Dear Cohort,

Remember driving to Wild Treasures last September as a group of strangers? I remember riding in the back seat of Molly's car making small talk and playing trucks with Matt and the waning awkwardness that is found between anyone who doesn't know each other very well. At just under halfway through our degrees, we've figured out the ins and outs of firstclass and week-at-a-glance, learned how to use the Walgreen's parking lot to make a left hand onto West Street and finally found our way to the recycle room. Minor victories aside, we've also spent countless hours with each others' ideas. At Elm City or in our journal musings, we turn them inside out and hold them up to the light to look for holes or weak spots and to find the connecting threads. We mix them together like paint and we pick at them like skinned-knee scabs. The ones that we like we adopt as our own, and the ones that we don't, we reject wholeheartedly.

Which brings me to why we're here today. I have worked on this curriculum for months—making it shorter, longer, different (remember when I had you stare into each others' eyes?!?), sometimes better and sometimes worse. Now I need your help. As Chris Toy says, "All of us are smarter than one of us."

Addressing the Standards

In the month of curriculum that I have planned, students will begin to understand ideas of heredity and Mendelian genetics. Throughout the planning, I have tried to stay true to national standards. I have done my best to address the following national standards:

- Science and Technology Content Standard E, Understandings about Science and Technology:
    - Many different people in different cultures have made and continue to make contributions to science and technology.
- Life Science Contend Standard C, Reproduction and Heredity:
    - Hereditary information is contained in genes, located in the chromosomes of each cell. Each gene carries a single unit of information. An inherited trait of an individual can be determined by one or may genes, and a single gene can influence more than one trait. A human cell contains many thousands of genes.
    - Every organism requires a set of instructions specifying its traits. Heredity is the passage of these instructions from one generation to another.

To ensure that these standards are covered, I am using a self-assessment method that we learned about in school law. I have broken the standards into individual statements. At the end of each week, students will rate their knowledge of each statement. If I have

done a good job, by the end of the unit, each student will have gained an understanding of each topic.

Student and Teacher Interviews

We all know that everyone has different tastes and interests. This was something that was driven home in my student interviews. When I interviewed sixth grade twins that I see regularly at the Y about their science class, they agreed that they liked 'doing stuff'. I asked them if they like following instructions and they said that most of the time when they do lab activities, they have to follow directions, which makes class 'more boring'. They said that science class is more fun than other classes because they spent more time doing hands-on activities, but that sometimes they did have to listen to their teacher talk a lot. While I wasn't surprised by any of the things that they told me, I was reminded how school can be dull and also that students *have to go to school.* I remembered teachers taking attendance and hearing everyone dully call out 'here' in response to their names. To quote Steinbeck, "it is customary for adults to forget how hard and dull and long school is." Although neither of these students professed that they disliked school, it was clear that they felt it was just something that must be endured.

I kept this in mind during my teacher interview. When I asked what was most challenging in keeping students engaged, the teacher I interviewed said that his strategy was to walk the line between developing classroom routines and mixing up his lessons with different techniques and methods. Routines like completing periodic journal entries and writing up lab reports the same way each time help students know what is expected of them. Yet, like any routine, they can become dull. Without routine though, there can be no break in routine. And it's breaks in routines that students get excited about.

It seemed like I was hearing the same thing from both teacher and students—sometimes school is tedious, but there are periodic bright spots that make it tolerable. I can appreciate this conundrum. There will be highlights of every school year, which by default means that there are periods that aren't as exciting. I'm sure that even in the 'Ideal Classroom', there were days that students were less excited about the project. With this in mind, I tackled the challenge of writing my curriculum with my lofty bottom lines in mind.

Bottom Lines

Now let me tell you what I think about bottom lines. When I buy a pair of shoes or jeans, my bottom line is that they are comfortable and affordable…but if they are really cheap and a little bit uncomfortable I might consider. And if they're expensive, but really comfortable *and* they look good, I might consider. The same is true for my experiences in science class. One of my favorite college classes was genetics, and it was a class of a few hundred and the professor had a six foot long pointer so he could read his power point slides to us from the comfort of a bar stool next to the pull-down screen on stage. I also learned a lot in my AP bio class of three students when we were given a generous budget and the option to choose our lab supplies from a catalog. Not surprisingly I didn't have any experience in marine science after completing a four-year degree in an agricultural school, so I had to learn a lot about the ocean on my own through reading middle school, high school and college textbooks. The only bottom line I have for learning about science is efficacy. In my case, efficacy can be achieved through a variety of approaches.

Likewise, when choosing or crafting a curriculum, I am in search of the same thing: efficacy. The subsequent challenge is therefore to achieve efficacy, which I believe can only be met through a variety of approaches. An ideal curriculum is engaging, fun, applicable to real life situations, democratic and holistic. On a given day, two or three of these conditions might be met. To piggyback on my teacher interview, every day cannot be the 'most fun' or the 'most engaging'. It is the variation from day to day that sustains a curriculum for weeks or months. This means that one day might consist of activities that are fun and democratic, but not at all holistic. The next day might include a literature review and a lesson on the history of science. In practice, I know it will be difficult to make each day different from the one before and the one following, but I believe that it is the best way to accommodate the greatest number of students. If efficacy and inclusiveness can be achieved reliably through variety, then variety is my bottom line.

