of thinking to process and solve problems. Sometimes Hallie forgets things – physical and informational – but will always ask for the help she needs.
Cumulative file

In reviewing Hallie’s cumulative file, I learned a lot about her educational journey and life. A form in her file indicated that her mom did not graduate high school, but her grandparents did. No one in her family, it seems, has attended college. Regardless, Hallie has expressed that she would like to work in the medical field in the military. Her boyfriend is going to be deployed soon, and so I know that she has been a bit down about being far away from him. It seems like even though Hallie’s family didn’t pursue higher education, they are supportive of her education.

When Hallie was about 5 or 6 years old, her maternal grandmother was given full custody of Hallie. She not lives with her mom and brother. She has noted before that her brother used to be in a gang, but is no longer. She has expressed the feeling of having to take care of her brother and mother, and I wonder if her life history and challenges for her family has had an effect on her socio-emotional health and development. In 2007, when Hallie was about 8 years old, the school she was attending had a study team meeting, and in the meeting it was noted that Hallie’s family has a history of “learning problems” on her mother’s side.

For her star tests, Hallie seems to hover score-wise around basic to basic-proficient from year to year. She seemed to occasionally dip into below basic. Maybe this was enough to gain the attention of her teachers who seemed to take action. In 2010, when Hallie was about 11 years old, a “success team” indicated that Hallie underwent psychoeducational testing. Here it was also indicated that Hallie was below grade level in reading and math. In 2011, another “success team” report indicated that Hallie’s reading and math are still below grade level even a year later. The report also notes that Hallie has lived with her grandmother for the last 8 years. This shows that Hallie’s educators took the time to learn about Hallie and her family. It was noted that Hallie’s brother lives with their mom. The report notes that Hallie was asked if she had trouble hearing, but this did not seem to be a problem for her.

Hallie’s grades do not seem to have been a huge problem or indicator for her or the educators and community and family members who have been a part of her educational journey. She has consistently A’s, B’s and C’s.
**Demystification meeting**

In order to learn more about Hallie and her experience as a student with a visual processing challenge, I met with her for a demystification meeting. We met during lunch after our class, which is a general biology class right before lunch. Hallie shared that some of her strengths are her artistic qualities and also her ability to work with others and to be social. These are definitely areas of strength I’ve seen at work in our class. Hallie shared that what is most difficult for her is really remembering all of the material and details we go through in our class. When I asked how we could work on this, she said that she will continue to ask for help when she needs it and also pointed out that when we review for quizzes and tests beforehand it’s not as difficult. I have a feeling the extra review helps Hallie process things, as visual processing what her IEP is for. I asked Hallie if there was anything I could do to check in, but she said that she’d just ask for help when she needs it. She knows that I am always around and willing to help, and seemed to feel secure in relying on herself to check in when she feels she needs some extra support or explanation or processing when I introduce new material.

I felt that our meeting was helpful to both Hallie and myself. Hallie needed to stay in at lunch to get caught up because she had been absent the class period before. I just mentioned that I had met with her study skills teacher to learn more about her IEPs in general and how to support students, and asked her to describe areas of strength and areas for growth. Having talked to Hallie’s study skills teacher, I knew that the subject Hallie struggles with most is math, in terms of remembering and applying formulas, so I expected Hallie not to have too many issues with biology so far. And indeed, Hallie seemed to feel pretty good about biology and just noted that doing lots of review is most helpful for her. I think that in general Hallie just needs time to process information, and our class is fortunately designed with lots of opportunities for review. I can sometimes see when she gets confused and am always around in case she wants to stick around and ask questions, which I think made it easy to talk to her.
Consultation with IEP case study manager

It was in a meeting with Hallie’s case manager, I finally learned of what Hallie’s IEP is actually for – visual processing. In the meeting, Hallie’s counselor explained that Hallie’s visual processing diagnosis is really most salient in her doing of math. In the meeting we flipped through many pages and pages of testing and documentation. The most helpful I gained was that Hallie is a very focused learner but sometimes requires extra processing time and space particularly in math. Writing and speaking seem to come really easily to Hallie as does socializing and being artistic. Where Hallie needs extra support really seems to be in the cognitive/academic realm, and not as much in the behavioral/social realm.

From Hallie’s counselor, my general impression of Hallie as being very reflective was confirmed. Fortunately, Hallie is being given time and space in her study skills class to do a lot of reflection. I think that also in my conversation with Hallie, she very casually admitted that biology feels easy and that she does not feel too much of a challenge with the cognitive demands of the class. I reflected with Hallie’s case manager and study skills teacher, and we agreed that Hallie is doing quite well in biology and doesn’t seem to need any biology class-specific accommodations. As her instructor, I plan and deliver content in language accessible to all students including language learners which pedagogically also benefits Hallie and the other students in my class with IEPs. But I also think that Hallie has a genuine interest in biology, makes connections, and is invested in school and the class. Much of the work we do is centered on learning the language and practices of science as opposed to the highly abstract processing and thinking Hallie might be doing in math class.
**Attentional dysfunction inventory**

In this section, I provide the findings of an attentional dysfunction inventory. Areas where I felt that I found evidence were the following:

- *requires repetition of instructions (processing depth/detail)*
- *does best with “big picture” conceptualizing (processing depth/detail)*
- *has trouble entering new material in memory (processing depth/detail)*
- *seems to have trouble allocating, organizing, estimating time needs (tempo control)*
- *dawdles, misses deadlines (tempo control)*
- *does many things slowly (tempo control)*

I highlighted these six areas in particular, three from processing depth/detail and three from tempo control. I think that these are related to each other, and also to Hallie’s IEP area – visual processing. Furthermore, having done this inventory I’m very convinced that where Hallie needs extra support really seems to be in the cognitive/academic realm, and not so much in the behavioral/social realm. Taking a step back, none of the more behavioral aspects of the inventory really applied to Hallie. I think that Hallie is patient and focused and although she has some processing challenges, she has found ways to work around them. We’ve chatted before about how much she enjoys meditation. She is easy-going and kind and patient and empathetic, and I think her positivity helps her cope with any difficulties or challenges she might face because of her visual processing condition.
**Work samples**

**WORK SAMPLE 1 and analysis**

This work sample illustrates Hallie’s strengths as an artist. But I think what’s important to note here is that it took Hallie much longer to complete this carbon cycle map than the rest of the class. The map is incomplete, lacks labeling, and doesn’t show what I know that Hallie knows about the carbon cycle. I know that Hallie was able to explain the carbon cycle and its steps, but when working with another student on creating a poster of the steps, Hallie may have experienced some challenges with spatial ordering and temporal-sequential ordering. I think the work sample addresses issues of spatial ordering and temporal-sequential ordering because the task was to create a visual ordering of the steps of the carbon cycle. From this work sample, I learned that Hallie might need some extra supports and opportunities for completing tasks like the carbon cycle map. Perhaps the task hit some of those visual processing challenges that Hallie’s IEP is for. Hallie might have also been able to better focus on the task if she were given the task to do on her own, and with more check-ins from me. I think extra time to complete the task to allow for more personal reflection and processing may have allowed Hallie to complete the task more comfortably as well.
### WORK SAMPLE 2 and analysis

<table>
<thead>
<tr>
<th>Essential Question</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>How do enzymes change the speed of reactions?</td>
<td><strong>Chemical reactions speed up by substances called catalysts.</strong> Enzymes are catalysts. A catalyst is a substance that speeds up chemical reactions. Enzymes are proteins, catalysts. <strong>How are enzymes different from catalysts?</strong> Enzymes are a type of protein that changes the rate into a type of protein catalyst. <strong>How do you use the rate into a type of protein catalyst?</strong> Enzymes are proteins that speed up chemical reactions. <strong>What is an example of enzymes in a digestive system?</strong> Hydrogen peroxide is a dangerous compound to use, so it must be broken down immediately.</td>
</tr>
</tbody>
</table>
The work sample on the previous page illustrates Hallie’s strengths in terms of being able to communicate ideas and work independently. I am not sure however if it illustrates Hallie’s visual processing challenges (for which she has the IEP). Instead, I think it illustrates the challenges of higher-order cognition. Cornell notes require that students (1) take notes (2) generate questions (3) write summaries (4) annotate and reflect on the notes (5) generate higher-order open-ended questions. From this work sample, I learned that Hallie (and her classmates) were all able to take notes and ask surface level test questions, but found summarizing and synthesizing the information to be more challenging. Doing this type of work is more cognitively demanding. Unlike work sample 1, I can find fewer connections to Hallie’s visual processing challenges and instead am broadly thinking about how I can support more students with tasks that ask for not only processing content but also for organizing, synthesizing, and processing information. I’ve learned that for both the Cornell notes and for the carbon map, more opportunities for scaffolds and practice and opportunities for multiple iterations to complete a project might benefit all students.
Description of student’s learning is informed by class discussions and readings
I have found that my student’s learning can be informed by a number of class discussions and readings.

Growth Mindset

Hallie has a strong sense of growth mindset. Dweck describes students with a growth mindset as ones who are “mastery-oriented,” who “think intelligence is malleable and can be developed through education and hard work” (Dweck, 2007, 2). Hallie wants to learn. She asks questions. And I believe that Hallie has overcome the various challenges in her life – living apart from her mother and brother and moving around to different schools – because she has a growth mindset and does not feel “helpless” when she faces difficult personal or intellectual problems. Hallie has an IEP. Hallie may, at times, feel that her status as a student with an IEP would make her “less smart” than other kids. But Hallie is determined. Hallie is focused, and does her best to help the students around her in order to learn and to help them learn in a community of learning.

A Beneficiary of Classroom Management that supports Differentiated Instruction

Tomlinson (Tomlinson, 2014) describes a number of classroom management strategies that support differentiated instruction. Hallie has told me time and again that she wishes some of the students in our class would take class more seriously and quiet down. Her teachers have to be creative in making sure there is quiet work time for students like Hallie and also time for noise and conversation for students who need noise and conversation. I believe that much of Hallie’s relative success in school, and the reason why she feels supported by her teachers, is a result of their attempts to manage their classrooms to support differentiated instruction. Teachers get to know their students. Teachers talk to students often. They reflect with one another. For Hallie, being in the Green Academy means that many of her teachers gather regularly to collaborate, plan, and talk about the ways they are meeting the unique needs of students, moves that I think are ones that Tomlinson suggests for a successfully managed classroom that is supporting differentiated instruction.
Hallie’s Turkey and Crow Tendencies

Eide & Eide (Eide & Eide, 2011) point out a tension between (1) automaticity and efficiency and (2) divergent problem solving and innovation. They align the automaticity and efficiency with turkeys and turkey learners. They align divergent problem solving and innovation with crows and crow learners. Turkeys go with the flow. They don’t question. They follow directions. Turkey learners are privileged within school systems with many rituals and procedures whereas crow learners are often sources of frustration. Crows are independent. They do not always follow directions. They think outside the box.

