Professional Development Proposal

STEM Leadership Seminar

Spring 2020

Title of Professional Development: Paper Rockets, Real Opportunities

Reason for selecting this topic:

One of my areas of interest throughout my STEM master's coursework has been looking at how an engaging context can be applied to a variety of content areas and lessons. Rockets are intrinsically interesting to both teachers and students. Rockets provide plenty of cross-curricular opportunities for STEM engagement.

This PD will allow teachers to design and launch paper rockets using an easy to build PVC launcher. Teachers will discuss a number of math, science, and engineering context behind the activity. They will then launch the rockets focusing their efforts on the context of the lesson they hope to target. For example, teachers will record the flight of their rocket with a measuring device in the background in order to gather and graph a quadratic function for the rockets acceleration. A science teacher on the other hand might focus on how changes in the design of the rocket affect its flight.

Teachers will then explore how they can encourage students to share their learning in the form of a NASA do-it-yourself podcast.

NASA assets/previous coursework integration into PD:

The PD will focus on three main NASA assets:

1) 5e lesson plan structure

2) Nasa Rocketry for educator's webpage

3) NASA Do-it-yourself Podcast webpage

Target audience:

The target audience will be middle school and High School math and science teachers

STEM concepts and learning goals addressed:

The PD will allow educators to discuss and explore a variety of applications for model rockets in the classroom. The activity itself will focus on two things. Measuring and gathering data on the rockets flight, and engineering design.

> CCSS.Math.Content.HSS.ID.B.6.a
> Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.
>
> CCSS.Math.Content.HSF.IF.C.7.a
> Graph linear and quadratic functions and show intercepts, maxima, and minima
>
> NGSS - MS-ETS1-4
> 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.

Professional development session execution (how, where, when):

The session will be held in a commons area of a high school after school gets done (around 4PM). The high ceiling will allow the rockets to get good height. Teachers will all have ipads for note taking and looking up resources. Teachers will begin with a discussion on creating an engaging context around STEM. They will then be introduced to the paper rocket project and the variety of application. Teachers will have the opportunity to build and fire their rockets while taking part in a data gathering example lesson.

Pre and Post-survey for PD:

Pre PD - teachers will be asked to discuss/record a few ways they could use model rockets in their content area if they had the time and resources to incorporate them.

Post PD – teachers will be asked the same question. They will also be asked to discuss some other engaging contexts that could apply to what they teach such as 3D printing, virtual reality, etc.

Expected outcomes of professional development:

Teachers should be able to walk away from the PD with ideas about how an engaging context in general and rockets in specific could be applied to a variety of different learning objectives. Teachers will also be given an

opportunity to create and launch their own rockets, as well as how the rockets can be used for a particular math and science lesson.

Post-session follow-up:

I will share links and resources with the attending teachers that were discussed. I will offer the PVC launcher for any teacher that wants to use it. I will also offer suggestions and advice on lesson plans that teachers have that incorporate the rockets.

Session feedback data collection:

The feedback data will ask teachers what they learned, what aspects of the PD could they apply in their classroom, and to reflect on other interesting STEM contexts that could be used with the content they teach.