

Professional Development Leadership Proposal

- What is the title of your STEM professional development?

The title of my STEM professional development will be “Engineering Your Way to STEM”.

- Why did you select the topic?

I decided on this topic because it was an Endeavor class that had an impact on my teaching. Engineering design seemed so foreign and scary. When I signed up for the engineering class, I was a bit nervous and felt very overwhelmed. After the first couple of classes I realized engineering can be so many different things but the best part was the design process. I really liked the idea of giving students a problem or situation and them working together to find a solution. When I did the required engineering design project with a mix of first graders and fifth graders it was eye-opening to watch them collaborate and discuss different strategies to complete the given project. I especially liked creating a notebook for students to complete as they worked through the design process. I would like other teachers in my school to start implementing engineering in their classrooms and not feel as nervous by the word engineering.

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

My PD will focus on the E in STEM. In the PD, I will show examples of different design models such as the NASA Engineering Design model, Design Squad and NASA Design model, and the Dartmouth Design Process. Together we will compare the different models. I will show the model I decided to use in the challenge I completed with students over the summer along with the notebook I created for students to take notes, sketch, brainstorm, and revise their solution to the challenge. I will pose a challenge for teachers to complete and we will talk through the design process using the notebook I created. Teachers will have time to look through the PBS Kids Design Squad activities towards the end of class to choose one they may want to complete with their students. My school does not discuss nor have any professional developments on using STEM in the classroom. The teachers at my school are great about incorporating technology with research and different content areas along with teaching science using different engaging activities but engineering activities are rare.

- 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 K-3 teachers at my school or other teachers within our school district. I am also going to invite staff who work with K-3 students which could include support staff, specials teachers, and learning coaches.

- 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.

Professional Development- “Engineering Your Way to STEM”.

NGSS standards: Science and Engineering Practices

K-2-ETS1-1- Students who demonstrate understanding can:

Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

K-2-ETS1-2.- Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

K-2-ETS1-3.- Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Disciplinary Core Ideas

ETS1.A: Defining and Delimiting Engineering Problems

- A situation that people want to change or create can be approached as a problem to be solved through engineering._
- Asking questions, making observations, and gathering information are helpful in thinking about problems._
- Before beginning to design a solution, it is important to clearly understand the problem.

ETS1.B: Developing Possible Solutions

- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem’s solutions to other people.

ETS1.C: Optimizing the Design Solution

- Because there is always more than one possible solution to a problem, it is useful to compare and test designs.

Mathematics-

MP.2- *Reason abstractly and quantitatively.* (K-2-ETS1-1)

MP.4- Model with mathematics. (K-2-ETS1-1)

MP.5- Use appropriate tools strategically. (K-2-ETS1-1)

- 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 intend to carry out my PD at my school. The session will be about an hour long and will need to take place after school. Teachers will have access to computers.

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

My pre-survey will determine how comfortable teachers/staff feel about incorporating engineering in their classrooms, their knowledge and comfortableness with STEM practices, and how often they use engineering in their classrooms. My post-survey will determine if their comfortableness changed after the PD, how the activities went in their classrooms, and if they would continue to utilize engineering practices in their classrooms.

Pre-survey-

Have you ever done a design challenge with your students?

Have you ever heard looked at different design processes?

Are you comfortable with having students complete a design challenge in the classroom?

Post-survey-

Did you try a design challenge activity?

How did your students react to the challenge?

What did you like? What would you do differently? Would you try another challenge in your classroom?

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

Ultimately, I would like teachers to use more STEM practices in their classrooms but also to collaborate with other teachers and create engaging activities to use with students in our school. I hope the attendees take back a few ideas to their classroom and try at least one activity with their students. My goal is to get them excited to try an engineering design challenge activity with their students.

- How will you follow up with the teachers in attendance?

After the PD, I will check in to see if they have chosen an engineering activity, created an engineering design notebook for their students, and/or completed an engineering design process activity in their classroom or with students they work with.

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

I will use surveys to analyze the success of both PD's. The surveys will determine whether my PD provided insight to the design process models, gave teachers a better understanding of engineering in the classroom, and whether teachers went back to their own classrooms and completed a design challenge with their students.

References:

NGSS Lead States. (2013). Next Generation Science Standards: For States, By States. Washington, DC: The National Academies Press. Retrieved from: <https://www.nextgenscience.org/search-standards>

Colorado Standards - Academic Standards. (n.d.). Retrieved June 3, 2019, from <https://www.cde.state.co.us/standardsandinstruction/coloradostandards-academicstandards>