I think that Hallie has both turkey and crow tendencies. She does not have any behavioral issues that are crow-like. She follows instructions and class procedures. She is quiet and obedient and respectful at school. But where she exhibits crow features are the ways in which she is creative and thinks outside the box. She does not take the easy road. When I gave a large culminating project, many students chose to write essays since they thought essays would be easy. Hallie chose to make a book. When learning a new idea, she automatically begins to ask questions such as, “Well is it like… (Insert connection to other concepts and ideas here)?” This signals to me as her teacher that Hallie is making connections and thinking innovatively about science ideas that many students memorize as facts without questioning or connecting.

Medication (and the lack of it)

To my knowledge, Hallie is not taking any medication related to her visual processing condition. I think that her growth mindset, her supportive community, her teachers being open to classroom management that supports differentiated instruction, and his ability to adapt turkey and crow learning features has made it such that Hallie is not a “problem” to “fix.” I wonder if Hallie’s situation was more serious and she was not able to have her learning needs met by non-medical interventions if she would be medicated.

Diller describes some of the costs of medicating children (Diller, 2006). He notes that it is expensive, it’s potentially damaging to students (we’re lose their nonstandard but innovate ways of making sense of the world), we are reinforcing a culture of looking at “what’s wrong with kids” and just trying to “fix” them into what society wants them to be with drugs. I think that Hallie has really benefitted from not being exposed to this world.
I wonder if she has. I wonder if she and her family and others in her life have advocated for her not to be given drugs. I know that Hallie values natural remedies such as meditation for her stress. I know that Hallie values her culture as being part Native American and values indigenous connections with nature and with oneself. I wonder if the culture of trying to “fix” children with medicine is one that is inherently western and produced by western notions of medicine. Perhaps Hallie’s culture, personality, and community have protected her from the world that Diller describes.

Or maybe, Hallie fits into schools and school culture. Maybe she doesn’t need drugs. And if she did, she might not be the same creative, innovative, kind, compassionate, and caring student that I have come to know.

**Motivational Fatigue**

Diller describes some concerns with diagnosing students with ADHD and a possible conflation of this diagnosis with the notion that a “drop in motivation and school performance” is fairly common for students (Diller, 2006). When I first read this article, I did not think it was very relevant to Hallie. But the more I thought about it, the more I felt that her supportive family, although fragmented, has provided her with opportunities to feel motivation. Hallie is motivated to care for her mother. Hallie is motivated to care for her brother’s child. I think that she feels love and support from her small but fragmented family and realizes her capacity to support her family, and she sees school as a way to further support her family.

When I think about my own high school experience, I attended a high school with many students who were from extremely wealthy families who rarely saw the other members of their family and when asked by teachers could not come up with reasons for staying motivated in school. Their grades suffered. They abused drugs and alcohol. And some of them were diagnosed with learning disabilities, but now I wonder if it they were experiencing motivational fatigue and what those students really needed were goals and passions to pursue and to direct their learning towards. For Hallie, I know that she hopes to study to learn what she can to work in some capacity in medicine so that she can be near her boyfriend who is currently in the military. Her love and connectedness to her family and to her loved ones motivates Hallie, and once could say protects her from motivational fatigue.
## Areas of difficulty and suggested strategies

<table>
<thead>
<tr>
<th>AREA OF DIFFICULTY</th>
<th>UNDERLYING NEURO-DEVELOPMENTAL SYSTEMS</th>
<th>STRATEGIES</th>
<th>BYPASS OR INTERVENTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1: visual processing</strong>&lt;br&gt;I see Hallie have difficulties with visual processing in the class when she has trouble looking and graphs and data tables. This is further confirmed in that I know that Hallie struggles with visual processing of math problems and formulas.</td>
<td>Student has difficulties: “understanding information that is presented visually, generating products that are visual, and organizing materials and spaces” (<a href="http://www.allkindsofminds.org/learning-framework">http://www.allkindsofminds.org/learning-framework</a>)</td>
<td>1. I would present the whole class with <strong>content in textual form</strong> to supplement visual information. 2. I would use <strong>graphic organizers</strong> and <strong>structured note-taking opportunities</strong> for all students to organize and summarize in their own words the information I give them, including visual information and diagrams. 3. I would recommend that Hallie use this <strong>math website</strong> (assistive technology) to reference for examples and practice: <a href="http://www.amathsdictionaryforkids.com/dictionary.html">http://www.amathsdictionaryforkids.com/dictionary.html</a> when drawing on math concepts that Hallie has struggled with in the past.</td>
<td>1. Bypass 2. Bypass 3. Intervention</td>
</tr>
<tr>
<td><strong>2: memory</strong>&lt;br&gt;I see Hallie have difficulties with memory when she expresses that she needs to review a lot before things begin to “stick” for her. She notes that she struggles to remember things on quizzes and tests unless we have reviewed them extensively.</td>
<td>Student has difficulties: “briefly recording new information, mentally juggling information while using it to complete a task, and storing and then recalling information at a later time” (<a href="http://www.allkindsofminds.org/learning-framework">http://www.allkindsofminds.org/learning-framework</a>) SPECIFICALLY I think this student has difficulty with <strong>long-term memory</strong>. When we do activities and introduce new content in class or introduce certain procedures for labs, Hallie’s short term and working</td>
<td>1. I would provide lots of <strong>wait time</strong> and introduce <strong>multiple points of entry</strong> when teaching students about new types of problems or topics. 2. I would utilize <strong>Cornell Notes</strong> in my classroom and follow the 10-24-7 model to allow students to review and recall information regularly for longer retention time. 3. When Hallie seems to have difficulty with certain topics, I might <strong>meet with her before a quiz or other assessment</strong> to</td>
<td>1. Bypass 2. Bypass 3. Intervention</td>
</tr>
</tbody>
</table>
memory do not seem to be a huge challenge for her. But recalling information for big tests does seem to be a challenge.

I do not know if attention or language are involved. They may be, but I cannot think of a time when Hallie showed or suggested difficulty with attention or language.

<table>
<thead>
<tr>
<th>3: temporal-sequential ordering</th>
<th>Student has difficulties: “understanding the order of steps, events, or other sequences; generating products arranged in a meaningful order; and organizing time and schedules” (<a href="http://www.allkindsofminds.org/learning-framework">http://www.allkindsofminds.org/learning-framework</a>)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I would provide my class with opportunities to <strong>build timelines for biological processes</strong>. For example, as a class we might practice describing and explaining protein synthesis along a timeline to solidify understanding of the steps and sequences of protein synthesis.</td>
<td>1. Bypass</td>
</tr>
<tr>
<td>2. I know that Hallie struggles with organization, so if know that Hallie has a lot of deadlines coming up in my class and her other classes, I would have her stay after class one day and have a <strong>look at her planner</strong> to make sure she has organized time to get all of her work and other tasks done.</td>
<td>2. Intervention</td>
</tr>
<tr>
<td>3. I might design <strong>review games</strong> that present students with different descriptions and images within a process with the goal to <strong>put these descriptions and images in a certain order and to explain why that order makes sense</strong>.</td>
<td>3. Bypass</td>
</tr>
</tbody>
</table>
This way, students are gaining practice understanding, explaining, and justifying why certain processes are in the order they’re in.

(“All Kinds of Minds,” 2015)
Concluding reflection

- What did you learn from the process?
  I learned a lot about my case study student, and also about how people process information. I think that I previously took my own cognitive abilities for granted. Now I feel very lucky for the unique and powerful ways in which I know that I learn and receive information, and I hope to tap into the strengths of my future students while also supporting them in their areas for growth.

- Would you do anything differently next time?
  I probably won’t be writing this type of case study about my future students. However, I hope to learn about the IEPs of my future students drawing on some of the activities and strategies I learned from this process.

- Any take-aways you could use in your own classrooms?
  I wish that schools or some institution within education did some of this leg work for teachers. I think I’m going to have to make a lot of decisions about where to invest or not invest my time as a teacher, and I wonder if there would be ways to consolidate information into a chart or a summary for teachers when they get a student who has a particularly complicated or complex history in where their learning challenges and needs are.
Range of services and resources is in school

Size of school: 1,810 students

Are support personnel part-time or full-time?

- Some personnel are part-time and some personnel are full-time
- For case managers, all but one is full time

Services available to students with special needs including SST and IEP process

- Co-taught Classes and Instructional Aids
  - Co-taught classes are one available service to students, if it is written into their IEP. This could be that all of their classes need to be co-taught or just specific ones (e.g., only math and english)
  - Co-taught classes are taught by the academic subject teacher and the special education teacher. In co-taught classes, the co-teachers also have the option of having an individual aid in the classroom. In the co-taught class that I am in, the teachers share planning, instructing, and assessing responsibility.
  - Students may also have personal instructional aids that follow the individual student through all their classes (as opposed to a general instructional aid as for the co-taught model)

- Case managers, IEPs, and SSTs
  - As a freshman, if you had an IEP in middle school you are automatically assigned to a case manager. This case manager will teach the student’s Study Skills class for all four years, so students have consistency over their high school career
  - Full-time case managers are generally responsible for three study skill sections and two co-taught sections (same class)
  - If a student gets an IEP in the middle of year, there schedule will be changed and the teacher for whichever study skills class they get put into will become their case manager
  - Case managers are the point of contact for parents and are responsible for running IEP meetings and updating paperwork
There are different types of IEP meetings: one happens every three years and is a comprehensive review of goals, progress, and the student’s plan; one happens annually and checks whether the modifications are working/if they need to be adjusted.

- Teachers only know the accommodations from the IEP (a privacy issue), but if you ask their case manager they can give you more information e.g., it's an audio-processing disorder.
- Accommodation examples are sitting towards the front of room, extended time for tests/quizzes, typing up all assignments.
- IEPs are only given out if other options are expended. If students have been through SSTs and the modifications aren’t working, then the school psychologist will test the student and make a decision regarding the IEP based on testing and teacher input.
- Parents/students wanting to begin this process can talk to their counselor; there is also an SST team at the school; for the most part my CT has found that SSTs are started by teachers rather than parents/students.

- **Special Day Program**
  - This is for students with greater physical or mental needs → this program is totally isolated. According to my CT, in the past they tried to have these students in general classes but it did not work out for the school.

