

## The Nature of STEM

The Nature of STEM is more complex than one might think. With my own experience, or lack thereof, I assumed and thought that as long as each component was being taught, I was accomplishing something with my students. STEM has not been something that has been prioritized in my school. I teach kindergarten in a kindergarten through second grade building. I feel that there is more emphasis on math and reading as cores and the sciences are an afterthought. After reading, *Is There a Nature of STEM?* By Peters-Burton as well as many other articles assigned in this course, I have a much clearer understanding of STEM and that all parts need to be integrated for our students to be successful, literate students and citizens that contribute to our workforce.

*The integration—revisiting the subjects of design, inquiry, analysis, and skills as practiced in STEM within and across each subject—gives a learner more complex understanding, and perhaps increased learning given the same amount of time, than studying each individual subject. (Peters-Burton, 2014, p.1).*

I now see and understand the importance of integration. The NOS, NOT, NOE, and NOM each produce specific types of knowledge, but they also overlap and can apply each other's knowledge with each discipline.

As an elementary teacher who does not have much experience with STEM, I chose mathematics. This is a subject that I feel comfortable teaching. From the Common Core State Standards for Mathematics are the following mathematical practices:

- 1 Make sense of problems and persevere in solving them.
- 2 Reason abstractly and quantitatively.
- 3 Construct viable arguments and critique the reasoning of others
- 4 Model with mathematics

## Tammy Martinez

5 Use appropriate tools strategically.

6 Attend to precision.

7 Look for and make use of structure.

8 Look for and express regularity in repeated reasoning

Currently, for my grade level, I find myself modeling and using a lot of self-talk to demonstrate the mathematical practices. This has been something I have been trying to get better at. In fact, it was one of my professional goals for the last school year. In the past, I was only teaching concepts and not giving students much control over how they solved problems. With kindergarten it is a slow process to get them to be able to think critically on their own. It is not impossible, however, it takes an intense amount of modeling on the teacher's part. We want students to be able to compute problems, but to be able to recognize the problems' importance and be able to think critically to find the best solution.

In addition to modeling, I have anchor charts that stay up in the classroom for students to reference. These anchor charts are made together with students, before, during and after the concepts are learned. Many of the problems that are presented to students arise in everyday life that students can relate to. We often create these problems together. As concepts are introduced, I like to incorporate problems that will arise later in their life that may apply to the worklife.

Three standards for mathematical practice focus on representations: model with mathematics, use appropriate tools strategically, and attend to precision. Modeling and using multiple representations is key to get students to become familiar with the variety of ways to solve problems. Again, I stress the word MODEL, because the majority of students that come into kindergarten have never experienced preschool. Mathematics is new to their world. I incorporate manipulatives along with drawings and stress to my students that they are free to choose their own way of solving problems. I also like to have students work with partners or small groups. After

## Tammy Martinez

solving they have to explain to their partner what the problem is asking for, how they solved it, and why they chose to solve it with their manipulative or drawing choices. It helps students to recognize and realize that there are multiple ways to find a solution. I make sure to model and provide students with sentence starters. For example, "I know my answer makes sense, because..." "I solved my problem differently than you because..." "I noticed that..." "I wonder..."

I can enhance my teachings of the other disciplines, by not treating them at separate content. By incorporating them to overlap each other, I feel that my students will start to build a positive relationship with learning. Before this course, I taught math, reading and science independently from one another, using what curriculum was given to us. I haven't even tapped into engineering or technology. I can see now how they are all intertwined with each other and that the goal in teaching STEM is problem-solving based and to get students to think critically about finding solutions.

As I read Appendix H, the common overlaps I kept coming across were: developing models, design investigations, testing models, gathering data and analyzing data. None of those can be accomplished without bringing in the nature of mathematics. We use mathematical models, formulas and patterns to find solutions and identify patterns while conducting experiments.