

Title of STEM professional Development:
NASA Engineering Design Method in Preschool Classroom

Reason for selecting this topic

We evaluate the curriculum provided to the preschoolers in our center every year. This year, we launched a new curriculum initiative in August. The purpose for this initiative is for teachers to construct new activities and adopt a new implementation process that will not only encourage further progress in social and emotional developments for the students, but also to engage the students with real world experience and problems that allow the students to use their own observations and creativities to explore and solve the problems. The activities must be engaging enough for students to participate voluntarily and the process must be inclusive to preserve the creativities from different students. While designing an activity with NASA Engineer Design process, we can meet the essential criteria of making the activities inclusive and purposeful for this age group of children. It is the process that provides rigorous steps to engage students to an activity and allow students to have the autonomy to explore, to create and to experiment on their own.

Integration

This professional development opportunity will cover the implementation of NASA Engineering Design from Engineering in STEM courses. The session will last about two hours. For the first half an hour, I will give a brief introduction on teaching Engineering in STEM setting and NASA Engineering Design process. After the introduction, I will create a scenario together with the Principal to present a small engineering problem that needs solutions from the teachers. Teachers will be divided into groups of 3 to 4 to work as a team to design and create the solutions following NASA engineering design process. Upon the completion of the process, I will use 30 minutes to have teachers share briefly how they can integrate this process into their new classroom activities and fill out the post-activity surveys.

Standards:

K-2-ETS1-1 Engineering Design

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 Engineering Design

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

Recruit Audience

It will be a two-hour Professional Development Session. The Engineer Design Process is part of the initiative to help teachers redesign the activities purposefully for the students. So all teachers in 3-5 classrooms will be attending the PD session as a part of initiative.

Preparation and pre-survey questions:

The preparation before the PD session includes having teachers to observe the students during one of the construction activity in the classroom. Teachers will use STEM rubrics to record students' engagement and performance during the activity. In this rubric, it will have indication on students' active engagement and response during the courses of the activity. This is the same rubrics that teacher will use to observe and record students' performance during the first implementation of NASA engineering process after the PD session.

What does Engineer mean for this age group of children?

Have you implemented Engineer Design activity in the classroom before? If so, please share one as an example.

How many students were engaged with the activity?

- . Less than 30%
- . 30%
- . 50%
- . 80%
- . Above 80%

What was the biggest obstacle when implementing the activity? How do we overcome it?

Was the goal of the activity being achieved? How did you find out?

Post-Survey Questions May Include

How will NASA Engineer Design Process help you to design an activity in the classroom?

What obstacles do you foresee when implementing Engineer Design activity in your current classroom? What are the possible solutions for the challenges?

What are the resources we can provide you to help you prepare for the activity?

How often will you implement Engineer Design activities in your classroom?

When would you like to start the first implementation of activity with NASA engineering design process?

Expectation:

After the Professional Day Development session, I am expecting that teachers start building the connection between NASA Engineer Design process and planning a purposeful but open-ended activity in the classroom. Considering the age of the students, I anticipate certain challenges that the teachers will encounter when implementing the activities with NASA Engineer Design process. I encourage teachers can actively use NASA engineering design resources based on the interests of students in their classrooms when designing the activities. Certain process in the engineering design process could be challenging for preschool age students such as conceptualizing their ideas by drawing or sketching, or simply completing small group work. I am confident teachers will improvise certain steps during the process without losing the core of NASA engineering design process.

Follow up:

A strong support for the teachers alone the process is crucial. This support can come from the leadership team, as well as among the teachers themselves. After professional development session, we will discuss the timeline for the first implementation, as well as the timeline for different process. I will set up an online platform for teachers to upload and share their lesson plans and resources for the activities. After the first implementation of the new activity with engineering design process, we will bring our experience and reflection in discussion as a group. The reflection questions include:

1. What went well in this lesson? Why?
2. What problem did I experience?
3. What questions did students ask during the process?
4. What did I learn from this experience?

Data Collection:

Teachers will need to make their own observation and collect data by using the same STEM Rubrics that they used before the PD session. I will compare the rubrics collected before the session and the rubrics marked after the first implementation of engineering design process from each classroom to analyze the successfulness of PD.