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Leadership Seminar PD Proposal
SCED 545
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Mission to Mars: Using NASA Resources in Elementary STEM/STEAM/Science Lab/Makerspace

In our district, there is no set curriculum for the district's approximately 50 STEM Lab classrooms. A core group of us, who have been in this position for many years, have collected resources over the years that we eagerly share with the newer STEM teachers, who have been asking for a curriculum to follow. This year, our elementary science specialist put together a series of half-day PD opportunities for these teachers to learn more about resources available to create meaningful and memorable STEM experiences that also integrate state science standards.

In one of my other Endeavor courses, I wrote a unit plan based on designing and building a model of a community on Mars. This topic is relevant and will be increasingly in the news as the Artemis missions bring us closer each year to landing humans on Mars. This unit would be a perfect fit for a class that meets on a weekly schedule, as most of our STEM classes are treated as special areas in our elementary schools. The unit, written for fifth grade, integrates fifth grade science, math, and social studies, and includes research, design, and modeling.

I will open the PD with a video from NASA's Marshall Space Flight Center introducing the Artemis missions (<https://www.youtube.com/watch?v=dOOHJrqIJqY>). I plan on having the teachers put themselves in the role of student and go through the first lesson of the [unit](#) I wrote. The lesson that will be used as an example uses videos from the Jet Propulsion Laboratory (<https://www.jpl.nasa.gov>) as well as data collected by NASA on Mars, which is housed on the NASA Science Solar System Exploration website (<https://solarsystem.nasa.gov>). After our shared lesson experience, I will ask teachers to explore resources surrounding the Artemis missions (<https://www.nasa.gov/content/nasas-journey-to-mars>) and add to a shared resource page I will establish for teacher to add their ideas for activities and lessons based on the Artemis missions.

The teachers I will serve will be those teaching STEM Lab in the district's elementary schools. They teach kindergarten through fifth grade, mostly as a special area. There are 50 teachers across the district that will be invited, as well as fifth grade science teachers that might be interested in the content of the PD.

This PD will connect to student outcomes in science, social studies, and math. Specific standards that are directly addressed are listed at the end of this proposal. In science, students will learn about

environmental conditions on Mars and how they compare to those on Earth. They will also learn about properties of materials. In social studies, students will consider the elements of their community here on Earth that are essential for everyday life as well as taking into account our cultural needs. In math, students will use their understanding of geometric shapes to determine which shape is the most efficient for the engineering task of building a community to sustain human life on Mars. This PD also addresses engineering, as students will design and build a community to sustain human life on Mars, keeping in mind strength and efficiency. To design a community for Mars, students must apply their understanding of the environment on Mars to their knowledge of the essential elements of our community. They must use their understanding of perimeter and area to keep their design within the constraints.

The session will be two-hours long. Since this will be part of a series that we have been presenting this year, it has been on the calendar since the September. Our elementary science specialist will send a series of emails prior to the event, reminding teachers of the topic and location. I will also ask her to include my pre-survey so that I have an idea of how many teachers are already familiar with NASA resources and how extensively they might already use them.

I will use pre- and post-surveys as well as post-interviews with those that are willing to participate. My pre-survey will ask teachers about their familiarity with NASA resources on a 5-point Likert scale and ask them to check off which resources from a list they actively use or have used in the past. I will also ask them to rate their familiarity with the Artemis missions on a 5-point Likert scale. My post-survey will ask participants to rate their familiarity with NASA resources, their interest in using NASA resources in the classroom, and their comfort level with using NASA resources on a 5-point Likert scale. I will also ask participants to share narrative feedback as to what they felt was the best or more useful part of the PD as well as a suggestion for what might be changed or improved. Finally, I will ask if participants would be willing to have me contact them for an additional short interview later in the spring, approximately 3-4 weeks later.

Our STEM teachers often struggle with developing lessons to use with their kindergarten through fifth grade students. With no official STEM/STEAM/Science Lab/Makerspace curriculum provided by the district, teachers are left to patch together their own units. I am hoping that my presentation will give these educators a resource for activities, lessons, and units that are deeply connected to the science and math curriculum, relevant to our students, and highly engaging.

State Standards Addressed in this Professional Development Event

North Carolina Essential Standards for Science:

- 5.P.2.1 Matter: Properties and Change. Explain how the sun's energy impacts the processes of the water cycle (including, evaporation, transpiration, condensation, precipitation and runoff).
- 5.P.3.1 Energy: Conservation and Transfer. Explain the effects of the transfer of heat (either by direct contact or at a distance) that occurs between objects at different temperatures. (conduction, convection or radiation).
- 5.P.3.2 Energy: Conservation and Transfer. Explain how heating and cooling affect some materials and how this relates to their purpose and practical applications.
- 5.E.1.1 Earth Systems, Structures, and Processes. Compare daily and seasonal changes in weather conditions (including wind speed and direction, precipitation, and temperature) and patterns.
- 5.L.2.1 Ecosystems. Compare the characteristics of several common ecosystems, including estuaries and salt marshes, oceans, lakes and ponds, forests, and grasslands.
- 5.L.2.3 Ecosystems. Infer the effects that may result from the interconnected relationship of plants and animals to their ecosystem.

North Carolina Essential Standards for Math:

- NC.5.MD.4 Recognize volume as an attribute of solid figures and measure volume by counting unit cubes, using cubic centimeter, cubic inches, cubic feet, and improvised units
- NC.5.MD.5 Relate volume to the operations of multiplication and addition.
 - Find the volume of a rectangular prism with whole-number side lengths by packing it with unit cubes and show that the volume is the same as would be found by multiplying the edge lengths.
 - Build understanding of the volume formula for rectangular prisms with whole-number edge lengths in the context of solving problems.
 - Find volume of solid figures with one-digit dimensions composed of two non-overlapping rectangular prisms.

North Carolina Essential Standards for Social Studies:

- 5.G.1.1 Explain the impact of the physical environment on early settlements in the New World.
 - Physical environment dictates settlement patterns.
 - Physical environment can determine the way people meet basic needs.
 - The physical environment includes climate, landforms, soil, hydrology, vegetation, and animal life.
- 5.G.1.3 Exemplify how technological advances (communication, transportation and agriculture) have allowed people to overcome geographic limitations.
 - Geographic challenges are often resolved through technological innovation.