

## **Alison Huenger**

Practicum in STEM Leadership

### **Mini-STEM Professional Development**

1. What is the title of your mini STEM professional development?

Implementing Engineering Design in the Classroom

2. Why did you select the topic?

I am the director of the science research program at my high school (Manhasset High School) and teach grades 10-12. I want to introduce the concept of engineering design and show that it can and should be implemented in all science classes. I also want my focus to be on resources that science teachers can implement in their classes to increase student engagement and provide hands-on learning experiences that are easily accessible.

3. Who is your proposed audience? Which teachers will you serve with your PD and activities? What grades, subjects, and how many students do they teach?

My target audience is the science department at my school. I am in a building that houses both the middle school and high school (grades 7-12). In total, there are roughly 25 teachers in the science department, approximately 4-5 teachers per subject area (7<sup>th</sup> grade general science, earth science, living environment, chemistry, physics, technology, and engineering) with roughly 20-28 students in each of their classes.

4. What “general” science or mathematics concepts or learning goals will you and your materials address which can potentially replace other classroom activities?

For the first half of my presentation, I would like to introduce concepts of engineering design. I would like to introduce them to: (1) NASA Engineering Design Model (NASA, 2018), (2) NGSS Engineering Design Model (NGSS, 2013), and (3) Dartmouth Design Process (Garmire, 2003).

NASA has several videos on their website that further illustrate each of the steps of the NASA Engineering Design Model:

- NASA’s Best – Introduction:  
[https://www.youtube.com/watch?list=PLTUZypZ67cdsM-asYGpX0L6NaIPqhIjP&time\\_continue=8&v=c0wh4GxoL28&feature=emb\\_logo](https://www.youtube.com/watch?list=PLTUZypZ67cdsM-asYGpX0L6NaIPqhIjP&time_continue=8&v=c0wh4GxoL28&feature=emb_logo).
- NASA’s Best – Ask: <https://www.youtube.com/watch?v=Oy1DrYTfwil&list=PLTUZypZ67cdsM-asYGpX0L6NaIPqhIjP&index=2>
- NASA’s Best – Imagine:

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- <https://www.youtube.com/watch?v=laPUvKFP-GY&list=PLTUZypZ67cdsM-asYGpX0L6NaIPqhIjP&index=3>
- NASA's Best - Plan:  
<https://www.youtube.com/watch?v=bYxO3iXfu-Y&list=PLTUZypZ67cdsM-asYGpX0L6NaIPqhIjP&index=4>
- NASA's Best - Create:  
<https://www.youtube.com/watch?v=VzVJbGucZw8&list=PLTUZypZ67cdsM-asYGpX0L6NaIPqhIjP&index=5>
- NASA's Best - Experiment:  
<https://www.youtube.com/watch?v=ICXIhe66pfs&list=PLTUZypZ67cdsM-asYGpX0L6NaIPqhIjP&index=6>
- NASA's Best - Improve:  
[https://www.youtube.com/watch?v=Kt1oVv2D\\_ns&list=PLTUZypZ67cdsM-asYGpX0L6NaIPqhIjP&index=7](https://www.youtube.com/watch?v=Kt1oVv2D_ns&list=PLTUZypZ67cdsM-asYGpX0L6NaIPqhIjP&index=7)

In the second half of my presentation, I would like to showcase some of the NASA resources that I have been introduced to and that I have implemented in my classroom. I would like to introduce them to the following websites:

- <https://www.jpl.nasa.gov/edu/teach/tag/type/Classroom+Activity>
- <https://www.nasa.gov/education/materials/>

I would also like to review NASA's Design Squad Challenges and illustrate how I incorporated the "Feel the Heat Challenge" into my classroom. ([https://www.nasa.gov/pdf/308966main\\_On\\_the\\_Moon.pdf](https://www.nasa.gov/pdf/308966main_On_the_Moon.pdf))

I would also like to make teachers aware of STEMonstrations by NASA. They are a great resource that provide short videos on several different topics.

<https://www.nasa.gov/stemonstrations-solar-energy.html>

5. How and where do you intend to carry out your PD? How long will the session be? When will it be held? Will teachers have access to computers?

I will be carrying out the PD on Monday, March 23<sup>rd</sup> at my science department meeting. The session will be 30 minutes. Teachers will have access to computers.

6. What outcomes or expectation do you hope to see for your educators?

I want the teachers who attend the mini professional development session to be exposed to resources that they can implement into their classroom. It is my hope that by implementing some of this material into their

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lessons, more effective and engaging lessons can be created that challenge students to think critically and creatively. I am also hoping this will encourage teachers to implement more engineering based activities into their curriculum and expand upon the number of hands-on lessons.

#### 7. How will you follow up with the teachers in attendance?

I will send out emails that contain the resources that were discussed as well as a copy of the power point that was presented. (For the science teachers in my district, we have monthly meetings so I can talk to everyone who attended the mini STEM professional development at a future department meeting. For the science research teachers target audience, I can follow up with them at a future executive board meeting or via email.)

#### **References:**

Garmire, E. (2003). Engineering Design Method. *The Technology Teacher*, 62, 22-28.

NASA. (2018). "Engineering Design Process." NASA. Retrieved from:  
[www.nasa.gov/audience/foreducators/best/edp.html](http://www.nasa.gov/audience/foreducators/best/edp.html)

NGSS Lead States. (2013). *Next Generation Science Standards: For States, By States*.

Appendix I - Engineering Design in NGSS. Retrieved from  
[http://www.nextgenscience.org/sites/default/files/Appendix%20I%20-%20Engineering%20Design%20in%20NGSS%20-%20FINAL\\_V2.pdf](http://www.nextgenscience.org/sites/default/files/Appendix%20I%20-%20Engineering%20Design%20in%20NGSS%20-%20FINAL_V2.pdf)

<https://www.jpl.nasa.gov/edu/teach/tag/type/Classroom+Activity>

<https://www.nasa.gov/education/materials/>

[https://www.nasa.gov/pdf/308966main\\_On\\_the\\_Moon.pdf](https://www.nasa.gov/pdf/308966main_On_the_Moon.pdf)

STEMonstrations:

<https://www.nasa.gov/stemonstrations-solar-energy.html>