Understandably then, I have tried to incorporate a wide variety of activities into this curriculum. Through lessons like blood type tag, students will apply their knowledge to a physical and fun situation. They will listen to the story of Gregor Mendel and create an art project that represents their own ideas of what heredity looks like. Through their museum projects, they will have an opportunity to explore a particular interest and share it in a way that they find engaging. They will have a chance to feel the satisfaction that comes with community involvement through recruiting volunteers for the blood drive. I have included small and large group discussions as well as reflective writing assignments. I believe that including a wide variety of techniques in a curriculum is the best way to incorporate differentiated learning into every day class culture.

Curriculum Review

Early on in my quest for a varied and effective curriculum, I turned to everyone's favorite vast and limitless resource (not Jean Amaral, but close…): the internet. Though I found lots of different heredity lessons, there were two that kept reappearing. The first was to use colored candy to teach Mendelian genetics. There were several variations on a common theme: the teacher counts out prescribed numbers of different colored gummy bears into paper bags and then simulates some sort of reproduction. Students will see that in the F1 generation, the recessive color is absent and that it reappears as a quarter of the F2 generation. When I read these lesson plans, I did have a good chuckle at the thought of little red and green gummy bears having sex, but then I saw the obvious flaw: gummy bears don't have sex, nor do they reproduce or even have cells, let alone genes or chromosomes. This method could hardly be more contrived, which is a shame considering that there are so many other things that do have genes and chromosomes. I did like the way that these lessons gave visual representations of mathematical relationships, but overall, I rejected them on the grounds that they were too fake.

Another common theme that I found was making a DNA necklace. Yup. By scraping skin cells from your cheek, breaking open cell membranes with detergent and then subjecting the resulting matter to meat tenderizer, it is possible to precipitate out your DNA into little white clumps. I found several different lessons that ended by using an eyedropper to squirt the DNA into tiny vials and then tying a silken cord to them so they can be worn as a necklace. Again, no thanks.

Through the process of curriculum review, I began to see how easy it would be to slip into bad teaching habits that result in a bad classroom culture that results in apathy and ennui. With a basic idea of what topics I wanted covered in my curriculum, I could schedule a month's worth of activities by doing two or three Google searches. They would probably be disjointed and lack the glue that holds a good curriculum together, but it is possible that some students could learn from them. As I worked to develop my own curriculum, I was struck by how *hard* it was. Often I would spend a few hours on an idea that seemed to really take of and then turn around and ditch it the next day. I'm sure you all know the feeling off being stuck at a dead end and still trying to force your way onward. At this point, I am still optimistic that the rewards of designing a good curriculum will be great enough to make it worthwhile—hopefully great enough to deter us from the cop-out-jerrybuilt-Google-style curriculum.

It was this hope that drove my desire to create everything in the following curriculum from scratch. I find it difficult to predict which ideas will work, which will flop and which just need some adjustments--especially in the absence of an actual classroom to test them in. I also can't help but doubt that many classroom teachers spend as much

time designing a month's worth of curriculum as I (we) have. In the midst of a school year, there will hardly be time for the care and consideration that we've all given to this project. In my view, working a curriculum this intensely is like greasing the wheels—were we to write a second or third month, it would take far less time and effort.

Questions for Review

As you read this curriculum I would like you to try and picture what it would look like in a classroom. The ultimate performance is for students to build a museum display about heredity and to present it to community members that participate in the student-organized blood drive. Try imagining what kinds of displays students could create. How would the room look?

I have been trying to find a way to motivate students to engage in each other's museum projects. By including a museum 'soft opening' day, students will have an opportunity to practice presenting their projects and to see their peers' projects. Currently, providing an opportunity for them to give each other feedback is my only attempt at encouraging investment in other students' projects.

Finally, I'd like you to think of the students that you interviewed and consider their perspective on this curriculum. I remember one rainy day when I was teaching marine science to eighth graders and we were stuck indoors. I decided to use a clip from The Blue Planet of a blue whale feeding. It is one of the most amazing video clips I have ever seen and it usually gives me goose bumps or brings tears to my eyes. As I showed it, a kid said under his breath, 'Why are we watching a whale eat? This is *so gay!'* So I'd like you to anticipate a student's reaction to the curriculum. One of my fears is that in my excitement, I'll completely overlook the student perspective.

Curriculum Plan

All you need for my convening session is a writing utensil. I'll solicit your feedback in the form of a letter, which will be mostly written for you. Please be honest and thorough in your feedback. I look forward to your time and consideration.

Reintroduction to Curriculum:	5 min
Microdiscussion about Microcurriculum:	10 min
Write me a letter about Microcurriculum:	10 min
Secret Activity:	5 min
Write me a letter about Macrocurriculum:	10 min
Macrodiscussion about Macrocurriculum:	20 min

Thank you in advance for your thoughtful and helpful feedback!

~Emily