

Stem Leadership Seminar Professional Development Proposal

- What is the title of your STEM professional development?

The E in STEAM: Meaningful content for engineering.

- Why did you select the topic?

Teachers are interested in this topic and it can relate to all content areas such as biology, chemistry, and physics. I want to provide a PD that teachers can actually implement and something that I know students would enjoy and be engaged in.

- How does your PD integrate NASA assets and/or content from the Endeavor courses?

My PD integrates content from the Endeavor courses by showing teachers the engineering design process. I also provide teachers with NASA resources that can help them with engineering ideas. I would also like to let teachers know that I have resources from other topics including (Arts in Stem & Tracking Live Animals: Marine Science).

- Who is your proposed audience (**minimum 12**)? Which teachers will you serve with your PD and activities? What grades, subjects, and how many students do they teach?

My proposed audience is the science department team (17 Teachers) at Parsippany Hills High School. I will serve teachers that teach biology, chemistry, physics, marine biology, food science, and forensics. The grades taught range from 9th grade to 12th grade. There are about 24 students in each classroom. (800 students total)

- What STEM concepts or learning goals will you and your materials address which can potentially replace other classroom activities? List NGSS and CCSS or your state standards.

Fatema Sheikh

HS-ETS 1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

HS-ETS 1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-ETS 1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.

HS-ETS 1-4. Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

- 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?

My PD will take place in my classroom at Parsippany Hills High School. The session will be 1 hour long. It will be held on September 25, 2019. Teachers will have access to their laptops.

- What, in general, will your pre-survey and post-survey ask?

For my pre-survey I will gauge how many teachers already do engineering design projects and will check to see if they only do one in the beginning of the school year. My post survey will be to see if the teachers feel like they would like to implement what they have learned. I would also like to know if they are more likely to implement multiple engineering projects.

Pre-Survey Questions	Post-Survey Questions
How many times do you complete an engineering design project during the school year?	Did you learn anything new from this PD?
Do you feel comfortable with engineering in your classroom? If not, why?	Did you find this PD helpful and informative?

Have you ever incorporated any kind of Engineering notebook in your class?	Will you use anything from today's PD in your classroom (NASA resources or Engineering Design)?
Where do you think you can fit engineering in your curriculum?	Did you enjoy today's PD? Anything you would change about today's PD?
Are you interested in incorporating NASA resources in your class?	What are some ways you can make engineering rigorous for your subject?

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

I hope to see them implement what they learned from my PD. I hope they consider engineering no matter what subject or content they are teaching. I also hope that they adopt a version of the engineering design process for their classroom to teach their students problem solving skills.

How will you follow up with the teachers in attendance?

I will follow up with teachers during PLC's and during our monthly meetings.

What data collection methods (e.g. surveys, interviews) will you use to analyze the PD's success?

I will have a pre and post survey. I will ask teachers for feedback and constructive criticism.

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

Fatema Sheikh

The outcomes I hope to see for my educators is high engagement and energy, motivation to include engineering in their classroom and overall positive feedback and constructive criticism from them.

Outline of PD:

- Introduce Engineering Design and water crisis – will use this video as a hook:
<https://www.youtube.com/watch?v=B-nEYsyRIYo>
- Some of the Nasa Resources that I will talk about:
<https://mynasadata.larc.nasa.gov> <https://observer.globe.gov>
<https://www.nasa.gov/stem/>
- Engineering Activity: Design a water filter.
- <https://www.jpl.nasa.gov/edu/teach/activity/water-filtration-challenge/>
- Connections to Biology (measuring turbidity and salinity), Chemistry (Testing for different chemicals found in the water, oxygen levels, pH levels, Nitrate/Nitrite etc...), and Physics (testing the speed of the water filter).
- Connecting engineering to real life situations with students. Connect to Flint, Michigan and in our own state Newark, NJ - both face a water crisis.
- Mini presentations
- Q & A session