

Kelly Myers
Spring 2019
STEM Leadership Seminar

Professional Development Proposal

Title: Integrating STEM into Your Elementary Classroom

Topic Selected:

I selected this topic because there is a substantial disconnect between engaging students in inquiry, science or STEM and their general education classroom lessons. The teachers in my building are often intimidated, frustrated or generally lacking confidence when it comes to science instruction, inquiry-based learning and the mention of STEM integration. I feel substantial work must be done to increase teacher self-efficacy in the areas of inquiry and STEM in our elementary building.

NASA Integration:

This professional development will include sample activities for different elementary grade level bands utilizing NASA resources and suggested links. The goal of integrating NASA's resources is to provide teachers with easy access to real world data and meaningful connections for their classroom implementation of STEM or Science. The NASA Space Place will be a highlight feature of this professional development session. This resource will be extremely helpful to this group of educators as they reflect on how they may begin integrating STEM into their classrooms. The featured resource is found at: <https://spaceplace.nasa.gov/>

Proposed Audience:

Clarke Elementary School "Teacher U" participants and any other voluntary staff participants. Teacher U participants includes Lead Teachers and first or second year teachers from K-6 classrooms including Special Education, ELL and TAG programs.

Teachers Being Served:

| Teacher | Grade Level | Teacher | Grade Level |
|-------------------|--|--------------------|--------------------------|
| Hannah Finn | Kindergarten - All Subjects | Mady Adamson | 3rd Grade - All Subjects |
| Calie Dukes | 3rd Grade - All Subjects | Lakyn Mathews | 5th Grade - Writing |
| Molly Fitzpatrick | TAG | Emily Lande | 6th Grade - Science |
| Dawn Williams | Special Education | Jordyn Bethards | 3rd Grade - All Subjects |
| Beth Comer | 1st Grade - All Subjects | Tara Norman | 3rd Grade - All Subjects |
| Randi Johnson | ELL | Gina Sickels | 4th Grade - All Subjects |
| Sara Pauley | 1st Grade - All Subjects | Melanie Strudthoff | Behavioral Disorder |
| Maggie Eichhorn | 4th Grade - All Subjects | Caitlin Crook | 4th Grade - All Subjects |
| Bambi Sharp | Special Education | Hannah Ridder | 4th Grade - All Subjects |
| Marilyn Roberts | Special Education | Kathy Burk | 5th Grade - Math |
| Pam Sereg | Instructional Coach | Becca Kedley | Instructional Coach |
| Brittany Vidales | Student Success Coach | Angela Halsband | Student Success Coach |
| Jean Bahls | Curriculum Director | Mackenzie Otto | 2nd Grade - All Subjects |
| Other Staff | All elementary staff will be invited to attend | | |

Proposed Number of Students they Serve:

Varies by teacher but would include approximately 450 students total (excluding Special Education, ELL and TAG which would account for repeat and/or additional students). This group is representative of approximately 56% of our elementary school student body.

STEM Concepts and Learning Goals:

Given the lack of Science and STEM programming in our building at this time, the primary learning goals of this PD will include: the direct instruction of what are the NGSS, what are science and engineering practices, how is inquiry defined, what is the EDP and how do we go about integrating STEM in our classrooms. The teachers will most likely be in need of scaffolded learning resources accessible for later review that will help to explain STEM and the foundations of creating an inquiry driven classroom. In order to support the goal of having them become willing to implement a new STEM activity user friendly and simple resources will need to be provided to the teachers.

NGSS/CCSS Addressed:

The standards that will be highlighted in this PD include:

CCSS - ELA

Kindergarten:

Comprehension and Collaboration:

CCSS.ELA-LITERACY.SL.K.1

Participate in collaborative conversations with diverse partners about *kindergarten topics and texts* with peers and adults in small and larger groups.

CCSS.ELA-LITERACY.SL.K.1A

Follow agreed-upon rules for discussions (e.g., listening to others and taking turns speaking about the topics and texts under discussion).