**Documentation that describes services/procedures offered**

- “We do not have a list of services available, because services are determined during an IEP or 504 Plan meeting, and are determined based on a number of measures and reports to accommodate each student’s needs. The SST and 504 process begin with the student’s counselor, and IEPs are implemented only if a student has implemented all general education services and interventions and have completed a psychoeducational assessment with our school psychologist and found to qualify for special education support.”
Works Cited


Next-Generation Community Heroes
EDUC284: Teaching and Learning in Heterogeneous Classes

December 4, 2014
Table of Contents

Context ................................................................................................................................................. 3
  Our school context ................................................................................................................................. 3
  Our class context ................................................................................................................................. 3
  Our instructional context ..................................................................................................................... 4

Planning ............................................................................................................................................. 4
  What is a groupworthy task? .................................................................................................................. 4
  Why did we design this lesson to be groupworthy? ............................................................................. 6
  How specifically did we incorporate group design features into our task? ..................................... 7
  What were the language demands? ....................................................................................................... 8
  How did we prepare students for the task? ......................................................................................... 10
  Essential question and specific content ............................................................................................. 11

Instructing ......................................................................................................................................... 11
  Teacher orientation ............................................................................................................................... 11
  Overview of overall levels of student engagement ........................................................................... 13
  Video of student interaction ................................................................................................................ 18
  Wrap up and feedback .......................................................................................................................... 19
  Status interventions ............................................................................................................................. 19
  Strategies used to facilitate access for English learners ................................................................. 20

Assessing ............................................................................................................................................ 21
  Formal Assessment .............................................................................................................................. 21
  How do we know they know? ............................................................................................................... 23
  Informal Assessment ........................................................................................................................... 27

Reflecting ........................................................................................................................................... 27
  What went well and students’ reactions ............................................................................................... 27
  What we learned from and what we might do differently in the future ........................................... 29

References .......................................................................................................................................... 32

Appendix .......................................................................................................................................... 32
Context

OUR SCHOOL CONTEXT

We implemented at Woodside High School, a comprehensive, public school that services mainly Redwood City, East Palo Alto, and Woodside. The school has ~1,875 students and the population is said to be 56% Hispanic/Latino, 30% White, 7% Asian Pacific Islander, and 4% African American. The population is comprised of 19% students who are classified as English language learners, 14% students who are said to have learning-related disabilities, and 47% students on free or reduced price meal subsidy. Of the languages spoken at home by students classified as English language learners, 92% of students speak Spanish (2011-2012 SARC report). The administration speaks to a focus on college preparation. Looking back to the 2011-2012 SARC report, 47% of 2011 graduates passed all of the courses required for the UC or CSU system; 89% of students graduated.

Narrowing in on science, incoming ninth graders are recommended to take either Advanced Biology or Advanced Integrated Science (AIS) based on Math and English testing scores. Physics is also an option. Often, students in AIS go on to take Regular Biology their sophomore year; students who go on to take Advanced Biology their sophomore year are considered to go “off track.” Students can opt into any science class freshman year if they discuss it with their counselor; however as I understand it from a discussion with a Woodside teacher, this seems to require significant advocacy on behalf of the student.

OUR CLASS CONTEXT

We implemented in an Advanced Biology section comprised of 25 students: 17 freshman and 8 sophomores; 14 females and 11 males; 19 students who are White (not Hispanic), 5 who are Hispanic, and 1 who is Asian Indian. The data was based on school records; however, from what we know of our students, this data seems to classify at least a small handful of students as White who would self-identify as either multiracial or Hispanic. All of our students were born in the US and six have parents who immigrated to the US, emigrating from places including Mexico, Peru, Guadalajara, El Salvador, Jordan, and the Philippines.

We have no students with an Individualized Education Plan or a 504. We have no students who are currently classified as English Language Learners, and we have seven students who have been reclassified Fluent English Proficient. Twelve students in our class say they speak Spanish; three students say they speak some Spanish; one student speaks some Arabic (students were not asked to qualify fluency when we gathered the information).
OUR INSTRUCTIONAL CONTEXT

Our lesson focused on drawing connections between the cell cycle, our bodies, and our community. At the time of implementation, our class was familiar with cell parts and cell transport and had been introduced to the cell cycle through four activities: 1) a mini-lecture introducing the purpose of the cell cycle; 2) a webquest with an accompanying notes sheet that went through the high-level steps of the cell cycle; 3) a video that reviewed the cell cycle and introduced mitosis; and 4) a bead and string model activity reviewing mitosis.

Our class often works in groups; however, we have not yet done a “groupworthy” project as defined by Lotan and Cohen. Students will generally work through short labs in pairs and longer labs in groups of four; however, these labs trend towards having explicit instruction and an expected result. Also of note, our class is arranged to facilitate group work: student seating is structured so that every student is in a three- or four-person group and every student has a role (facilitator, recorder, resource manager, or reporter). The responsibility of each role is described on a laminated card at the corner of students’ desks. However, the only time we have made functional reference to these cards was during beginning of the year skill builder activities - these roles have yet not been used purposefully within our classroom.

The classroom already has two norms that were established by the teacher during the first week of school: work smart and be nice. At that time, the teacher put the two norms on the board and students brainstormed what it would look like to “work smart” and “be nice.” Over the course of the semester, working smart was rarely referenced in the class. Being nice has been revisited on occasion during whole-class discussions when comments significantly deviate from this norm. Generally, the teacher will say something to the effect of, “Remember, be nice.” Then, the conversation will continue. The two norms are also written on posters in the front of the room.

Planning

WHAT IS A GROUPWORTHY TASK?

In Lotan and Cohen’s book “Designing Groupwork”, groupwork is defined as:

“Students working together in a group small enough so that everyone can participate on a clearly assigned learning task. Moreover, students are expected to carry out their task without direct and immediate supervision of the teacher” (1).

Lotan and Cohen are quick to clear up any misconceptions, since the description above might describe ability grouping or small group work. What sets groupwork apart from those other two types of groupings in the classroom are five design features (2-23, 80):

1. the teacher delegates authority to students and allows them to struggle on their own and make mistakes
Why is this design feature important? This feature is important because it allows students to be “responsible for specific parts of their work; students are free to accomplish their task in the way they decide is best, but are still accountable to the teacher for the final product” (2). This allows students to develop important skills in time management and decision-making. When they leave school, they should have strong skills in managing time and being responsible. Many will go into professions that require groupwork, and working on these skills in school will better prepare them for group tasks later on in life.

2. members need one another to complete the task, cannot complete the task by themselves, and students have multiple opportunities to demonstrate competence

Why is this design feature important? An important part of a groupworthy task is, of course, the nature of a group! When students must depend on one another, “students interact in ways that assist them in understanding, applying, and communicating ideas” (10). Working in a group asks students to be flexible, to stretch their prior knowledge, and also to try out multiple opportunities to show what they know in applying and communicating their ideas. This way the multiple abilities and strengths student bring can be acknowledged, utilized, and celebrated (Gardner, 1993).

3. the task poses complex problems or dilemmas, has different potential solutions, and relies on creativity and insights

Why is this design feature important? This feature is important because it promotes skills in creative problem solving. When creative problem solving, students, “learn form one another, they are stimulated to carry out higher-order thinking” (14). This type of thinking is not always present in more traditional learning tasks. “Knowledge acquired by rote memory is insufficient for the challenges of modern social problems and modern technology” (15). And so students must learn how to be creative and to think critically about complex problems so that they are prepared for the complex problem solving demands of modern society.

4. the task is related to the discipline with relevant and important content

Why is this design feature important? “The group situation is ideal for the development of the thinking skills and practices associated with each discipline. Cooperative groups provide learners with the opportunity to practice generating causes and effects, hypothesizing, categorizing, deciding, inducing, and problem solving” (16). Not surprisingly the group situation created by a groupworthy task could easily mimic a scientific lab community where many members of a lab are working on answering one complex question and take on many roles to answer that question. The group task mimics discipline-related conversations and collaborations. This makes it easy to link groupworthy tasks to relevant and important content for science especially since much of science involves some kind
of scientific investigation working in a team to answer a question or identify a phenomenon.

5. students are given a clear idea of **how the group project will be evaluated**

*Why is this design feature important?* Evaluation or assessment is important for the same reasons it is important in other parts of a student’s academic life. Teachers need to have, “some way of finding out if they are on the right track in solving problems. They need to know how what they have done measure up to some set of intellectual criteria and what they can do to improve their product” (80). When giving students such a large and complex task, the evaluation or assessment provides students opportunities to reflect on what they learned, how they learned, what they understand, and what their group may have been confused or unclear about. This way, they might learn from their mistakes or have their learning reinforced by reflecting on their areas of strength and areas for growth.

**WHY DID WE DESIGN THIS LESSON TO BE GROUPWORTHY?**

For science educators, the design features of groupwork lend themselves particularly well to the learning and doing of science. In their book, Lotan and Cohen cite science educators and research in science education that has shown how groupwork in a science classroom allows students to:

“*Become members of a scientific community for whom the process is less about the acquisition of specific facts and procedures, but rather about acquiring a culturally produced way of thinking, knowing, and valuing*” (11).

Student independence from teachers, student dependence on other students, and the emphasis on creativity required by groupworthy tasks mimics how professors and industry scientists function in the creation of scientific theories and knowledge. In science there are no real facts or procedures, only scientists who are creating theories and procedures that might eventually turn into what we call “knowledge” until another scientist comes along and presents new evidence and new theories.

We designed this lesson on the cell cycle to be groupworthy so that students could have an experience not only as students learning content. Our goal was for them to feel like scientists capable of thinking critically about existing science knowledge and creating new understandings and questions about science knowledge through interaction with their peers. In most careers even beyond science, these students will need to collaborate and cooperate, so practicing these skills now is vital to a practical education that prepares students to work well with others (Webb, 2007).

While this is not a groupworthy task design feature, we tried to make sure that the “complex problems” or “dilemmas” we provided students with were related to real-life issues. So that not only would our task delegate authority and require students to
interact with one another, but that students would also feel a sense of relevance and importance while completing the task.

HOW SPECIFICALLY DID WE INCORPORATE GROUP DESIGN FEATURES INTO OUR TASK?

Below I provide each design feature and example of how we incorporated those design features into our task to make it groupworthy:

1. the teacher delegates authority to students and allows them to struggle on their own and make mistakes

   When the teacher delegates authority, the teacher delegates more of the learning responsibilities to the student. We were able to do this by assigning a homework assignment that required students to learn about a care team role and to learn about a cell cycle condition through learning about this role. Students also had to learn together about how problems with the cell cycle result in certain conditions. Students had to learn about and interpret resources we provided and also look for their own. They reported what they learned on a graphic organizer. The teacher did no teaching or lecturing at all during the groupworthy task.

2. members need one another to complete the task, cannot complete the task by themselves, and students have multiple opportunities to demonstrate competence

   First, the students needed each other to complete the task because they were each given expert roles that they had to research and learn about independently. They needed each other for the unique knowledge everyone came with. Also, the students were given very distinct procedural roles where students needed each other to physically complete each part of the task. Second, the students had multiple opportunities to demonstrate competence from the homework assignment, a graphic organizer, the creation of a poster, and the writing of a letter. Each of these required different skills and strengths, which students had a chance to demonstrate.

