Jason Hornickel

STEM Leadership Proposal

September 15th, 2020

Title: NASA STEM 5E Virtual Project-Based Lessons

Topic: There are several reasons that I decided to develop and present this information. To start, being in virtual teaching setting this year, we are responsible for organizing all our instructional resources, assignments, and assessments into Canvas Online Learning Systems. The process can be time-consuming to create quality and thorough lessons that utilize relevant data and information. Based on formative discussions with my co-teachers, they assisted me in identifying two areas they would like to further develop in our current curriculum. The first is helping students discover real-world connections within content areas, and the second is to provide accessible hands-on project-based investigations for our students to access while they are learning from home.

NASA Integrations: My colleagues shared with me that they often do not rely on NASA resources, so I am hopeful that by accessing these 5E lessons, it will inform them of many resources they may not be currently aware of. I will be developing a 5E lesson for each of our three units that will organize and integrate a combination of resources that will include data, videos, activities, and STEM projects found on both NASA and the Jet Propulsion Laboratory websites. There have been so many resources that have been covered throughout my Endeavor experience, I am still in the process of narrowing which will best align for each unit. A few classroom activities that I plan on including so far include: On Target (Forces), Feel the Heat/Solar Oven (Energy), and the Water Filtration Challenge (Water).

Proposed Audience: I will be delivering my professional development resource to my five colleagues in our 6th-8th grade science PLC. In all of our science classes, we have over 800 students. I explained in our previous discussion that it was important to me to have a take-away or resource that I can immediately use or implement into practice as a follow-up to the professional development experience. I will be able to share the lessons electronically with my co-teachers through a Canvas Sandbox, and they will be able to download the lesson directly into their own personal course to easily deliver during each unit. The units that we will be covering this year are ecology and climate, weather and water, and forces and energy.

Learning Goals: As mentioned previously, the learning goals will be to help students make real-world connections to content and provide hands-on project-based learning opportunities that are accessible at home. Providing engaging hands-on learning is much easier in the classroom than virtually, but just as important to keep students interested in science and STEM. I do not believe

the activities will be more engaging than classroom activities, but I feel they are a necessary component of learning science regardless of being in the brick and mortar classroom or virtual. However, the most difficult obstacle that arises with planning virtual hands-on lessons is to provide equitable projects to all students. This means either providing basic materials to all students through an arranged pick-up or creating projects with materials all students have access to. With over 800 students, both scenarios can be challenging in comparison to the classroom setting, however, innovation will be a key concept for both teachers and students this year!

NGSS Standards: These are the Engineering Standards that will be included in the lessons.

- MS-ETS1-2: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- 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.
- MS-PS3-3: Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.
- MS-ESS2-1: Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.

Duration of PD: The professional development will be an hour-long meeting that will be held during our designated PLC time. I will not have to recruit for this because I already requested it is included in our upcoming agenda. I have already talked to fellow PLC members for their input and to inform them of the PD that I will be offering during our meeting. In the pre-survey that I will provide, I will be looking for how often they use NASA resources and how often they use 5E lesson planning. In the post-survey, they will be asked if they plan on using the lesson in the future, how feasible they feel the lesson plan is for delivering virtually, and any feedback on the resources or information presented.

Outcomes & Expectations: I am hoping the lessons that will be shared at this professional development help the attending teachers plan future lessons by helping them organize resources, assignments, and assessments using 5E lesson planning. I also hope that our teachers find the NASA resources are equitable and accessible to all students, and an option to extend hands-on learning opportunities in the virtual teaching world. I will follow up with the teacher in attendance at the next month's PLC meeting. I will analyze the pre & post surveys to determine the initial feedback, as well as have an informal interview to provide insight from the outcomes of the lessons provided and if it was beneficial to student's virtual learning experience.