CCSS.ELA-LITERACY.SL.K.1B

Continue a conversation through multiple exchanges.

CCSS.ELA-LITERACY.SL.K.2

Confirm understanding of a text read aloud or information presented orally or through other media by asking and answering questions about key details and requesting clarification if something is not understood.

CCSS.ELA-LITERACY.SL.K.3

Ask and answer questions in order to seek help, get information, or clarify something that is not understood.

1st Grade:

Presentation of Knowledge and Ideas:

[CCSS.ELA-LITERACY.SL.1.4](#)

Describe people, places, things, and events with relevant details, expressing ideas and feelings clearly.

[CCSS.ELA-LITERACY.SL.1.5](#)

Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings.

2nd Grade:

Research to Build and Present Knowledge:

[CCSS.ELA-LITERACY.W.2.7](#)

Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations).

[CCSS.ELA-LITERACY.W.2.8](#)

Recall information from experiences or gather information from provided sources to answer a question.

3rd Grade:

Integration of Knowledge and Ideas:

[CCSS.ELA-LITERACY.RI.3.7](#)

Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur).

[CCSS.ELA-LITERACY.RI.3.8](#)

Describe the logical connection between particular sentences and paragraphs in a text (e.g., comparison, cause/effect, first/second/third in a sequence).

[CCSS.ELA-LITERACY.RI.3.9](#)

Compare and contrast the most important points and key details presented in two texts on the same topic.

4th Grade:

Comprehension and Collaboration:

[CCSS.ELA-LITERACY.SL.4.1](#)

Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 4 topics and texts*, building on others' ideas and expressing their own clearly.

[CCSS.ELA-LITERACY.SL.4.1.A](#)

Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.

[CCSS.ELA-LITERACY.SL.4.1.B](#)

Follow agreed-upon rules for discussions and carry out assigned roles.

CCSS.ELA-LITERACY.SL.4.1.C

Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others.

CCSS.ELA-LITERACY.SL.4.1.D

Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.

CCSS.ELA-LITERACY.SL.4.2

Paraphrase portions of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.

CCSS.ELA-LITERACY.SL.4.3

Identify the reasons and evidence a speaker provides to support particular points.

5th Grade:

Range of Writing:

CCSS.ELA-LITERACY.W.5.10

Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

CCSS - Mathematics

5th Grade Mathematics:

Geometric measurement: understand concepts of volume.

CCSS.MATH.CONTENT.5.MD.C.3

Recognize volume as an attribute of solid figures and understand concepts of volume measurement.

CCSS.MATH.CONTENT.5.MD.C.4

Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.

CCSS.MATH.CONTENT.5.MD.C.5

Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.

CCSS.MATH.CONTENT.5.MD.C.5.B

Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.

NGSS -

Kindergarten:

K-PS3-1. Make observations to determine the effect of sunlight on Earth's surface. [Clarification Statement: Examples of Earth's surface could include sand, soil, rocks, and water] [Assessment Boundary: Assessment of temperature is limited to relative measures such as warmer/cooler.]

1st Grade:

1-ESS1-1. Use observations of the sun, moon, and stars to describe patterns that can be predicted. [Clarification Statement: Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars other than our sun are visible at night but not during the day.] [Assessment Boundary: Assessment of star patterns is limited to stars being seen at night and not during the day.]

2nd Grade:

2-ESS2-3. Obtain information to identify where water is found on Earth and that it can be solid or liquid

3rd Grade:

Natural Disasters

A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts. (3-ESS3-1) (Note: This Disciplinary Core Idea is also addressed by 4-ESS3-2.)

4th Grade:

4-PS3-2. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. [Assessment Boundary: Assessment does not include quantitative measurements of energy.]

6th Grade:

LS1.D: Information Processing

Each sense receptor responds to different inputs (electromagnetic, mechanical, chemical), transmitting them as signals that travel along nerve cells to the brain. The signals are then processed in the brain, resulting in immediate behaviors or memories. (MS-LS1-8)

Time & Location of PD:

This PD will take place during a single Teacher U session. Thursday, February 28, 2019 from 3:00 pm - 4:00 pm in an elementary school classroom.