3. the task poses complex problems or dilemmas, has different potential solutions, and relies on creativity and insights

   The task we gave students was very open-ended, and had no obvious answers. Students had to think creatively about what angles or perspectives or approaches to take on to synthesize and chunk information into ways that made sense for them. One real dilemma many students had to grapple with was the idea that the conditions they were learning about and working with are still being studied by scientists and do not have cures. The complexity of the problems they had to work with is the same complexity scientists, community organizers, patient advocates, and healthcare providers must grapple with on a daily basis.
4. the task is **related to the discipline** with **relevant and important content**

As mentioned above, the content is deeply related to the discipline and relevant content in that the topic of cell cycle conditions affect people in their everyday health and wellness. Medical science and its implications affect the students and people the students know every day. Having to think critically in the roles of scientists, community organizers, patient advocates, and healthcare providers gave students a taste of what it’s like to work in a collaborative scientific endeavor.

5. students are given a clear idea of **how the group project will be evaluated**

Students were provided with criteria for the group product in their task card. The task card described what had to be present in their graphic organizer and also what had to be present on their group poster/infographic. Students were also given criteria for their individual homework, and their individual reflective culminating letter. All aspects of the group and individual tasks had clear criteria for evaluation so that students knew exactly what they had to learn and complete, and how do demonstrate their learning.

**WHAT WERE THE LANGUAGE DEMANDS?**

In considering the language demands and affordances of groupwork, Lotan and Cohen examine the speaking, listening, reading, and writing activities that students do to 1) access the learning task; 2) participate in the work of the group; and 3) demonstrate what they have accomplished (102). Each aspect will be considered here:

1. **access the learning task**

   *Students received task-based instruction through listening and reading.*
   *Students listened to the teacher who introduced the task and to the individual in their group who read the task card. Two task cards were provided to each group so that students also had the opportunity to read along with the speaker.*

   *Lotan and Cohen write: “During groupwork, as group members read and discuss the task card collectively, they clarify information, repeat instructions, restate the question and prompts for discussion, translate, and organize the information in various ways” (102). This was most clearly seen as students grappled with the graphic organizer in step 2 of the task. Students could be heard asking clarifying questions of each other and the teacher about the prompts in the graphic organizer.*

2. **participate in the work of the group**

   *Students were asked to listen, speak, read, and write. During step 1 of the task card, students had to listen and speak as each group member shared out their*
findings from the homework assignment. Moreover, to have completed the homework assignment, students had to have written their findings based off two sources of varying language demands. The sources ranged from news articles to podcasts to interviews.

Students were asked to listen, speak, and read during step 2 of the task card when they investigated the relationship between their condition and the cell cycle. The resource cards supporting students’ work in this stage included video and written text. Further, in step 2 students were asked to synthesize information from the resource card by discussing four questions, coming to consensus, and recording that response in a graphic organizer. Only one student was required to write on the graphic organizer, a feature of the task that we may reconsider as discussed in the What we learned from and what we might do differently in the future section.

The group product construction of step 3 further required students to engage through myriad modes of communication. Students needed to discuss how to organize their collected information and how to present it succinctly through text and images on their infographic.

3. demonstrate what they have accomplished

Lotan and Cohen write, “Your responsibility is to expand and to deepen your students’ linguistic repertoire so that they can use language to communicate effectively with a number of different audiences for different purposes” (99). The two products, the infographic and the individual assessment, each served as an exercise in selecting an audience and using language appropriate for communicating to that audience and in that format. For example, students who addressed their letter to a close family friend used very different language than students who wrote to an unnamed health care provider. Of note, the individual assignment was the most writing-intensive part of the project.

In addition to making a task with opportunities for speaking, listening, reading, and writing, we had to make sure that the linguistic and language challenges of these opportunities were indeed appropriate to our student group. Our class has high English proficiency and has, generally, shown comfort speaking or trying to speak scientific academic language. While STAR testing by no means captures the nuance of the language skills of our classroom, it does provide one piece of evidence to the level of language in our section: of the 23 students with testing scores reported, 9 students are said to be ELA proficient and 14 are said to be ELA Advanced. We felt the language challenges of our task were mostly appropriate to our students; we did this, in part, by anticipating where the language demands would be most challenging and putting in additional supports.

We expected that the professional roles and concept of a “care team” would be unfamiliar to many of our students: the responsibilities of these roles were front
loaded in two ways: 1) in a survey in which students could select role preferences; and 2) in a research homework assignment that asked students to investigate their condition of study through the perspective of their role. In this way, students knew their “role” for a week leading into implementation.

We also expected that some of the content and support vocabulary for the resource cards addressing the connection between the cell cycle and condition would be either unfamiliar or uncomfortable to students: for the Alzheimer’s video resource, we provided both a list of keywords and a “What is Dr. Bloom saying in this video?” summary so that students had the opportunity to make sense of the video themselves and to revise/confirm/augment their understanding according to the summary provided (see appendix D); for the Breast Cancer resource, we expected that “gene” would present the greatest challenge to student understanding: while students have likely heard the word, they have not studied it and it underlay much of the science in the resource card. However, students would have encountered much of the other scientific language in the piece in class already and the science was nested in an analogy (see appendix E).

We identified two places where the language demands were not appropriate to our students: 1) we did not foresee the language challenges that surfaced in students’ own research during Step 2 of the task card (see appendix F) - we saw students reading paper abstracts on their computers and asking language questions like, “What is acetylcholine?”; and 2) the fourth question of the graphic organizer “What communities does this condition most impact, and what about their bodies or cells or environment makes this community most at risk” seemed to raise several language-related questions around the concept of environmental risk factors.

HOW DID WE PREPARE STUDENTS FOR THE TASK?
As discussed briefly in the What were the language demands? section, we prepared students for the groupwork and task through two assignments leading up to the implementation: 1) a google survey gave students the opportunity to identify their condition and role preference; and 2) a research homework assignment familiarized students with their role and condition in advance. In this way, much of the preparation for the groupwork came in the form of removing the surprise of the task. A significant downside to this strategy relates to equity issues connected to homework. Not doing the survey only had the downside insofar as a student’s preference could not be voiced; however, not doing the research homework meant that a student would not have information to share during Step 1 of the task. As to the former, we gave students time in class to do the survey at the end of a classwork assignment. We had 17 out of 25 students submit responses. As to the latter, we gave a week to complete the research. We hoped that would address some of the equity issues embedded in homework; however, we saw at least two students who had not done the research and expect that it exacerbated status issues within that group.
We also prepared students by discussing the upcoming group work on three different occasions (when administering the survey, when assigning the research homework, and in the class prior to the implementation date). In our class, routine dictates so much of our instructional structure, and we felt that students would feel greater comfort coming into the project if they knew that the class would have a very different format.

We did not prepare students for the “how” roles (i.e., recorder, facilitator, editor-in-chief, and harmonizer) or the new groupwork norms in advance of the implementation date.

**ESSENTIAL QUESTION and SPECIFIC CONTENT**

The essential question for this task was: **what is the relationship between the cell cycle, our bodies, and healing?**

The students are currently in a unit on cell biology, with a focus on the cell cycle. Students will have an understanding of cell parts, cell cycle, and mitosis coming into our task. With our task, we aim to address the NGSS Disciplinary Core Idea LS1.B Growth and Development of Organisms. We also hope to incorporate 3 out of the 8 science and engineering practices in the NGSS. These are:

- asking questions and defining problems
- constructing explanations and designing solutions
- obtaining, evaluating, and communicating information

For more information on *how students will be assessed* on their transfer of prior knowledge about the cell cycle and their performance in carrying out the science and engineering practices, see the “formal assessment” section.

**Instructing**

**TEACHER ORIENTATION**

Students already knew the premise of the task ahead of them, as explained in the *How did we prepare students for the task?* section, and came in to find name tags that arranged them into their care teams. To orient students to the task, we began with the essential question. Similar to how the task is introduced on the task card, we explained that we are part of a community of people where friends and family are facing health challenges every day, and that today, we would be investigating one condition that affects our communities. Educating ourselves and each other is a first step towards creating communities of support and healing, we said. With that, we presented the essential question – what is the relationship between the cell cycle, our bodies, and healing – both verbally and on a slide on the board.

We then entered a discussion of norms related to how our class would work in groups. We asked each group member to share in their care team either 1) a time that they were part of a group that worked well together and why it was successful; or 2) a time that
they were part of a group that didn’t work so well together and what would have made it better. We then asked the group to decide on one norm that was critical to good group work and that they wanted to hold the whole class accountable to. We had the Community Organizer from each group share out after group discussion. We were left with six norms that we kept on the whiteboard throughout the class (one group re-iterated a norm already mentioned):

1. everyone works
2. everyone shares ideas
3. flexibility and acceptance of ideas
4. good leadership
5. cooperation and listening
6. share the work

Next, we transitioned into our multiple abilities orientation. We said that another important part of working successfully together as a group is making an effort to draw on the strengths that each person brings to the group. We presented a list of “the many skills needed” for the project and asked for each group member to write down at least one skill on the back of their name tag that they either felt they had or that they really wanted to focus on improving today. We felt that by including the “improve” option, no student could go through the list without writing something down. The skills included:

1. internet researching
2. summarizing text or video or audio
3. empathy
4. learning about the cell cycle
5. connecting the cell cycle to other things
6. sharing your unique ideas
7. drawing pictures or graphs or diagrams
8. listening to others
9. making connections between different people’s ideas

Where possible to do so succinctly, we tried to draw a direct connection between the skill and how it could be used. For example, for “empathy,” we connected it to adopting the perspective of patients or communities supporting people with these conditions; for “drawing pictures or graphs or diagrams,” we connected it to putting together the infographic. We also added that this list was not comprehensive. Then, we asked each group member to share one of the skills they wrote with their team to reinforce that their group might want to draw on them for that skill later on.

After most groups completed Step one of the task card, we once again regrouped as a whole class to layer process roles onto students’ perspective roles. We asked each group member to write their process role on their nametag:

1. **Patient Advocate → Facilitator**
   i) Responsible for facilitating discussion on each question in the graphic organizer before the group starts writing
ii) Responsible for facilitating discussion about infographic sections

2. Community organizer → Recorder
   i) Responsible for making sure that the graphic organizer gets filled out
   ii) Responsible for making sure the group completes a rough draft of the infographic
   iii) Responsible for organizing group’s work on the final draft of the infographic

3. Researcher → Harmonizer
   i) Responsible for making sure all voices are included and all ideas are valued
   ii) Responsible for making sure that any process concerns are addressed
   iii) Responsible for coming to agreement on questions for Ms. Maker

4. Health Care Provider → Editor-in-Chief
   i) Responsible for making sure all parts of the task are completed professionally
   ii) Responsible for managing time and materials

These roles and responsibilities were left on the smartboard for the remainder of class.

OVERVIEW OF OVERALL LEVELS OF STUDENT ENGAGEMENT

(student interactions/status problems/areas of conflict if apparent will be addressed throughout)

Student groups were observed 6 times throughout the 100-minute block period. The observations lasted from 2-5 minutes. Graphic depictions of student engagement will be provided for each observation with commentary.

