STEM Resources to Support Units of Inquiry and Math

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Professional Development Project Title

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Justification

While working on the Endeavor STEM Leadership Certificate I have become aware of so many valuable resources, from NASA-specific ones to other resources that have been more particular to the courses I have taken. My current school does not have a STEM focus. Working within the Primary Years Program of the International Baccalaureate, teachers at my school are responsible for collaborating and teaching integrated, transdisciplinary Units of Inquiry. Our Units of Inquiry (six units per grade per year) are usually focused on one main discipline (science, social studies, literacy, or the arts) while trying to integrate the other curricular disciplines (including math) when appropriate. I think that sharing my learning from the Endeavor program, along with resources that can support a wide variety of units across my school, along with math instruction, will provide my colleagues with some basic knowledge and understanding of what STEM education is. In addition, they will learn how STEM integration complements what they are already doing, as well as how their current units and math curriculum can be further enhanced with resources from NASA and the Endeavor program.

School: Shanghai Community International School, Shanghai, China

Number of Educators and Grade Levels: 15 homeroom teachers, grades 1-5

Key Learning Goals for Educators

I wanted teachers to become aware of the vast resources available online that can be easily accessed and integrated into their curriculum to either supplement or possibly replace some activities across the STEM subjects. I also wanted to highlight that despite not being a STEM school, that we are already integrating across subject areas, and that my session would

hopefully provide teachers with new resources and activities to further the integration of STEM into what is already being done.

Curriculum Topics and Standards Addressed

The following curriculum topics and math standards were addressed during the professional development session:

Grade 1: weather, math (1.NBT.B.2.A); Grade 2: simple machines; Grade 3: strong and stable structures, math (3.MD.C.5-7; 3.NF.A.3) ; Grade 4: light and sound; Grade 5: natural disasters, body systems

Project Summary

Prior to the professional development session, I studied the elementary school's Program of Inquiry, along with the Common Core State Standards for math, to narrow down the resources I planned to share. In my Methods of STEM Education course, I was introduced to PhET Interactive Simulations (https://phet.colorado.edu/en/simulations/category/by-level/elementary-school) by a classmate. I chose to showcase this site as it has a number of science and math simulations and models (area-multiplication, area-perimeter, fractions, sound/light, *etc*.) that were highly applicable to the teachers in my session. I had each teacher find and try one simulation that they could use in their grade level. I then transitioned to Teaching Engineering (https://www.teachengineering.org/) and first had teachers use my search keywords (simple machines, architecture/structure design, model lungs, Jell-O earthquake) to find activities that connected directly to their curriculum. I also shared NASA BEST (https://www.nasa.gov/audience/foreducators/best/activities.html) and spent a few minutes talking about the Engineering Design Process and how it connected to the Inquiry Cycle we use

at school. I also briefly touched on the National Oceanic and Atmospheric Administration (NOAA) and United States Geological Services (USGS) resources available when studying weather or natural disasters, including the incredible amount of data that can be accessed and used to integrate math and science into my school's Program of Inquiry.

I also provided each teacher with an electronic handout that included a number of other useful resources and links (Space Math @NASA, Concord Consortium, Turtle Pond, Robot Virtual Worlds, and some others) along with possible curriculum integrations for participants to inquire into further.

Reflection

Teachers had extremely positive feedback during, and at the conclusion of, the professional development. Each attendee thanked me in person, or afterwards via email, for providing links to resources, ideas, and activities that could be implemented in their current grade level and curriculum. A majority of the teachers commented that they really appreciated how specific I was with resources that explicitly connected to the Units of Inquiry taught in their grade level, along with resources that could be used to teach and learn about math concepts at different grade levels.

I also sent out a Google Form soliciting feedback from my peers. Twelve of the fifteen participants completed the online form, with all 12 respondents rating the professional development session as very useful and/or relevant.

Outcomes

Overall, I feel that the professional development session was a success. Based on feedback (verbal, email, and follow-up questionnaire), the teachers that attended seemed interested and excited to learn about new resources that could easily be integrated into their Units

of Inquiry and what they are already teaching. As we are approaching the final part of the year with grade level teams planning their last Unit of Inquiry, many teachers gave feedback that they would be taking their learning back to their teams to discuss and see what they might be able to implement before the end of the academic year. Many also told me that they made notes of specific resources they would like to try out next year.

I think the teachers I worked with met the learning goals I set out. As we are not a STEM school, my main goal was for teachers to see the opportunities that are already present in their curriculum to implement and use the resources I was sharing.

The integration of NASA assets and other STEM resources will benefit teachers and grade level teams to broaden their understanding of integrated, transdisciplinary teaching and learning. Although this is already happening in my school, as we run the Primary Years Program of the International Baccalaureate, integrated STEM has had lesser focus then integration across English Language Arts and Social Studies. Using the integrated STEM resources that were shared will hopefully continue to consolidate and improve our transdisciplinary Program of Inquiry.

Attendees:

Cathy Morris, Grade 1 homeroom teacher, cmorris@scis-china.org

Ricky Whitfield, Grade 3 homeroom teacher, rwhitfield@scis-china.org