The Mathematics Practice Standards as identified the Common Core Standards are behaviors math teachers should strategically plan to elicit from their students on a daily basis. These practice standards are a bridge from the classroom to the real world—in other words, the content that should matter the most. The Math Practice Standards aren't necessarily something you can explicitly teach, one should plan lessons that naturally allow for challenge/growth in that area. I left the math classroom a little over a year ago to become a math coach and since stepped into a math consultant role at GRREC. I will be reflecting on how I addressed the Math Practice Standards as a 6th grade math teacher.

Out of the eight Mathematics Practice Standards, I found I addressed four more often than the others. The four I intentionally addressed most often were:

- *Make sense of problems and persevere in solving them*
- *Construct viable arguments and critique the reasoning of others*
- *Model with mathematics*
- *Attend to precision*

In order for students to become stronger in any Mathematical Practice, they must routine have the opportunity to engage in activities that strengthen the said behavior. One way I managed this in my classroom was through the use of instructional routines. When addressing, *Make sense of problems and persevere in solving them*, students would analyze information, make conjectures and plan solution through completing the "Three Reads" strategy for solving a complex mathematics problem. Often times I found students struggled most with checking for reasonableness, to help with this we would identify a solution that would be much too big and a solution that would be much too small. This helps students get into the habit of generalizing if their answer is reasonable. In order to assist students in *Constructing viable arguments and critiquing the reasoning of others*, we would use bounce cards in class. Bounce cards utilized as a visual reference document to help students with structured discussion. The cards provide sentence starters for "bouncing idea", summing up what someone said and asking an elaborating question. Other instructional routines that I frequently used to address Math Practice 3 are Number Talks, Which One Doesn't Belong, and My Favorite No. All three of these instructional routines require students to make observation and provide rationale. Rational can be provide with words, writing, and pictures/models. After rationale is given, the class discusses and provides argument.

Modeling with Mathematics was a daily practice in my classroom. However, my favorite unit to hammer on this practice was Ratios & Proportional Reasoning. Seeing students make the connection between a verbal situation, a unit rate, a table, a graph, and an equation may be my favorite thing about sixth grade mathematics. I also found it easiest for students to practice checking to make sure their answer made sense within the context of the situation.

When thinking about *Attending to Precision*, many teacher think about precise measurement, numbers, graphs. While all of those things are vital, I think precise vocabulary is equally important. In my classroom students regularly engaged in writing tasks that required the use of correct vocabulary. I reserved a 10-15 minute block out of each class period for vocabulary work using Marzano's 6 steps.

As a sports fan of my favorite lessons that included many of the math practices standards focused on NFL players and their salaries. This lesson fell in the statistics unit. It took the current top 25 NFL player salaries and ask students to graphically represent the salaries (using on of the graphs from 6th grade content) then make inference on a team's value to particular positions. Then students had to make argument for the position the team valued the most using accurate vocabulary. This lesson required students to engage with all eight of the Mathematical Practice Standards at some point.

While I intentionally planned for students to be exposed to opportunities to exhibit Math Practices, I had plenty of room left for growth. The main way I feel I could have grown in implementing the Mathematical Practice Standards is by providing my students with opportunities for authentic data collection. As it is in every classroom, time was my worst enemy. Many lessons could have offered opportunities for students to lead explorations in collecting data but to save time, I often designed lessons that gave students the data.

Another way I could have enhanced the Mathematical Practices in my classroom is through thoughtfully planned phenomena as anchors to lessons. I did not learn about phenomena-based learning until this year when I joined the STEM team at GRREC. I used real world contexts daily in the classroom but the use of phenomena would have provided the challenge and the rigor I often struggled to maintain. By providing anchors as outlined in the STEM Teaching Tool #28 document, I would have also created culturally responsive experiences.
In sixth grade mathematics, a great deal of time is spent building on students' understanding of the number systems and computation that goes along with that. When teaching these units, I struggled to make as many authentic connections to the real world as I did in the Geometry unit, Ratios unit, and Statistics unit. I wish I had known about the NASA resources while I was still in the classroom. For instance, on the Space Math @ NASA page, the Fun with Gears and Fractions would have been an outstanding lesson to use during the Rational Numbers unit to enhance the Mathematical Practice Standards. This lesson includes four problems that address all eight of the math practice standards.

Although the nature of STEM is complex, I see many comparisons when looking at the individual documents for each STEM discipline. When investigating the Nature of Science document, I read the first three categories and almost found a perfect one to one match to the Math Practice Standards. The first category is *Scientific Investigations Use a Variety of Methods*. I found connections to three different Math Practice Standards within this category. For example, this category describes science investigations using a variety of methods and tools to make observations, this closely aligns to *Use appropriate tools strategically*. In this *SMP* students must choose the tool that fits the task or experiment and use it to visualize the results. The next category that aligned to the Math Practice Standards is *Scientific knowledge is based on empirical evidence*. This aligns to SMP number 3 (*Construct viable arguments…)* and SMP 7 (*Look for and make use of structure)* because the category focuses on finding and recognizing patterns as well as making connections while using evidence in explanations. *Scientific knowledge is open to revision in light of new evidence* makes a strong connection to Math Practice 1 (*Make sense of problems and persevere in solving them)* and Math Practice 3

(*construct viable arguments…)*. This category requires explanations and interpretations (SMP 3) but emphasizes the importance of continuous revision (SMP 1).

The Nature of STEM could be related to human nature. When we talk about human nature we are talking about common behaviors that humans exhibit. The Nature of STEM is the compilation of behaviors each practitioner or student of STEM should exhibit. The behaviors are complex but very much interweaved throughout the different disciplines.