

Nature of STEM: Focus on Math

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Methods of STEM Education - Secondary

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Nature of Math

A year and a half ago, I began a great adventure: teaching! I am now in the middle of my second year teaching math at Butler County High School in Morgantown, Kentucky. I find teaching math to teenagers to be such a blessing; however, it is overwhelmingly challenging all at the same time. The schools in our district have been on a journey this year to increase the rigor across the board in every grade. When I began to really dive deep into my standards and unpack them, I realized that increasing the rigor of my content could not solely be based on teaching the standards. Increasing the rigor in my classroom had to come from better practices as well.

The Principles and Standards for School Mathematics discusses six different principles that should be included in math: equity, curriculum, teaching, learning, assessment, and technology. I would say that the tenet I address the most in my classroom would be equity. “All students, regardless of their personal characteristics, backgrounds, or physical challenges, can learn mathematics when they have access to high-quality mathematics instruction” (Executive Summary,” n.d). I strongly believe that every single student can achieve greatness in my classroom. I address this tenet by treating all my students with the same amount of respect, and by challenging all of them to reach the same high standard. I have seen several students enter my classroom at the beginning of the year with the idea that they are “too dumb” to do math. It takes time to rewire that way of thinking, but by holding them to high standards and making sure they get there, the students are usually at least a little bit more confident before the end of our time together.

The rest of the principles really melt into one another. Curriculum, teaching, learning, assessment, and technology are all principles that I have good weeks and bad weeks with. I do

believe that I effectively address these tenets, but I think these are much harder to perfectly address all at the same time, every single day. I am currently trying to create curriculum and assessments, as I go, that productively challenges my students every single day. I want to raise the rigor in my classroom and allow my students to see how our content blends together with other concepts we have already learned, and concepts they are seeing in their other content areas.

Improvement

I would love to more effectively address all the tenets the Nature of Math includes. I believe that I could increase the value of my curriculum by making sure that it is constantly building on the ideas that my students already have. Background knowledge and phenomena is so important in the classroom. This allows students to connect new concepts to things they have already seen and understood before. We also know that using phenomena in the classroom allows student to develop the skills to explain or predict the phenomena (“Using Phenomena in NGSS-Designed Lessons and Units,” 2016). I believe I could do a better job in my classroom at creating a curriculum that challenges them to make the connections in not only their other classes, but in what they see around them in the real world.

I also believe I could enhance my teaching by improving the types of assessments I give to my students. At the moment, 99% of my assessments are all centered on math and the concepts I have taught them over the prior couple of weeks. I believe I could do a better job of creating questions and open responses that connect the math concepts they have learned to the other disciplines in STEM. NASA has some amazing resources online that coordinates with every single unit that I teach in my Algebra 2 classes. I believe using those types of assessments would really engage my students and benefit them by giving them real-life examples that overlap into their other courses as well.

My understanding of the nature of STEM has certainly been a constant change over the past few weeks. The more resources and examples I get, the more I realize how the integration of these disciplines will really help my students. The more I learn about the nature of math, the more I realize that the nature of math isn't just...math! I need to do a better job of really allowing my students to see the connection of math to nearly everything around them.

Nature of Science

Math and science always seem to have quite a lot in common. Therefore, we can see an overlap with their natures. First, the tentative nature of scientific knowledge is very similar to some knowledge that we have of math theories and laws. Most of math is taken as set in stone, but there is a lot in math that is not and that can only be assumed. It is very hard for students to realize their correct answers aren't necessarily the "absolute truth." Second, there is an overlap with the inferential, imaginative and creative nature of science, especially in statistics. Observations require interpretation and inference in statistics as well. We do have numbers and values that can't be argued, but interpretations of those numbers can differ and make big differences in results. Finally, there is an overlap with the socially and culturally embedded nature of science. Products and research in math is highly influenced by the society and culture around it. As our society progresses, we learn more and more about science and math. Events going on around us have always affected the type of research and projects that experts take part in from both of these disciplines.

References

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