Overall, the level of engagement for the entire lesson seemed very high. Below is a combination of the data from the whole class period to show the relative percentages of each type of behavior for the whole lesson. You can see that talking or manipulating was what most students were doing at any time during the class period.
In the following sections, you will see a graph of participation percentages for each observation (with data from all groups) and then a description of what was observed during that observation period.

**observation 1 participation percentages**

During **this first observation**, many groups were observed working on their expert group share-out. At 11:17, some of the groups had already completed their expert group share-out (they finished in 4 minutes) and the instructor paused the class in order to explain the next activity (filling in the graphic organizer). As indicated by the data, most groups were either talking and sharing out about their expert role or reading/writing the task card when they were observed. Upon arriving at group 7, they had just received materials, which they were manipulating and moving around with their hands but they had not started talking or reading yet. I think at this point, all students seemed engaged in learning about the task and sharing out about their homework. Groups seemed interested in the symbiosis of the various expert roles.

**observation 2 participation percentages**

During **this second observation**, many groups were working on, reading about, or looking at resources on the computer to complete the graphic organizer. Given the nature of this next task, even though we assigned specific roles for the completion of the graphic organizer, in groups where there was a mix of academic status levels, a couple students from different groups were observed as being disengaged. It seemed that groups 1, 2, 3, and 5 were particularly engaged in the task, and did not seemed phased by the challenging nature of the task.
During this third observation, most groups were still working on the graphic organizer. Groups 1 and 2 were very engaged in answering specific questions and were really taking the time to discuss questions before deciding on an answer. Engagement seemed high in these groups. Students were very interactive in speaking to and listening to one another. In group 3, one student was talking, two were watching videos, and one was writing in the graphic organizer. I think this group was also experiencing a high level of engagement but do more independent splitting of the work and then coming back together as a group.

In group 4, which was composed of 3 males and 1 female student, two of the males were writing on the graphic organizer and the other male was on a computer. The female student was asking questions about clip art. At this point it seemed that the female student was not interacting with the other three students, and I wonder if any gender-related status issues were at work in this situation.

In groups 5 and 6, students were similar to groups 1, 2, and 3 in terms of being engaged and working together on answering the questions. In group 7 however, all three students were engaged in a conversation about how one of the group members tore his ACL. The leader in the conversation was a male student, and the other two students were female. The student who tore his ACL has high peer status: he is one of the sophomores in the class and the two females he was working with are both freshman; he plays football and lacrosse for Woodside and athletics seem to carry social status within the larger Woodside context. His academic status is highly variable within class depending on the type of work. He has low grades, and variable participation. In small groups, he is an
active contributor, while he does not add his voice to whole class discussion unless called on by equity cards. Both female students have appeared to act with social status in previous groups they have been a part of; however, we don’t recall either of the female students having been in a partnership or having worked extensively with either each other or with the male student. Perhaps, the unfamiliarity within this group exacerbated gender-related status issues or small class-related (i.e., freshman vs. sophomore) status issues. At one point, the teacher tried to redirect the groups’ attention to the task, asking which section they were on for the graphic organizer and what they were thinking. The male responded for the group; instead of evaluating his answer, the teacher tried to direct the conversation to the two female students by asking if they agreed. The students responded with a quick yes and nod. While the intervention transitioned the group back to the task for the moment, the authority remained with the male student.

During **this fourth observation**, groups were finishing up the graphic organizers and beginning to work on the poster. I noticed a shift in the atmosphere, and the graph above shows a lot more students talking or manipulating. I think a shift in the atmosphere came simply from a change from writing and reading tasks to a more manipulative, creative, and artistic task. I’m not entirely sure how we might change the task so that there is less reading and writing. The graphic organizer activity is challenging and we had hoped that it would require the students to really stretch and work together to do.

But perhaps we need to adjust the activity graphic organizer activity so that it is more engaging for all students. The graphic organizer may have been a task in which high academic status were excited and engaged, and students with lower academic status were not as engaged or excited by the challenge. But more students seemed to be engaged with an artistic task because it was not as intellectually challenging so lower academic status students could feel as prepared as high academic status students to complete it.

Groups 1, 3, and 5 were excitedly discussing their infographic and manipulating materials. Groups 2, 4, 6 were still working on their graphic organizers. Interestingly, the same female student in group 4 who had previously been discussing clip art actually
got her group back on task when they were becoming unfocused. This dynamic will be discussed later in the paper in the “status interventions” section.

Group 7 shifted from their previous conversation about their group member’s ACL injury upon getting the art materials. The group seemed more collaborative and on-task. However, I think the male student in group 7 may have been distracting a student in group 6 and they would chat with each other off task throughout the remainder of the class period even when I was not observing them.

In general, I find that the time between the graphic organizer and the poster provided a “breath” in the lesson where students could move around and take a break from the intellectual rigor of the graphic organizer task and re-center and re-focus on a more kinesthetic and artistic activity that the infographic activity provides.

In this fifth observation, all groups are now working on the posters. Many students are standing up. As indicated in the chart above, almost all students in almost all groups are talking and manipulating art supplies. Groups are talking about where to put things on their poster, who they are making the poster for, the best way to communicate ideas.

Groups 6 and 7 stood out from the other five groups. In group 6, there were two males and one female student. The female student has high academic status, and she was dominating the poster-making while the boys seemed to hang back. Students’ status in this group and the teacher intervention is discussed is discussed in depth in the Video of Student Interaction and the Status Intervention section, respectively. In group 7, only one of the girls was attempting to talk about and work on the poster while the other two students were engaged in a side conversation.
In this sixth and final observation, all groups except group 7 were working intently on their posters. Since many groups had made a plan for who would work on what, there was less talking and more writing, manipulating, and looking on task. In group 7, only one girl seemed to be working on task (and would watch for the teacher to come over) (she may have been off task when we weren’t looking) and the other two students were talking off-task.

**VIDEO OF STUDENT INTERACTION**

Unfortunately we do not have continuous footage of one group for 5-8 minutes. However, the following analysis looks at student interactions in group 6 over two short segments within a video clip that switches back and forth between 3 different groups in (see appendix G).

(at 1:22) Camera moves to group 6. This group consists of three students, one girl, and two boys. For the purpose of this analysis, we will call the female Arya, the male sitting diagonal to the female Billy, and the male directly across the table from the female Charlie. At 1:33 Arya puts her hands up, and leans back in her chair. We cannot hear what was said beforehand, but I wonder if one of the group members asked her to make space or if she felt threatened in some way. As we continue watching, Billy dictates an answer, Charlie writes, and the girl is one the computer not speaking to the boys. This group does not seem to be experiencing the same level of interaction and collaboration as compared to other groups in the classroom.

(at 3:40) We return to group 6 in time to see that Arya is now leaning over the graphic organizer and actually leans across the table to grab the pen from Billy who, perhaps not very enthusiastically, hands over the pen. As a note, for Arya to have the graphic organizer in front of her, at some point since the segment at 1:22, the responsibility for writing in the graphic organizer transferred away from Charlie. Arya starts writing, and the two boys are silent for a minute. Billy says, “Ok, next question” while the girl is still writing (probably on the question they had been working on). After reading out the question, Billy says what he thinks the answer is. Arya is still writing, and Charlie remains silent. Billy repeats what he thinks the answer is again. At one point Arya looks up and while we can’t hear the students clearly, it seems that all three students are in conversation. Then, she says a little more loudly, “It’s radiation” and starts writing.
again. At this point the boys are quiet and leaning over watching her write on the organizer.

The video segment seemed to represent a group dynamic that we might have expected based on academic status. Arya and Billy both have high academic status in the group as two of the most vocal class participants and highest achieving students. Charlie, meanwhile, has very low academic status in the class. Charlie was the recorder in the group, and so had significant responsibility in the graphic organizer production; however, even just over the course of these two segments, Arya and Billy seem to assume greater responsibility over the conversation, output, and direction of the group.

Billy in particular has high social status in the group. Much like the male described in group 7 under the Overview of overall levels of student engagement section, Billy too is a football player of high seemingly status at the school. Later in the project these two males seemed to repeatedly engage in off-task, cross-group discussion with each other. When this happens, Arya seems to take on even greater responsibility for the group product, which seems once again indicative of the academic status difference between herself and Charlie. The teacher intervened during the infographic-making portion of the project in an attempt to re-distribute responsibility to Charlie. As described in Status interventions section, the intervention had little success.

One point to note is that this group was originally intended to be a four-person group. The fourth group member was absent on the day of implementation. This individual has high social status but an unassuming social presence, such that she has seemed to engage well with many different types of partners this semester. Her academic status is difficult to categorize: she seems to act with low academic status with respect to how she participates in small-group and class discussion; however, she is a relatively high achieving student in the class. I would be curious as to how the group dynamic might have changed had she been present.

**WRAP UP AND FEEDBACK**

Our wrap up and feedback was minimal. During our implementation period, all groups had begun their final draft, but no group had completed it. In circling and checking in with the groups and with our CT, we decided to give students additional time at the beginning of the next class to complete the infographics. As such, we concluded class with clean up instructions, homework instructions, and reassurance that groups would have additional time next class to complete the project.

**STATUS INTERVENTIONS**

As described in the observations, a few groups seemed to be affected by status issues. As a teacher, I think I successfully intervened in group 4 where one student’s voice – the sole female in the group – appeared as though it was not being valued. She has high academic standing in class, but generally does not vocally participate. Perhaps, her academic standing explains why this intervention provided more lasting changes in the group dynamics than in other interventions; or, perhaps it was in part that my
intervention explicitly valued an academic contribution. I intervened when another student in her group asked me for clarification on the fourth question in the graphic organizer – what communities does this condition most impact, and what about their bodies or cells or environments makes this community most at risk? I turned the question back on the group, to which she re-voiced the question in different words. As mentioned in the What were the language demands? section, this question seemed to present challenges to a few groups. I quickly confirmed her re-phrasing and the group seemed to look to her to for more explanation. From this point, she seemed to play a more active role within her group. I also think that I had temporary successes in some groups by intervening with additional ideas for how group members could contribute (e.g., suggesting that students could use the computer to look up graphs/images for their infographic).

