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Nature of STEM Assignment
Methods of STEM education
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Part A

I teach 11th-grade college-level precalculus and 12th-grade college-level calculus. For the nature of math, I was asked to use the common core standards however those standards don't go up to those levels of math courses. However, I will use my lessons and STEM unit projects to discuss the nature of mathematics.

As a math teacher, I find it important to teach students the importance of what NTCM calls the core standards. Which references the computational aspect of math. But as a STEM educator, I always include what NTCM calls the process standard. It's the idea of students who can problem solve outside of the basics steps and work examples.

For all of my units, I open by giving the students their STEM projects. For example, I created a project called Hungry Much! Students are given a restaurant menu and asked to create regression models, research calories and fat (grams) intake, and also do field work where they go to the restaurant to consume an item of their liking and then exercise to burn the calories they ingested. Students are given 1-2 weeks to complete the project, through that timeline I am beginning to teach the math skills they would need, for example, to create regression models, students need to learn about the different types like linear, exponential, quadratic, etc. Students will learn what makes these functions different, whether it be the rate of change, the shape of the graph, and the type of equation that creates these functions. I then begin to teach them about correlation and causation and how this analysis is used in the real world and can be used to conclude their projects. Lastly, I begin to teach them how to use Excel to analyze data as well as the use of their Texas Instrument calculators to create equations and look at graphs and other

data values. To include mathematics in STEM students truly need the foundational skills, once they have that they can do anything when it comes to including mathematics in STEM.

While looking over the Common Core standards for mathematics I found that it is relevant to the core standards. Understanding what computational skills students will need to learn. However, there is not a huge connection between those individual grades and categorical sections that use a cross-cutting approach. I do think the standards for mathematical practice are found on pages 6-8. Can be expanded more to apply the standards and cross-cutting approaches to include mathematics. In science graphing, tables, analyzing data, and exponential functions are frequently used. Oftentimes educators who are content specialty teachers rarely have the opportunity to do horizontal/vertical planning. This is a great space for teachers to help one another learn that they are using standards from other contents, and it creates an opportunity for a student to see that the math skills they are learning are being applied in their sciences course or vice versa.

Part B

There are so many ways I can better enhance my STEM education, for one I think I would like to learn more science inquiry. I find that I include science for example students learning about calories and fat in grams in food. However, I didn't spend time having students research the effects on our bodies, or what the average calorie intake a person should intake. Students could have also researched and talked about different exercises to help balance eating and burning fat. I think the Nature of Science is like "This means that science is based on and derived from observations of the world around us from which interpretations are made" (Tenets of the Nature of Science 2011). I think I can work on helping my students learn how they can

include the inquisition of science in our STEM projects by asking the right questions. I would like to learn about inquisitive questioning.

The second enhancement I would like to make is to include the E in my projects. This past school year was the first time I included the Engineering aspect in my class. I had my calculus students create a cross-section of their 3d shapes. I would like to learn more ways to include engineering in my precalculus STEM projects. I know that STEM doesn't mean we use every variable every time but it would be great to say "Hey, I was able to include every aspect of STEM today."

Part C

I read the Nature of Technology, to be quite honest I never thought of the technology aspect of STEM to be more than just a PowerPoint, maybe even a calculator. But to read this and learn that technology is everywhere around us, and is developing quickly like the AI's. It resonated with me when it stated " Finally, students should understand that the scope of technology involves its essences, its relation to the natural world, and its rapid and often unexpected development."(Standards for technological literacy - iteea.org 2007).

While in mathematics although we are taught to teach the skills the standards are changing and real-life application is growing to be a needed skill for students. In the Executive Summary Principles and Standards for School Mathematics, they discuss the process standards which include problem-solving, reasoning and proof, communication, connection, and representation. All of these are also aligned in technology, the world creates new technological advances to help solve a real-world problem for example watches that track your exercise and calories burned. To create better technology you have to research good reasoning and prove that it will work. Technology is communication. For example, a cell phone communicates that the volume on your

headphones is too loud. There are so many ways the nature of technology and the nature of mathematics are connected. It is like in the Is There a “Nature of STEM”? article Peter states “(NOM) can be considered the cycle of inquiry that begins with the representation of quantities as abstract symbols, accounting for all possibilities through manipulation of the rules (although there is some flexibility), and validating the quality of solutions and models by understanding the differences between mistakes and reasonable choices that did not turn out to be successful (Schoenfeld, 1992).” (Is There a “Nature of STEM”-Peter-Burnton,2014).

Overall, I learned that to be a great STEM educator is to truly learn the craft and skills through research, and communication with others to better enhance my STEM instruction for my students.

Citations

Tenets of the nature of science. Science Learning Hub. (2011, October 7).

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Peters-Burton, E.E. (2014, March 5), Is There a “Nature of STEM”? Editorial. *Sch Sci Math*,

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