Teacher Electronic Access:

Teachers will be invited to bring a technology tool so that they may access shared materials, resources and the post-survey. However, computers will not be required for session attendance.

Pre-survey:

The pre-survey will be conducted in advance using Google forms. Teachers will be asked to identify their understanding of STEM, Science and Engineering Practices, Inquiry and the NGSS. They will also be asked to gauge their level of confidence and willingness to implement STEM and/or Inquiry in their classrooms. The purpose of this pre-survey is to identify the areas of need of this group of staff. I anticipate need to vary and there to be limited teacher confidence and little understanding of the NGSS or the Engineering Design Process.

Post-survey:

The post-survey will also be conducted using Google forms. Teachers will be asked to identify the understanding of the selected focus topic, which may include: STEM, Science and Engineering Practices, Inquiry or the NGSS. They will also be asked to again gauge their level of confidence and willingness to try something new to implement STEM and/or Inquiry in their classrooms. The purpose of this survey will be to determine if the PD was successful in shifting teacher perceptions, understandings and self-efficacy in integrating STEM and inquiry in the classroom.

Desired Outcomes:

The goal of my PD will be to increase teacher self-efficacy or willingness to try to implement more inquiry, STEM and the NGSS in their classrooms. I would like to see growth in their understanding and a heightened interest in trying something new to promote STEM within their classrooms. An additional desired outcome would be to create an atmosphere where this is not an isolated session but an initial session of continual learning that I

may help to facilitate building-wide by increasing this group's interest in STEM.

Follow Up:

Teacher U is a year-long, weekly opportunity for professional dialogue and learning. I will follow up with teachers through this platform as well as through the opportunity to visit with their grade level PLC on our designated weekly PLC days. By sharing a Google Folder/Drive with the teachers I will also be able to encourage resource sharing and a systematic approach to building school-wide STEM resources for integration into their classrooms.

Data Collection/Analysis:

I will be using the data generated from the Google form survey to analyze the teachers' growth in the areas of confidence, understanding and willingness to try something new. The Google form will generate data that can be broken down by question response as well as grade level of instruction so that I may gear future learning toward individual grade levels if applicable. Given the nature of our weekly PLC and Teacher U sessions, the opportunity may exist to interview a few teachers after the PD session to obtain additional data for reflection.

NASA Resources Available for Use:

Kindergarten - NGSS

Sun's Effect on Earth - Connection to Humans and Sunscreen

<https://spaceplace.nasa.gov/sunscreen-activity/en/> Activity

1st Grade - NGSS

Patterns in the Sky - Moon Phases

<https://spaceplace.nasa.gov/oreo-moon/en/>

2nd Grade - NGSS & CCSS - ELA

<https://spaceplace.nasa.gov/water/en/> Water/Informational Text, Video

3rd Grade ELA - Integrating Information

<https://spaceplace.nasa.gov/all-about-mars/en/> Informational Text

3rd Grade - NGSS

Natural Disasters

<https://spaceplace.nasa.gov/hurricanes/en/> Hurricanes

4th Grade - NGSS

Energy

<https://spaceplace.nasa.gov/greenhouse/en/> Greenhouse Gases

<https://spaceplace.nasa.gov/gumdrops/en/> Greenhouse Gases Models

5th Grade Mathematics

https://www.nasa.gov/pdf/190541main_How_Much_Waste.pdf Activity

6th Grade - NGSS

Information Processing

<https://spaceplace.nasa.gov/pigeons/en/> Informational Text & Engaging Phenomena (Could be used as a writing prompt as well)

NASA General Resources: K-6 Grade Levels

Defining "Science" for Teachers

<https://spaceplace.nasa.gov/science/en/>

Engineering Design Process Information

<https://www.nasa.gov/audience/foreducators/best/edp.html>

Inquiry-based Learning Activities

https://www.nasa.gov/audience/foreducators/stem-on-station/learning_launchers_inquiring_minds_education