However, on the whole, I think intervening to address status was an area I really struggled in as a teacher. As explained in the Overview of Overall Levels of Student Engagement section, my intervention in group 7 to redirect attention to the task did not remediate the status issues of the group and only temporarily kept the groups’ attention on the task. In particular, I was unable to address the status issues in group 6, a three-person group in which the female student had assumed nearly all the responsibilities for the project. I intervened upon noticing that the group had not done a rough draft for their infographic and that the female student (Arya) seemed to have taken over the decision making and execution on the infographic. I asked the Recorder (Charlie) if the group had had the chance to work through their thoughts on a rough draft (a responsibility that fell under his role). Arya responded instead with a quick “Yes.” I chose not to react to her response and waited for Charlie, to whom my question had been directed. He reiterated, “Yes.” In retrospect, I can see how pointing out something that fell under the Recorder’s responsibility that had not been done could accentuate rather than ameliorate academic status issues; however, perhaps the results of this intervention manifested later. Also, I can see how given Arya’s initial response, his decision to either confirm her “yes” or contradict her could be a decision grounded in social status considerations. The group continued working with an unchanged dynamic. In some ways, I was reminded of the case study presented in “Silences: the Case of the Invisible Boy,” seeing certain similarities between Charlie and Dennis and between the teacher and myself: Charlie has an F or D in every class, but for Spanish, and like Dennis, responds to many class questions with “I don’t know,” even following think-pair-shairs. Like Dennis, he has low academic status in the class. While I tried to intervene to indirectly re-establish role responsibilities and continued to check in on the group, I shared the sentiment of the teacher in the case study in feeling complicit in reinforcing his low status by allowing the group to continue its manner of work unchanged.

STRATEGIES USED TO FACILITATE ACCESS FOR ENGLISH LEARNERS

We did not have any English learners in our class and did not employ any strategy specific to English learners. However, we did use scaffolding strategies that supported all students in accessing the task. First, the pre-task homework assignment gave students some familiarity with the language and ideas around the condition they would
be investigating. Second, the graphic organizer helped students synthesize and organize the information from the resource cards by focusing discussion onto four questions. The information students put into the organizer could then be referenced and built on to create the infographic. Third, the group task itself was a scaffold for the individual assessment that students completed. Says Lotan and Cohen, “Often the group’s discussion and work on the group product serves as a scaffold for writing the individual report or the final unit essay” (107).

Assessing

FORMAL ASSESSMENT

There were four forms of formal assessment in this task. We will list and describe each task and its function as an assessment below:

1. student pre-task homework assignments (individual product)

The student homework assignments in some ways acted as both a pre-assessment of what prior knowledge students were coming in with about their condition and their care team role. Appendix A contains a homework sample. Some specific evidence we planned to gather from the pre-task assignment was (1) if the student could explain how their role and their cell cycle condition are connected and (2) if they could use evidence in the resource provided and one additional research of their choice to create this explanation. Seeing if students could explain concepts and ideas around their role and condition using evidence was important since they would need to be providing evidence-based explanations throughout the task. This was a warm-up for the students and an indicator to the instructor of how prepared and skilled students were going in to the task.

2. the graphic organizer (group product)

The graphic organizer was an assessment of how well students could understand and explain the information provided as well as any additional research conducted during class on the cell cycle and their condition. As the students had previously had some introductory content on the cell cycle in class, the assessment also can gauge how well students transferred that knowledge into this new context of looking at the cell cycle’s connection to a specific condition.

Appendix B contains a graphic organizer sample. Some specific evidence we planned to gather from the graphic organizer assignment to show student transfer of knowledge was explanations including their prior knowledge of the cell cycle, which they had gained a few days before. For example, for the question "why might have the cell cycle evolved to have checkpoints, and how might that be related to your condition?" students had to recall what they know about cell cycle checkpoints and transfer that knowledge to where in the cell
cycle there is a problem related to their conditions. Similarly, the students know the 4 phases of mitosis and could transfer this prior knowledge into a new context - their condition - to answer the question of "what might happen in a person's body if the cell cycle doesn't function properly?" since they know what mitosis does and what happens when it is disrupted.

3. the infographic (group product)

The infographic task assesses students' ability to explain and communicate what they have learned during the task to a larger audience.

Appendix F contains a task card sample. On it, you can find specifics on what students were required to do. Some specific evidence we planned to gather from the infographic was (1) if students could provide an explanation of their condition (2) an explanation of the relationship between the cell cycle and their condition (3) who the condition affects (4) how the condition could be prevented or treated including resources for all affected. For example, for a breast cancer group, we would expect an explanation of the condition that shows students can explain the condition. We would expect an explanation of the relationship between the cell cycle and the condition that shows that students can identify and explain the relationship. We would expect students to be able to explain who is affected and how the condition is treated or prevented or resourced so that they can connect their learning to real-world implications.

We are assessing students' performance in: asking questions and defining problems, constructing explanations and designing solutions, and obtaining, evaluating, and communicating information to determine if students learned and were able to use science practices in their exploration of the cell cycle and cell cycle condition.

4. student letters (individual product)

In this summative assessment, students individually had to explicitly explain the role of the cell cycle in their condition, reflect on the larger implications of our task in connection with societal problems and dilemmas, and reflect on the process of completing the group task.

Students could explain the role of the cell cycle for the condition by stating how brain cells fail to complete mitosis and die. This results in memory loss. This would show that (1) the student could present mitosis as a process in another context (the context of the condition) and (2) explain what has to go wrong with the cell cycle in order for the memory loss associated with Alzheimer's to occur.

Students could connect their exploration to larger implications of our task in connection with societal problems and dilemmas by commenting, for example, on how Alzheimer's affects mostly older generations of people. They could touch
on the problem of providing care and resources for these older people and also supporting their families as someone they love so much cannot recognize their own family anymore.

The letter provides a unique opportunity for students to see and acknowledge that even though science is stereotypically unfeeling, objective, and cold, it has a huge human component and connection. Scientific communities expand beyond just researchers and doctors but people who are trying to use and understand science better to heal their bodies, their lives, and their relationships.

**HOW DO WE KNOW THEY KNOW?**

The following section will focus on the effectiveness of the student letters as an effective formal assessment of student learning and reflection in the task. Part of the letter-writing task asked students to:

- Explain the relationship between the cell cycle and your condition.
- Describe what it was like to have a specific role/perspective as part of a larger care team. How do you think these various roles in real life work together in coming up with solutions to problems connected to this condition?
- What questions did this project raise for you? (For example, questions about your condition, care teams, your community’s health services?)

This final assessment allows students to think back through each stage of the task -- from when they were assigned their care team role, to what they learned about the cell cycle and their condition, to having to design a product for use by real people faced with challenges posed by these real conditions.

The following are three samples of student work that we think illustrate varying degrees of understanding. The differences in depth of response demonstrate where some students came to “know” the content and reflect on the process and other students reveal to instructors some areas for growth.

Sample 1

```
He’s not true! It’s will from Kennedy. It’s been awhile & hope you’re feeling better, and I was wondering if you still teach at Kennedy? I would love to Kennedy to visit but I’ve been very busy lately. But if you are still working there, maybe you’ll have my sister in your class.
```
In sample 1, the student does not address any of the three main prompts. Upon reading letters like this one, where the student is simply casually checking in with whoever they are writing to, we realize that providing students with a template for how to write a formal, organized, concise letter and also a sample letter may have been helpful. More scaffolding and clearer directions may have helped us avoid receiving letters like the one above, which does not hit on the assessment criteria.

Sample 2

In sample 2, the student does address two out of the three main prompts. In the student’s letter, we can see that she can explain what has to go wrong with the cell cycle in order to cancers to form. The student uses very general language to describe the cell cycle, such as “cell begins to go through its dividing process” and also uses language such as “bad, sick, or malfunctioning” to describe a cell that is not dividing, as it should. The student may have a general idea of how something can go wrong in the cell cycle, but she does not specifically mention the concept of mutations and how DNA mutations are an important part of cells not being able to regulate their division and growth. She discusses her role as a patient advocate, and empathizes with the person she is writing to in a very humble and sensitive way. The student does not mention any questions the project brought up for her, but overall her letter reflects the work and thought she invested into the project and demonstrates an awareness of how her learning and thinking in the classroom connects to real-world contexts and communities.
the 10th grade. I am choosing to contact you because I know you have a loved one battling breast cancer and I want you to remember that I will always be here for you. The cell cycle has a big role in this condition. When the cell divides the DNA improperly, the cells become mutated. These mutated cells multiply creating a tumor that could be cancerous. In my biology class, me and a “care team” researched breast cancer and how it interacts with the cell cycle. In this care team I was the community organizer, responsible for organizing community events and connecting healthcare providers, patient advocates, and researchers to resources and planning events to help raise awareness and fight for a cure.
In sample 3, the student clearly addresses all three of the main prompts.

She provides an explanation of how the cell cycle is linked to the condition. She does this by saying “the cell cycle has a big role in this condition. When the cell divides the DNA improperly, the cells become mutated. These mutated cells multiple creating a tumor that could become cancerous.”

She then describes and reflects on her role as a community organizer. She does this by saying, “in this care team, I was the community organizer, responsible for organizing community events and connecting healthcare providers, patient advocates, and researchers to resources and planning events to help raise awareness and fight for a cure. Being a part of this care team I learned a lot more about breast cancer, and working with my fellow students learning how we can do more was a good experience. In real life I think these roles of the care team work well together because each role covers an aspect of the disease and helps the other members do their job better.”
And finally the student poses a question about her condition that shows that she is able to reflect upon the knowledge she has just gained in order to ask new and more critical questions as a scientist. She does this by asking, “I was wondering what is different about improper cell division that creates a benign tumor compared to that of a cancerous tumor. Is it placement, or how the DNA is divided?”

This letter demonstrates not only an understanding of the science content, but also an awareness of the social impacts of science. Relative to the first two samples, this sample concretely shows how the student knows what she knows, as she describes her process of learning and working with others in the care team.

INFORMAL ASSESSMENT

Our informal assessment was grounded in teacher circulation; my assessment of student understanding - and even my circulation - ended up being driven by student questioning rather than by listening into groups. Often, too, I tried to survey the group for their thoughts, ask a question in return, or refer them to the resources in front of them then walk away. I felt like I didn’t gain a very complete picture of student understanding through this process. However, my assessment of student groupwork was driven by listening into groups during circulation and I felt like I came away with a more complete picture of student interaction. As described in the Status interventions, my interventions had very mixed success; however, as the teacher in Silences concluded, changing student impressions of academic status can require rewriting years of academic experience. It’s a long-term investment - a learning described in our Reflecting section - and I think that being able to recognize the status issues is a good place to start.

Reflecting

WHAT WENT WELL AND STUDENTS’ REACTIONS

The task as a whole seems to have engaged most students and was meaningful to students. Some students in their letters commented on how the whole project helped them to connect the science to real-world things, and also to gain the experience of working with and learning from their peers. Each sub-task garnered different student reactions, which are described below:

1. a homework assignment for students to become responsible for some unique portion of content and share out their expert knowledge with their group

From what we could see, students were well-scaffolded in doing their own independent research through the lens of their assigned care team role. Students seemed excited to share out about their unique care team role. Overall, we think students reacted positively to this pre-groupwork homework in order to come to class primed and ready to think about their assigned condition.
2. work with their group on a graphic organizer that requires their unique background knowledge and a collective interpretation

This part of the groupworthy task seemed to create a sense of frustration in some groups, and we think in general students felt challenged by the task. Some groups reacted by working together using each other to complete this more intellectually demanding task while other groups seemed to have more trouble staying on task. I do think that this task may have been too challenging for some students but just right for other students. I do not think the students had to rely on each other enough, because it seemed like the high academic status students really thrived and could do this task independently while other students did not. The source of the frustration is the same source that we encountered while creating the task – these processes are not simple or clearly understood by scientists, so it was expected that students would struggle intellectually the most with this part of the task.

