Nature of Math Collaborative Efforts

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GRECC Endeavor: Methods of STEM

Authentic Data and Engaging Phenomena in STEM

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After reading Peters-Burton (2014), the various fields that comprise STEM and the “nature of” each: NOS, NOT, NOE, and NOM. A primary goal of the NGSS and of integrated STEM education is to develop scientifically literate citizens who are capable of doing the following; asking good questions, thinking critically about information provided, and collaborating with others to problem solve. In an integrated STEM classroom students have opportunities to make connections between both disciplinary areas and through real-world connections to phenomena and authentic applications of skills. STEM learning represents the way in which educators lead students to participate in important inquiry. From a math collaborative perspective the nature of math definitely and naturally connects to all aspects of STEM through Common Core Standards. Common Core Mathematics Practices Common Core math practices 1 Encourage making sense of problems and learning to persevere in solving them. Students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. Students analyze givens, constraints, relationships, and goals. Students make conclusions about the form and meaning of a solution instead of going right to a solution, and examine the processes along the way. Math common core is aligned with NGSS standards in that theNGSS has a fundamental goal of developing scientifically literate citizens, capable of asking good questions. Common core math practices 2 Make sense of problems and persevere in solving them. Students

start by explaining to themselves the meaning of a problem and looking for possible solutions. Students must analyze given information, within given constraints, while identifying relationships among data. Students are encouraged to not just jump to a solution by also understanding the meaning of the process and the meaning of the form of the solution. Common core math practices 3: Construct viable arguments and critique the reasoning of others. Students are able to understand and use assumptions, definitions and previously established results when constructing arguments. Students are able to make an opinion based on incomplete information and build logical statements that explore these opinions. Students are able to justify their conclusions, communicate conclusions to others and respond to the arguments of others. Students are able to understand the effectiveness of two reasonable arguments, identify correct reasoning versus reasoning that is flawed. Additionally, if students identify flawed reasoning, they are able to explain what it is. Common core math standards align with NGSS science standards in that math is an exploratory event that can be improved upon, instead of a fixed event. Common core math practice 4: Model with mathematics. Students are able to apply known mathematics to solve real world problems. Real world problems may pertain to everyday life, society and the workplace. An example may be that a student is able to write an equation describing a particular event or real world situation. Students may also plan or arrange mathematical solutions to community problems. Students demonstrate that they are comfortable using and applying what they know to solve complicated situations with the awareness that the situation may need to be visited again Common core math just as NGSS strives to make connections between science and everyday life.

Currently, I work collaboratively (as a special education teacher) with the math content teacher. Students have two class periods of math instruction. There is a math class and a math skills class.

Our math class lessons include opportunities for whole group direct instruction, small group, peer and one one one instruction for coverage of the common core standards. Students maintain a math notebook with a section for notes and a section for journals. Typically, there is a daily math related journal that fosters discussion after students have responded in writing. A recent journal example: If the numeral zero means nothing, why is it important to mathematical processes? Student responses included " Zero is needed for place value as a placeholder "," Just because zero means nothing doesn't mean it isn't important". "Zero changes the way that a problem is viewed". Afterward there is a bellringer that is either a review of previously taught information or preview to new material that will be presented. There is a minute multiplication drill. The math content teacher believes firmly that basic multiplication skills are needed to effectively complete other math tasks.

The math skills portion of the class is focused on rotational small groups. With assistance from the GRECC cooperative learning cohorts students have been divided into skill level groups. There is a technology component, a hands on component and a teacher consultation component. As the collaborative special education teacher, my role has been to assist with the small skill group hands on level groups. Students are given differentiated tasks in the format of a game. I am able to give immediate feedback regarding areas that students are struggling with. All feedback is positive, light and constructive. " I see how you got that answer, try….instead. The tasks are differentiated in such a way that the highest functioning students are struggling just enough and challenged. Students have responded that they prefer this method of learning better than a teacher lecture. Both the math content teacher and the math special education teacher are seeing that students are taking risks with their math learning.

This GRECC Cohort opportunity has definitely made me aware of the many phenomenal based math resources. As a special education teacher, I am usually more familiar with connecting the content to students as the regular education teacher is the content area specialist. I am excited to delve into the phenomena based math resources that have been presented through this cohort. Worksheets that bring data to life! Students often ask " Why do we need to learn this?" or "Where will we ever use this?" (free online resource, http://datanuggets.org)

Spacemath has many resources that I am excited to dig into as well! With so many resources available, students will easily move from "Why do we have to statements and Where will we ever use this?" to "When can we do something like this again and I enjoy learning math this way".

References

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