

Bringing the E in STEM to Life
STEM Leadership Seminar
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STEM. It's on the forefront of most education magazines, websites and agendas. It's what some schools are working hard to integrate and ensure that students are well equipped to thrive

in the future. However, how exactly are teachers incorporating ideas of science, technology, engineering and math in their classrooms? How, particularly, will a teacher with no previous background in engineering, teach her students about the concepts of engineering? I would like for my PD session to be about integrating the engineering aspect of STEM. This topic is very significant to me because I didn't possibly understand its importance, application and methodology until taking "The E in STEM: Meaningful Content for Engineering" through the Endeavor program. Through this class, I understood how to breakdown the NGSS engineering standards and how to create activities that are aligned with these standards. This PD will incorporate some content (mainly 1-2 articles and activity ideas) from "The E in STEM: Meaningful Content for Engineering" course. Moreover, I'd like to integrate and highlight concepts that were taught during this course that will be of benefit to teachers of science and other disciplines. I will also be using resources from NASA's Jet Propulsion Laboratory for sample activities.

I hope to propose this PD to an audience of at least 15-20 teachers. My only concern is that I will be presenting this through EdCamp in which the number of participants may not be certain. I will be speaking to the organizers to see if I can do a session in February or March. My goal would be to make the session 1.5-2 hours long in order to cover the content and conduct hands on activities with the teachers. This session would be useful to teachers of all subjects, but more focused on content and ideas for K-8. Generally, each teacher will be able to modify the activities and content according to their class size and decide whether they prefer individual or group work (the latter being preferred). In order to make the most of our time, teachers will be asked to bring their own laptops.

NGSS Standards being addressed: MS-ETS1 Engineering Design

- MS-ETS 1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
- MS-ETS 1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- MS-ETS 1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
- MS-ETS 1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

Pre-Survey:

[1=least/never/no, 10=most/often/yes]

- How often have you received PD on STEM instruction?

- How comfortable are you in implementing STEM into everyday instruction?
- How receptive do you think your students will be to learning more about Engineering?
- How comfortable are you in utilizing the Engineering Design Process?
- Are your students able to make classroom to world connections on their own?

Post-Survey:

[1=least/never/no, 10=most/often/yes]

- Has this PD been effective in improving your everyday instructional practice?
- Do you have a better idea of how to integrate engineering concepts into your lessons?
- Do you have a better understanding of the NASA Engineering Design Process?
- Have your students been positive receptors to learning about engineering?
- Have they communicated any interest in learning more about this topic?
- Will you implement any of the resources and/or activities this year?

First and foremostly, I hope that educators are able to grasp the importance of individually analyzing each part of STEM education. Then, understanding the engineering aspect and how amazingly versatile it is as a subject. Engineering and design truly encourages critical thinking and drives students to think divergently. I hope that educators walk away with ideas on how to incorporate the NGSS engineering standards and apply them into their lessons. I hope to follow up with teachers via google docs and open the doors of future communication if any help is needed. Towards the end of the PD, teachers will be asked to fill a survey (via online/phone) and will be sent an additional survey 1-2 weeks post PD in order to see how they've utilized this information in their classrooms. Collecting this data will allow me to measure the success of this PD and where more work may be needed.