Nature of Assignment - Dani Jackson

I am struggling with this assignment a little bit, getting started. I have been teaching for 14 years. When I tell people I am a teacher, they ask what I teach, and I say “Chemistry and manners” but really, as time goes by, I strive to create thinkers. I know that I teach STEM, I am always trying to cross connect the other science disciplines, relate to real life situations and make connections and bring in history and current events and applications of the science they are learning.

My “ nature of” is science, and I have always wanted to create a space where the students are curious about why things “work” or happen. I think the only way to do that is to see science in action. The NGSS Appendix H list of basic understandings of the Nature of Science has eight, but the one I tend to build off of is Scientific Knowledge is Based on Empirical Evidence. I think this aligns well with the idea that science education needs to be based on phenomena that students are motivated to explain. The only way they can explain things is to ask questions and gather “information” which I want them to use as evidence. The classroom needs to have the focus of learning shift from learning about a topic to figuring out why or how something happens (Using Phenomena in NGSS-Designed Lessons and Units). I also want to add that the comments made by Paul Anderson about swapping the explanation and exploration need to be switched so that students engage in more sense-making is such a key idea. Peters-Burton mentions that knowledge production in science demands and relies on empirical evidence, which includes shared habits, it is influenced by factors related to history, culture and social interactions. Being able to engage in different scientific practices builds different types of knowledge, and I think that the combination of those skills will build a great foundation for students to become problem solvers.

I am not sure I have an exact example I can reference right now in my curriculum to weave into this conversation, but that's one of the reasons why I am taking this course and pursuing this program. As we try to transition to the NYSSLS (NY’s NGSS), I am working on finding my foundation in these ideas of building students with scientific skills and thought processes that support being able to approach any challenge with a mentality that will allow them to question, inquire, explore, gather evidence, evaluate their work and summarize where they stand and decide if they need more information. I think these skills are really important, even beyond the chemistry classroom. Peters-Burton also talks about iterative cycles of inquiry, which I like as a way of thinking about the fact that the students need to know that they do not have to, and almost never will be, right on the first try. I want students who are not afraid of failing, but who are willing to learn from mistakes, gain usable information from failed experiments and ask better questions as a result of some activity in class. Many of the readings for the last couple weeks make sense, and I would like to think that they are part of how I think as a teacher, and that I can always improve how much I integrate these into my lessons and teaching. The biggest challenge is the resistance from students to participate in the process this way. It should be more interesting, but it also requires more work on their part. It is worth the investment and I tell them that constantly. I feel like I am at a disadvantage with high school students sometimes because they have gotten into the habit of needing to just know the answer. They aren’t as curious as younger students are naturally. I think this is where Chemistry has always had a little bit of an advantage. Demonstrations have always been part of the process. It just needs to be mysterious, not explanatory. Paul Anderson states it plainly that we need to bring back the “wonder” to science, and stop giving away the punchline/answer. A student who can problem solve to determine how something happened will be more capable of recognizing parallel tasks and applying scientific strategies to situations. This will make more scientifically literate citizens.

I am constantly trying to find ways in which students can collect evidence that helps them to see patterns, or realize they don’t have enough information and they need to ask more questions. I have shifted more towards CER format activities in order to work on skills around gathering data or

evidence or observations of the “science” and then being able to express themselves in a coherent manner to decide if they can support their claim or refute based on the evidence they have in their records. Data analysis is such an integral piece of the process. I want students to be able to argue from evidence; which is such an important part of the 3D skills in the NGSS standards. The best lesson I think I sometimes teach them is that it is OK to be wrong. There is always something to be gained from an investigation/experiment.

I have decided to use the Nature of Technology as my additional discipline. As we have done different readings in the last few weeks the information around technology has really opened my eyes to how expansive it really is compared to my very narrow thoughts prior. I always just thought of technology as computers and computer skills. Being able to type, use excel to make graphs, maybe use Vernier or Pasco equipment to gather data were really all I thought about. The idea of having different interpretations of what technology is like the engineering view vs the humanities view started to really help me see how vast the field of technology is. (Kelley, T. R., & Knowles, J. G. 2016) Technology is how humans modify the world around them to meet their needs or wants and to solve practical problems and allows people to do things they could not otherwise do (ITEA Nature of Technology, Standards for Technological Literacy, 3rd edition)

3 ways that science overlaps with technology in many ways. The first most obvious way is data collection instruments that allow students to use digital or electronic devices to collect data more like real scientists in real world settings. The second way is using computers to do data analysis and write ups, data tables, and graphs during their analysis component of the lab. The last that is most obvious to me given the last couple years is the use of the internet to transmit information, gather information or research facts. I think this is a very narrow view, and I hope to expand it more as we work through the course and the integrated STEM concepts we have started to explore.