3. work with their group combining their unique background knowledge and newfound knowledge from working on the graphic organizer into one large infographic poster

Students reacted quite positively to the poster/infographic making process and especially if the group saw a lull in engagement during the graphic organizer activity, most groups became re-engaged and refocused when planning and creating their poster. I think this portion of the task was more engaging because drawing and coloring and decorating are not as intellectually demanding as thinking about DNA mutations affecting cell growth and division. Students were allowed to be artistically creative and perhaps there is less of a stigma around being artistically creative than there is around being scientifically creative. I think students may come to our task with notions about scientific thinking and problem solving as being hard and not a lot of fun. But with a more art/graphic/visual task, student may have simple felt more comfortable being creative whereas being creative with answering the graphic organizer questions may not have seemed as clear of an option. Perhaps students felt more pressure to have “the right answer” on the graphic organizer questions whereas there was not right or wrong way to do the poster. With the graphic organizer, maybe students felt like they had to act intelligent or if they couldn’t act intelligence then they weren’t going to be helpful for completing the task (Sternberg, 2007).

4. each student individually writes a personal letter with reflections on the group task, the content knowledge they gained, and lingering questions

Although we did not observe students writing their letters, some students reacted to the letters in a deeply reflective manner while other students did not answer the prompts provided -- for these students it is difficult to know how they reacted to the letter-writing. For those students who wrote thoughtful,
content-rich letters, it seems like these students reacted with a sense of empathy for those whom they were writing to and a sense of connection between the science content knowledge and the real-world conditions communities work around.

Overall, the groupworthy task design features were upheld: authority was delegated to students, students needed each other to complete the task, and students were creative in coming up with solutions to complex problems. We think that the norming and multiple abilities orientation provided by the instructor as well as delivering the cell cycle content and homework assignment before assigning the graphic organizer and infographic is an example of successful scaffolding provided for this group of students. Students were prepared with the content and resources they needed to be successful in the task, and they received clear and concise instruction before and throughout the task.

WHAT WE LEARNED FROM AND WHAT WE MIGHT DO DIFFERENTLY IN THE FUTURE

From the perspective of the teacher: I think I could have intervened more effectively by grounding interventions in recognitions of academic contributions that are sometimes overlooked (e.g., probing questions, questions from a place of misunderstanding that beget better understanding). I also think, in reflecting on the failed status intervention described under Status interventions, that I could have taken a more direct approach in asking students to respect eachother’s roles. This would have avoided the issue of highlighting something that the group had not done, which seemed to exacerbate the status issues by conflating academic and social status issues. We also would have wanted to extend the project, such that the research homework could have been completed in class. We liked that the students came in with an understanding of their perspective and their condition; however, we felt like in the case where our student was not able to complete the homework - or where students invested disparate energies into the homework and presentation of the homework - we contributed to status issues.

From the perspective of the observer: I think creating and watching the task being implemented was a unique experience. I wish I had spent more time observing the students prior to the implementation of the task so that I knew more about how they learn and behave in the classroom. As an outsider, I felt comfortable noting the various behaviors I saw but there may have been more to those behaviors that I could not understand given my limited understanding of the learners and the classroom culture/community. The graphic organizer activity as well as the scaffolding of the individual assessment are two areas I noticed through observation and review of the group and individual products where more support or guidance could have been provided by the instructor. I learned a lot about classrooms as ecosystems – the interaction of each student with their group members and with their environment and with their materials and their teacher result in change. The system depends on an interaction of parts, and how we control those interactions determines whether or not students can learn in a safe and empowering environment. Interactions are particularly important in the development of academic language, and watching the students talk with one another confirmed this for me in practice (Verplaetse, 2008).
With respect to the task itself, our biggest changes would have been in the individual assessment. As mentioned in the How do we know they know? section, we felt that given the wide spectrum of letter responses with respect to both depth and format, a sample letter and suggested format would have been really helpful to students. We also think that clearer instructions around the revision process would have been helpful, given that this is not a grading routine typical to the classroom. We also had some questions around the graphic organizer. In some groups, the work around the graphic organizer seemed very collaborative. Each section of the organizer was discussed as a whole group, a consensus was reached, and the Recorder wrote the results with ongoing phrasing suggestions from the group. However, in other groups this was where academic status issues seemed most apparent. The conversation and writing became dominated by the high status students. We wonder if this could have been entirely addressed through more effective teacher interventions; or if there may have been a different way to restructure this step of the task so that status would not have been so at play. Perhaps, each student could have had their own graphic organizer, or each student could have been responsible for leading the discussion and writing for one of the four questions. This also would have the language-related benefit of increasing the number of students with writing responsibilities during the group task.

As we think forward to planning future groupworthy tasks, we are excited to apply our learnings from this project:

1. **creating norms as a class**

   *We felt that rather than assigning norms, this helped construct our class as a larger group and help break down teacher-student hierarchies.*

2. **advance preparation**

   *We felt that letting the students know often and early that we would be engaging in the task helped students come into class on our implementation date both excited and better-adjusted to the change in routine. Particularly, we felt that giving students an opportunity to express their preference for a role and condition helped the project feel more interesting to them.*

3. **using how and what roles**

   *This was the biggest change we made between our micro-teach and our implementation date. During the micro-teach, our class seemed to struggle with how to approach Step 2. During our implementation we called the care team roles “perspective roles” and the how roles “process roles.” We thought the former situated students into a more real-life scenario, while the latter clearly delineated the responsibilities each person had and ensured that someone would help “start” each part of the task. For example, the facilitator was responsible for facilitating the conversation on each graphic organizer question; the*
recorder was responsible for making sure that the collective group response was recorded in the graphic organizer.

4. relevant context tied to community outreach

There were two students who we knew this project would be personally relevant to: one who dyed her hair pink during Breast Cancer Awareness month and one who had shared previously that her boyfriend’s mother has stage 4 breast cancer. We checked in with the second student to make sure she felt comfortable with the project, and she had replied that the reason she selected patient advocate and community organizer for breast cancer on the survey was because of her boyfriend’s mom. It came up informally (when one student who had not done the survey was trying to switch roles to study breast cancer) that a handful of the students felt personally connected to their condition of study, and we felt that having this relevant context with community outreach created a powerful lens for students.

5. investing in status intervention

The extent of some of the status issues that this group task revealed really stuck with us. As we think forward to designing group work in our future classrooms, it is with the recognition that addressing status is a long-term investment that can’t be remedied in one class. Groupworthy tasks are unique both in how they expose the issues that exist and how they create space to address and heal from the divides that these issues can create.
References


- (NGSS) Next Generation Science Standards


Appendix

A: Homework Sample

B: Graphic Organizer (printed on an 11x17 for students)

C: Individual Assessment

D: Alzheimer’s Resource Card

E: Breast Cancer Resource Card

F: Task Card

G: Video Clip: please see the Video Clip in our folder at https://drive.google.com/folderview?id=0B22CWw-83NCEdGdGVDBMMlBPZkU&usp=drive_web
Condition: Breast Cancer
Role: Patient Advocate

As a patient advocate, you are someone who:
- has the condition or a loved one with the condition
- has an active voice in the community

Your unique perspective:
- you have the day-to-day perspective of what it feels like to live with the condition

You will take on the role of a patient advocate when working in your care team. It’s important to do some research to understand what it means to be a patient advocate. To do this, you will analyze two resources.

Resource #1: The following interview tells a small part of Madhulika Sikka’s story of being diagnosed with breast cancer. [http://tinyurl.com/abc-of-breastcancer](http://tinyurl.com/abc-of-breastcancer)

Explain what it’s like to be a patient advocate with breast cancer. Use specific examples and evidence from the resource.

____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

Resource #2: Find one other resource that helps you learn about breast cancer from the perspective of a patient advocate! The resource could be an article, an interview, a podcast, a video...

Explain what it’s like to be a patient advocate with breast cancer. Use specific examples and evidence from the resource.

____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

Be prepared to share your work with other members of your care team on 11/21. Your goal will be to teach the group about breast cancer through the lens of a patient advocate. You will need to communicate:
- your role and your unique perspective
- what it’s like to be a patient advocate with Alzheimer’s using specific examples and evidence
<table>
<thead>
<tr>
<th>Question</th>
<th>Notes</th>
</tr>
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<tbody>
<tr>
<td>Why might have the cell cycle evolved to have checkpoints, and how might that be related to your condition?</td>
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</tr>
<tr>
<td>What might happen in a person’s body if the cell cycle doesn’t function properly, what does this look like in your condition?</td>
<td></td>
</tr>
<tr>
<td>How does prevention and/or treatment impact the cell cycle to lead to healing for your condition?</td>
<td></td>
</tr>
<tr>
<td>What communities does this condition most impact, and what about their bodies or cells or environment makes this community most at risk?</td>
<td></td>
</tr>
</tbody>
</table>
Next-Generation Community Heroes final project

Community Outreach:
You will share your project and the experiences you had while doing the project with someone who is affected by this condition. This can be someone who:

- has had the condition
- knows a person with the condition
- does research on the condition
- a healthcare provider who has worked with folks with this condition
- a community organizer who has experience raising awareness and supporting communities affected by the condition

You can write a handwritten or typed letter that we will mail from Woodside. If you know someone personally, you can hand-deliver or mail the letter on your own, after we review and grade it.

This letter will be due in class on Tuesday 11/25. If the letter does not appropriately address the components below, we will ask you to revise it before we mail it.

In your letter you must include:

a. Your name, your year, why you are choosing to contact them
b. A description of the project
c. Explain the relationship between the cell cycle and your condition.
d. Describe what it was like to have a specific role/perspective as part of a larger care team. How do you think these various roles in real life work together in coming up with solutions to problems connected to this condition?
e. What questions did this project raise for you? (For example, questions about your condition, care teams, your community’s health services?)
How are Alzheimer’s and the cell cycle related?

Before watching the video below, look over this list of words. They will be helpful in understanding what the speaker is saying in the video.

Histology (or histologically): the study of the microscopic anatomy of cells and tissues of plants and animals

Ectopic: not normal in place or position

Neurons: Neurons are brain cells, and they divide just like your body cells do. (They go through G1, S, G2, and mitosis).

Plaques: These are made up of proteins that are called amyloidbeta.

Tangles: These are made up of proteins that are called tau.

“law of human neuronal safety”: When we are young, our neurons (brain cells) divide and divide as we learn and make new connections. When we get older, they stop dividing (if they kept dividing, our brains will spill out of our skull eek!).

