

When teaching the tenets of science, I like to tell students about them but then also show them in a more memorable way. Science is an ever changing area. Mostly because we are always learning new ways to explore the things that we have explored for years. As we explore these phenomenas, we learn new things about them. Science curriculum has to be able to change just as quickly. When I think of this tenet of science, I always think of Pluto. In my lifetime, I believe that Pluto is one of the clearest examples of this tenet of science. As I grew up, there were nine planets. We learned "My very excited mother just ordered us nine pizzas." Not that many years ago, this has changed and Pluto no longer meets the classification to be considered a planet. It is important to teach students that science knowledge is tentative so that they are able to change their way of thinking with it. Another great example is the coronavirus. One of the science classes that I collaborate in, has been learning about the coronavirus and how we change the method of treating the virus, as we learn about it. I believe students that live through this, will understand this tenet a bit more because they've witnessed this first hand.

Making observations is one of the most natural things that we do. We naturally look at things and try to decide why they happened and how to make them have a different outcome. Especially when it is something from the natural world. One of the science classrooms that I have been collaborating with has worked on a lesson where we measured our resting heart rate. After that, they planned an experiment to see if their heart rate would increase or decrease after physical exercise. They planned out their experiment and we went outside to test it out.

The students did the planned physical activity and measured their heart rate again. Once students charted their heart rates, they began making observations about why their heart rate changed.

I love that science can be inferential, imaginative and creative. It allows students to think "outside the box" and come up with a plan that they probably wouldn't have thought of otherwise. One lesson in particular was when the students had a lab and they had to "save Sammy". Sammy was a worm (gummy worm) who was on top of a boat(plastic cup) that had capsized. His lifejacket (lifesavers gummy) was underneath the boat and the students had to work together to save him with paper clips. It was a wonderful way to have the students plan a hypothesis on how to save Sammy and make a plan that they worked on together. It was a creative and imaginative way to cause students to problem solve and they really enjoyed it.

The fact that science is theory laden is an area that I think students struggle with the most because there are theories of science that are a little controversial. They have been taught about this with their family in another way. For example, the big bang theory and the theory of evolution. I do struggle to teach these things as well as I could because I know going into these topics that they are controversial. I also struggle a bit with science being socially and culturally embedded, for the same reason. I absolutely want to respect people's beliefs and values within their family system. I struggle to find the right balance there. I enjoy integrating technology and science and it is a fairly easy integration most of the time. According to the *Nature of Technology*, "technology is how humans modify the world around them to meet their needs and wants or to solve practical

problems. It can range from building protective shelter and growing food to formulating cancer-fighting drugs and constructing a multi-level network. Technology extends human potential by allowing people to do things they could not otherwise do." Those type of real-world problem solving lessons are perfect for the science classroom.

Math and science are two subjects that overlap pretty often throughout the school year. They work so well together and oftentimes, math teachers and science teachers can collaborate and work together on their planning and make learning more effective. One example from the site, *Common Core State Standards in Mathematical Practices* states: "Display numerical data in plots on a number line, including dot plots, histograms, and box plots." When working with the scientific method, you use data and plot the points of your data on graphs in order to analyze the data that you've collected. Whenever I work with this content, I always incorporate the words mean, median and mode when I can in order to give students another time that they've used that terminology.

Another example from the site, *Common Core State Standards in Mathematical Practices* states: "Represent proportional relationships by equations. For example, if total cost  $t$  is proportional to the number  $n$  of items purchased at a constant price  $p$ , the relationship between the total cost and the number of items can be expressed as  $t = pn$ ." In science, this would be relationships between two variables where their ratios are equivalent. When looking at the site, *Common Core State Standards in Mathematical Practices* states: "Know and apply the properties of

integer exponents to generate equivalent numerical expressions. For example,  $32 \times 3^{-5} = 3^{-3} = 1/33 = 1/27$ ." This is an area that I will usually discuss with the math teacher when I'm working with students on earth and space science and we are discussing how many light years away planets and stars are and we have to write them in exponential form. This is a great opportunity to incorporate these common core math standards also.

Sources:

*Mathematics Standards | Common Core State Standards Initiative.* (n.d.). Common Core Standards for Math Practice. Retrieved September 28, 2021, from

<http://www.corestandards.org/Math/>

International Technology Education Association. (2021). *Standards for Technological Literacy: Content for the Study of Technology.* International Technology Education Assoc.