

Amy Donohue

Professor Eliza Bobeck

Methods of STEM Education

23 February 2020

Nature of STEM Assignment

The primary focus of my assignment is the nature of science. I chose to focus on science because I have been a middle school science teacher for over 10 years teaching grades fifth through eighth. I have also worked at the Buehler Challenger and Science Center which, although much different than a public school setting, was a fun way to expand my knowledge of science and space as well as technology, engineering and math.

Let me start by describing how I currently try to incorporate the tenets of the nature of science in my classroom. One of the first things I try to do when starting a new topic is try to show a picture or do a quick demo to grab the students' attention. The pictures or demonstrations relate to a phenomena that happens in our natural world. This allows the students minds to start thinking about how and why these phenomena occur. For example, I have a levitation toy that spins and the students, right away, begin to ask questions about this phenomena. Some students were able to identify that there must be a magnetic repulsion occurring while others came up with different observations.

From there, we discussed how we could investigate the phenomena even further to better understand what is causing the levitation. We discussed if certain variables could have an effect on the toy. Some students wanted to see if the distance of the levitator from the base made any difference, while others wanted to try different objects (magnetic vs. non-magnetic) as the levitator. Some wanted to flip the levitator around to see if there were magnetic poles at play. The students collected data in charts or diagrams as their evidence to support their ideas. The students then collaborated with their groups and analyzed their data to see if there were any similarities or differences in their findings. The students were then able to construct explanations based on valid evidence from their investigation and support their findings with the laws of magnetism.

In the end, students were able to identify that magnets have poles that repel if they are alike and attract if they are opposite each other. They understood that magnets have a magnetic field and how distance plays a role in how much attraction or repulsion occurs. This led to discussions about how our Earth is a giant magnet and how our magnetic field keeps us safe from deadly solar winds. This investigation used the NGSS model and kept in line with the nature of science objectives. It was a great (and fun) way for me to introduce magnetism to my students.

I feel my teaching can always be enhanced and one way I could do this is to be more consistent in addressing other disciplines. In my classroom, engineering plays an important role when we plan and design our investigations. I feel like it goes hand in hand with the science practices. However, I feel like I have neglected to tell students why engineering is so important. I plan on having my students explore the NASA Home and City website as a way for them to see how the developments by NASA has led to better products here on Earth. I also like NASA's video for kids explaining why engineering is so important ([NASA | NASA for Kids: Intro to Engineering](#))

Since I am teaching 8th grade physical science we are using math constantly. This is because much of what is taught has a mathematical formula to go along with it. Once students have been introduced to the formulas, they are reinforced through practice word problems and incorporated in their investigations or labs as part of the analysis of their data collection. Just like with engineering, I feel like I could spend a bit more time talking about the importance of math and why it is important to my students' future. Giving them both local and global examples can help them see how math can help advance our world and effect our lives. I want them to know that those who understand and can do mathematics will have more opportunities and options for creating their futures.

As far as technology goes, my students all have their own laptops which we use pretty much on a daily basis. However, this may just be as a bell ringer activity or ticket out on some days. We enjoy using the PHET simulations and Gizmos as a virtual lab experience. The students also create charts, graphs and data tables during their investigations along with typing up their results and submitting them via Google Classroom. I actually have a workshop coming up this week on virtual and augmented reality so I am excited to see how I can enhance the use of technology with these tools. In the future, I would like to spend some time showing my students how technology is helping shape our world and how what we develop now will lead us to further developments in the future.

I chose to read the nature of math document to see where I currently overlap with this discipline. I was happy to see that there was more overlap than I originally thought I would have. One example of this overlap is with MS-PS2 Motion and Stability: Forces and Interactions. When my students studied the third law of motion, they saw how *Number Systems* work (100 N force on one object and a -100N force on the other object). A second example is making scatter plots with data collected from our motions lab. This falls under the same standard but is considered *Statistics and Probability*. A third example falls under MS-PS1 Matter and Its Interactions. Students are given opportunities to work with ratios and proportional relationships, write and solve equations, and use order of magnitude thinking and basic statistics which falls under *Ratios and Proportional Relationships*. We solve equations all the time in class. We also look at the ratio of certain things such as any sample of

water has a 2:1 ratio of hydrogen atoms to oxygen atoms.

In conclusion, I have learned a lot from reading and watching videos on the nature of science, technology, engineering and mathematics. I have a better understanding of how each discipline should be introduced and utilized by my students. What I have found the most useful are all the resources I have collected from taking this course so far to help me to continue to grow as an educator. This will help me better prepare my students to explore science, technology, engineering and math deeper and help them become better thinkers and workers for our future.