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Nature of STEM Assignment  
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As an elementary school teacher, I am fortunate to have the opportunity to teach all general subject areas and expose students to areas of interest that they might not otherwise get to experience as they get older, but create that spark that hopefully will carry them throughout their lives. I am also fortunate to be able to get to know my students on personal levels and their passions and teach a lesson or two on things that they find interesting and important. After thinking about all the readings on the nature of STEM, I feel most comfortable exploring the nature of Mathematics. I have participated in many professional development trainings through our district for mathematics for a number of years so I can say that I feel most confident in addressing the mathematics area to focus on for this assignment.

For me, understanding mathematics will always be a core skill that each person will need to understand and be able to use in everyday life. It is essential that teachers provide students with the necessary skills to continue to grow as math will shape their futures and open the doors to many opportunities in their lives. Without the basic math skills and knowledge, students will face challenges and miss out on future endeavors. Teaching the younger students, I am limited to what I can teach throughout the school year. I am given a specific curriculum for the reading and math standards, and must use those materials 80% of the time. I am also told how many minutes in a day that I must teach those subject areas to the students. For instance, for first grade, I must teach reading for the whole class for 90 minutes, if I have students that are behind in their reading skills, I have to teach them an additional 30 minutes of small group instruction. Math lessons are planned the same way, my whole class is given 60 minutes of math lessons per day, if a student needs more support in that skill, I must provide an additional 15-30 minutes a day for them. Writing lessons also follow the math schedule break-down. Lastly, science and social science is thrown in at the very end of the day, when there's time left. That is precisely why the curriculum specialists have "integrated" science and social sciences into the reading curriculum, even though we have separate Science and Social Science units outside of the English Language Arts curriculum.

As I attended my curriculum training and started to understand the importance of the CC Math standards along with the Standards of Mathematical Practices, I now know where to place the most emphasis on for my students to help them understand the skills necessary for growth and success in their education. I teach my students that the 8 mathematical practices can be and will be applied to other areas we study, not just math. I explain that these are magical keys to unlocking your brain. The standards of mathematical practices are posted in my room and I explain to the students that not only being able to solve problems is important, but to be able to make sense and to

persevere in solving the problem, to explain your thinking to the teacher and to your friends as to how you solved the problem, and using the appropriate tools for any problem is very important. I always begin the school year with a video clip that was shared with me about how your brain looks when it is making connections to learning new things, and what your brain looks like when it is struggling to learn something new. And they find it so fascinating, how brains can grow when you work hard at anything. We talk about how it is important to give each person time to think about how they want to answer the questions, so that we are not shrinking someone's chance at growing their brain. I also teach my students silent signals when they want to pose another option to someone's answer. They aren't allowed to yell out negative words like, you're wrong or that's not right. They must put up a signal that means, "I have a different answer", and use the words, "I disagree with you because..." I find that these skills are very important to a student, not just in a math lesson, but in any lesson we are working on. When my students are engaged in a STEM project, they are working in a small group where I hear their conversations with each other are thoughtful, respectful, and viable to solving the problem together. As the students move to the critique stage of their projects, each group shares their designs and explains how theirs will work and solve the problem, while allowing for the other groups to ask questions, and offer ideas or suggestions on how to make the group's designs better. When I think about it, the final stage of the project for each group is the most intriguing to me. I love to hear the students put the skills I work so hard to teach them into actual practice.

This past week we celebrated National Engineers Week in class. It was definitely a challenge for my students to try and understand the difference between what a scientist does and what an engineer does. Seeing them struggle with those concepts, I am going to find more opportunities for them to experience those two ideas and share how they are related and why they are connected to STEM. I will plan for more lessons that can highlight what an engineer does and what a scientist does for the same problem that is being addressed. And like the Peters-Burton (2014, pg 100) article, she states that *"although each of the fields- NOS, NOT, NOE, and NOM- has distinct definitions and key characteristics, it is clear that there is a great deal of overlap across the subjects."* I think the other challenge we struggle with is incorporating the technology portion of the STEM. Students somehow don't relate technology to things that people use in our everyday lives, and are considered 'technology'. They think it only applies to computers, cell phones, ipads, and things that they have seen in the movies. I think if I had specific lessons on what technology is, and how, we as people have and continue to make technological advancements to make our world a better place. I want to be able to find age-appropriate lessons to teach the kids about nature of technology, and demonstrate for them how important technology is for survival. I was so excited to explore the resources that were posted about phenomena, and I would like to start incorporating those videos into our lessons for STEM. I would also like to know if our

state and district will adopt the National Technological Literacy standards, giving teachers a base to start teaching these concepts. I would think that in 2010 when the President's Council of Advisors on Science and Technology reported, "*that the success of the US in the 21st century and beyond depends on the ideas and skills of its population and calls for the creation of 1,000 new STEM-focused schools over the next decade*". The council also began organizing resources for STEM education initiatives, producing academic STEM centers, and other programs to help students be prepared for the workforce after college.

After reading the Standards for Technological Literacy, there are many examples of overlap within the STEM domains with the nature of technology. The standards are broken down into grade level bands, K-2, 3-5, 6-8, and 9-12. They are written in such a way, like the common core state standards, that they build upon the previous grade's skills. Within each standard, there is outlined how the grade level should introduce the goal and how it incorporates the other domains. For example, in the K-2 strand, students should learn that when they study technology that they are using the same ideas and skills as other subjects. Mathematics and Technology would overlap when looking at how mathematics skills like measurement are also used in the study of technology and how objects can be measured in order to build the object. Another example of overlap in the standards was how science and technology are connected as well. "*Science and Technology are like conjoined twins. While they have separate identities, they must remain inextricably connected in order to survive.*" The text used the example of the story of Charlotte's Web. By giving students the opportunity to learn about how spiders build their webs and how that relates to how humans might build fishing nets in the similar fashion. And finally, the strand also discusses how technology has influence over other fields of study, such as the arts. The creation of the movie camera, the synthesizer, and the computer have all helped advance technologies in the arts field.

#### References:

Peters-Burton, PhD, Erin (2014). Is There a "Nature of STEM"? SSM Journal Editorial. pp.99-101.

Standards for Technological Literacy; Content for the Study of Technology Third Edition. (2007). ITEA pp.44-48.

<https://www.iteea.org/File.aspx?id=67767&v=b26b7852>