* **What is my personal vision for my classroom?** My personal vision is that my classroom provides rigorous science instruction with hands on experiences that use the scientific method as a basis for inquiry. Students make connections between their experiences in the classroom and authentic scientific research in the field or lab. Students use real and current data in the classroom for instruction and for comparison to their own. Students have a working knowledge of current research and are consumers of scientific literature and news. Students understand that scientific literacy is an integral part of being a good local and global citizen.
* **What are the realities faced in the classroom that may help or hinder my vision?** My students each have a Chromebook to use in class. This increases their connectivity to the outside scientific world. Their ability to access journals, communicate with scientists, read blogs, monitor science websites, do research, watch videos and participate in self-paced, blended learning style lessons greatly augments inquiry based instruction and opportunities to connect with real world science.
* **What are realistic ways the experience can be shared with students?** I think the most realistic and meaningful way for me to share with students is to go through the standards, learning goals and curriculum beforehand and note each place where there is a connection to the expedition. Then, while on the expedition I will collect information, data and photos to use later in class. For example, my students learn about density. They could use real oceanographic data we collect from the CTD, create graphs such as salinity versus depth and analyze the behavior of the water, glaciers and upwelling in the fjord. My students also learn about elements, compounds and mixtures. They could use the analysis of a core sample to determine what parts of it are elements. Are the minerals compounds? Can the whole sample be considered a mixture? By determining the curricular “connections” ahead of time, I hope to bring back data, create videos from the field and make lessons that can be incorporated into existing curriculum. I know that this may not be entirely possible with every connection that I identify, but even if I have a few resources that I can use with a warm up (calculate the average speed of the glacier’s motion) or a photo from the field that shows sun angle during our astronomy unit; these are ways that I can share the experience with students. Development of these lessons (or mini lessons) will take time and probably happen over a few years, but I hope to bring back resources that I can use in their development. I think this will make it less of a “show and tell” experience and more engaging for the students.
* **Student needs**
1. “How do we know what we know?” Students need to understand that scientific knowledge comes from repeated experimentation, analysis and robust peer review.
2. “What is the nature of science?” Students need to know that science is a collaborative enterprise seeking evidence to questions and solutions to problems.
3. Students need to see themselves as scientists, problem solvers, seekers of knowledge and contributors to the improvement of the human condition.
* **Changes I would like to make to my teaching methods**
1. Incorporate more blended learning. I have been researching and using blended learning lessons. So far the students have been very engaged with the material and on task. Blended learning is self-paced and has the potential to tailor individual instruction. I also want to create my own blended learning lessons by creating lessons, videos and computer based quizzes. Some of what I create will be based on this research experience. I have not seen a difference in performance so far (test scores), but I haven’t used blended learning long enough to determine effectiveness.
2. Increase use of real data. My students spend a lot of time in the lab and in addition to collecting their own data I would like for them to use real data from scientific research. I believe this will connect them to the scientific community and increase their self-awareness as scientists. One of my goals during the expedition is to bring home data.
3. Rewrite some of the lab work so that it is more challenging and reflects real world applications. My students love to do labs but I need to make sure that they are making a connection between what they do in lab and the concepts they are supposed to be learning. When rewriting labs, I will also make connections to real science and the expedition so that students see labs as more than an activity or play. Requiring more writing after the lab will force them to think through what they have learned, connections they have made and be able to express it. This is difficult for my students to do and something we need to work on.
* **What do I expect to learn during the experience**
1. Specific methods for collecting raw data pertinent to this research. By increasing my own research experience and practicing methods for data collection, I will expand my research background and be able to offer more authentic instruction to my students.
2. Specific methods used to analyze the data. Data analysis is critical and the methods used can be shared with students to teach them different ways of looking at data and how to draw sound conclusions.
3. How to use proxy data to determine past climate. I think it is important for my students to understand that scientists don’t just come up with things or make things up. By sharing how proxy data can be an extremely accurate stand in for direct measurements, I can increase my students’ confidence in science and scientific research.
* **What I would like to teach better or differently**
1. Inquiry learning. I want to reverse the order of many of my labs and lessons so that the students’ lab work is a path for them to formulate new concepts rather than demonstrate concepts that they have already learned. I have read literature in education journals that actually showed it does not really make a difference either way in student performance on tests. However, my prediction is that student long-term retention increases and I like the idea that students “figure it out for themselves”. After all, that is how science works too.
2. Buoyancy is a concept that I don’t feel my students entirely grasp. We do lab work involving overflow buckets and weighing the displaced fluid, but they still come away with less than mastery of this topic. I want to include additional hands-on work with this concept. I would like to come up with something interesting from the expedition (buoyancy of icebergs, for example or scientists in their survival suits) and add it to my current curriculum to give students more exposure to this topic and increase understanding.
3. Newton’s Laws of Motion. Again, I would like to develop additional activities and lab work to increase their mastery of this topic. (What is the action/reaction force during rifle training or what are the forces on a glacier- friction, gravity, etc.)
* **Equity and expectations related to differently-abled students.** I have some highly functioning special day students in my classes and many students on IEP’s. By incorporating more self-paced blended learning in my class, I hope to better tailor instruction for these students and increase their access to the curriculum. By creating my own computer accessible lessons based on the expedition (videos, blogs, etc.) they will have more opportunity to work through material with their aides and during their tutorial classes.