Postmitotic: Cells have finished dividing and are locked out of the cell cycle (and won’t divide again).

Frontal cortex of the brain:

“ectopic neuronal cell cycle re-entry” translates into “when brain cells start going through the cell cycle when they aren’t supposed to”

Here’s the video: https://www.youtube.com/watch?v=OalhD3r-mOo
STOP THE VIDEO after it has played for ~2 minutes.

What is Dr. Bloom saying in this video?

In this video, Dr. Bloom gives us some key insights into how a hiccup in the cell cycle in brain cells is related to Alzheimer’s disease. Usually in adults, brain cells do not divide. However, in people with Alzheimer’s, brain cells start dividing but fail to complete mitosis and ultimately die. What causes these adult brain cells to start dividing but failing to complete mitosis? Dr. Bloom thinks that the proteins in the plagues and the proteins in the tangles are the source of this problem of the cell cycle in adult human brains.

*******************************************************************************
How is breast cancer and the cell cycle related?

Even though adults are no longer growing, many cells in an adult's body continue to divide to replace worn out cells. To divide, a cell must enter a "highway" called the cell cycle. There are specific signals that tell a cell when to enter the cell cycle and how long to stay there and divide. There are also signals that tell the cell when to exit the cell cycle. When a cell divides, it copies its DNA and produces two new daughter cells. If any of the signals controlling the cell cycle fail, cell division may go unchecked.

Watch this video to see what unchecked cell division could look like:
https://www.youtube.com/watch?v=IeUANxFVXKc

What causes unchecked cell division in breast cancer? There are many possibilities.

Genes called proto-oncogenes code for the "go" signals controlling the cell cycle. These signals tell a cell to enter the cell cycle and code for how long it should stay there and divide. If these genes lose the ability to control the cell cycle, the cell may reproduce uncontrollably because it stays in the cell cycle and continues to divide. A mutated proto-oncogene that has lost control of its "go" signal is called an oncogene. Researchers have discovered several oncogenes related to breast cancer.

Just as the cell has "go" signals that tell it when to enter the cell cycle, it also has genes which control the "brakes." The brakes are called tumor suppression genes. When these genes are mutated or inactivated, the brakes won’t work! An example of an important tumor suppressor ("stop") gene is the p53 gene. A mutation in the p53 gene is the most common genetic change found in breast cancer, but researchers have found other tumor suppressor genes that may also be related to breast cancer.

Putting on brakes at certain "check points" in the cell cycles allows the cell to check for any damage in its DNA. Repairs must be made before the cell is allowed to go on in the cycle. Without these brakes, cells with damaged DNA would copy, divide, and pass on the damage to daughter cells. The damage then becomes a permanent mutation in future generations of new cells because it is coded in the DNA!

Source:
Adapted from “The Biology of Breast Cancer” http://envirocancer.cornell.edu/factsheet/general/fs5_biology.cfm
Next-Generation Community Heroes:

*What is the relationship between the cell cycle, our bodies, and healing?*

**Introduction:** You are students, and you are also members of a community where people of all ages including friends and family are facing health challenges every day. Educating ourselves and educating each other is a first step to building communities of support and healing for people affected by these conditions. Today, you become part of a care team investigating a condition affecting your community. Your team is made up of a patient advocate, healthcare provider, community organizer, and clinical researcher.

You’ll be exploring how changes in the cell cycle relate to your condition of study and how you can build a supportive space for those affected by your condition. Together, your team will create an infographic (a visual to share important information) for your community.

---

**Step 1.** Sharing expert knowledge: Teach your group about the resource that was provided and the resource that you found through the lens of your care team role. *Each group member should take ~4 minutes to share.*

*(15 minutes; after sharing we will come back together as a whole class)*

**Step 2.** Connecting the science to your condition:

As a team, research and learn how to explain the link between the cell cycle and your condition. Your group is responsible for completing one graphic organizer that responds to the following questions.

*(25 minutes)*

- Why might have the cell cycle evolved to have checkpoints, and how might that be related to your condition?
- What might happen in a person’s body if the cell cycle doesn’t function properly, what does this look like in your condition?
• How does prevention and/or treatment impact the cell cycle to lead to healing for your condition?
• What communities does this condition most impact, and what about their bodies or cells or environment makes this community most at risk?

**Step 3. Embracing the community hero within you!** You are community heroes and you are also experts on this condition. **Design an infographic for a local healthcare center.** You can choose to focus on one demographic (for example, if you find that your condition largely affects a certain group based on sex, race, or age). You may want to make your poster in another language or include parts of it in another language if that is relevant to the community you are designing for.

*(45 minutes)*

Your infographic must include the following:

a. **What** is the condition?

b. **What** is the **relationship** between the cell cycle and your condition?

c. **Who** does it affect and why?

d. **How** do you prevent and/or treat it, including resources available to patients, friends, and families of those affected

Feel free to do additional research, if more questions come up!

You can either make your infographic online using google presentation or craft it by hand. For examples of and detail about health-related infographics, see the infographic resource card.

**Drawing on your work today, you will be communicating what you learned on your own and with your group to someone with a connection to this condition in your community.** Engaging with the group task today will better prepare you for this conversation.
EDUCATION

Stanford University, Stanford, CA, Expected 2015
  Master of Arts in Education, GPA: 4.0
  Preliminary California Single Subject Teaching Credential (Biology)
  Coursework in science curriculum and instruction, literacies, equity and democracy, adolescent development, classroom leadership, supporting language learners, supporting students w/special needs, and education technology.

Stanford University, Stanford, CA 2010 – 2014
  Bachelor of Science with Honors in Biology
  Minor in Education with Interdisciplinary Honors

TEACHING EXPERIENCE

Teacher, Madison Park Academy, Oakland, CA starting in Autumn 2015
  Will design curriculum and teach 9th grade biology using the Next Generation Science Standards.
  Drawing on previous teaching experiences, units are designed to differentiate instruction, support language learners, emphasize inquiry, and follow a cognitive apprenticeship model. School provides all students with Chromebooks, therefore much of the curriculum will integrate education technology.

Quiz writer, Newsela, Palo Alto, CA Spring 2015 - present

Co-Teacher, Woodside High School, Redwood City, CA Autumn 2014 – present
  Co-plan and teach in one section of 10th grade Biology and one section of 11th and 12th grade Human Biology. Completed unit plans using the Next Generation Science Standards on ecology, photosynthesis & carbon, cells, DNA, protein synthesis, genetics, and evolution. Units designed to differentiate instruction, support language learners, emphasize inquiry, and follow a cognitive apprenticeship model. Technology such as Socrative and Google Drive integrated for formative and summative assessments.

Co-Teacher, Columbia Middle School, Sunnyvale, CA Summer 2014
  Collaborated with teachers to modify and implement a Stanford-designed engineering curriculum for a class of 7th grade students. Helped design a learning segment on the use of design thinking in the implementation of social justice movements, where students completed a summative assessment using design thinking to design or re-design a community center by their school.

Docent, Jasper Ridge Biological Preserve Winter 2014 – present
  Completed a 20-week course on the ecology and natural history of Jasper Ridge Biological Preserve.
  Lead educational tours for groups of students and other community members as a docent at the preserve.

Science Head Counselor, Haas Spirituality, Service, and Social Change Fellowship Summer 2013
  Salesian Boys’ and Girls’ Club Summer Day Camp

  Developed and implemented a science curriculum for an 8-week camp program teaching 5 to 9 year olds elementary level science. Taught and directed hands-on activities and facilitated other camp activities.

Mentor, Spark Bay Area Spring 2012
  Worked with a middle school student to develop her own project. Developed relationship with the student and worked on developing confidence and self-esteem through the writing and drawing of her first comic book.

Mentor, Stanford Students for Educational Equity Winter 2012
  Worked with Professor Al Camarillo as a mentor for a high school juniors from East Palo Alto Academy High School.
Teacher, Stanford Splash  
Autumn 2011
Taught classes for students between grades 7 – 12 on creative writing as a part of Stanford's Splash teaching and learning program.

Intern, Office of Science Education in the National Institutes of Health  
Summer 2011
Worked on a range of projects promoting K-12 STEM education. Projects included working on curriculum supplements for K-12 students, science career awareness for high school students, and marketing for the NIH LAB Challenge – a call for inexpensive and engaging science experiments is being compiled and is available as a free resource for science teachers.

PROFESSIONAL AND LEADERSHIP EXPERIENCE

Student Leader, Discussions for Empowering Minds (DEM)  
Summer 2014 – present
Meet weekly as self-identified students of color in the STEP program to discuss social justice issues, provide peer support, and plan future events and ways of creating a sustainable network of teachers of color teaching for social justice.

Kitchen Manager, Stanford University Residential Education  
Autumn 2012 – Spring 2014
Terra House & Hammarskjold House
Managed kitchen and house communities of 33 - 54 residents completely run and maintained by students. Responsibilities included ordering food and mediating community dynamics.

Research Assistant, The Gordon Lab  
Autumn 2011 – present
Assist on projects exploring colony behavior and dynamics in harvester ants. Includes fieldwork gathering, analyzing, and discussing data using a range of statistical and ecological methods.

Panelist Trainer, Stanford University, LGBT Resources Center  
Autumn 2011 – Spring 2014
Safe and Open Spaces at Stanford (SOSAS) & Mentor for Community Academic Support and Advising (CASA) Program
Created and implemented programming and outreach to support LGBT and allied students at Stanford.

Research Assistant, NASA AMES Research Center  
Summer 2010 – Autumn 2011
Worked on a project to build enzyme complexes modeled after natural cellulosomes, using protein parts from different microbes to digest cellulose producing sugars for biofuel.

RESEARCH & AWARDS

Interdisciplinary Honors Thesis in Education  
2011 – 2014
Thesis title: Learning to "stick to your guns": Exploring gender perceptions among Chinese graduate students in STEM fields. Available at: http://purl.stanford.edu/fr626cv4102

Departmental Honors Thesis in Biology  
2011 – 2014
Thesis title: Within-nest interactions and the regulation of foraging behavior in harvester ants. Available at: http://purl.stanford.edu/gk250df6510

Chappell Lougee Scholarship, 2012

George Choy Memorial/Gay Asian Pacific Alliance Scholarship, 2011

SKILLS & INTERESTS

Languages  Proficient in conversational Cantonese
Interests  Playing the piano, competitive swimming, a cappella singing
Technology  Journalism, photo, and layout software such as Adobe Photoshop, In-Design, and Illustrator, coding in R studio, web design in html, php, and some experience working with SQL databases

Education Technology  Currently enrolled in education technology course within the Stanford Graduate School of Education, writing classroom technology plan to implement during the upcoming
school year.

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<th>summer</th>
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<td><strong>C&amp;I Literacies</strong></td>
<td><em>Science C&amp;I</em></td>
<td><em>Science C&amp;I</em></td>
<td>Supporting Students with Special Needs</td>
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