

Mandatory 4 – Final Paper

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NASA Endeavor STEM Teaching Certificate Project

STEM Leadership Seminar

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Spring 2018

I. Title of Project

The title of the STEM professional development was “*What is STEM Education?*” The professional development consisted of four mini-sessions (30 minutes each).

II. Curriculum Topics, School Name(s), Number of Educators, Grade Level(s)

Topics

- Science – Using Phenomena to Engage Students
- Technology – Ways to Incorporate 1:1 Devices Tomorrow!
- Engineering - The Engineering Design Process
- Mathematics – Using the 4Cs in Math

School Name: Potter Elementary School – The school has a population of about 500 students, and 100% of the students are on free/reduced lunch. About 85% of the students are African American and 10% are Hispanic. The other students are Asian, White, and Multiracial.

Number of Educators: 12

My proposed audience was the K-5 faculty at my school site, which included about 20 teachers. However, the only day of the week I was able to present the training was on an Early Release Monday during K-2 teacher planning time while one 2nd Grade and all 3rd grade teachers were teaching students in the Extended Learning Program and all 4th – 5th Grade teachers were teaching in the Extended Reading Program. Thus, only thirteen K-2 teachers were available to attend the PD. I was fortunate that 12 out of 13 teachers participated. One Kindergarten teacher was unable to attend, because she wanted to meet with her Mentor during that time. The participants included five Kindergarten, five 1st Grade, and two 2nd Grade teachers.

III. Standards Addressed

The Science, Technology, and Math mini-sessions primarily focused on teacher practices, rather than standards. The Engineering session focused on the Engineering Design Process which addresses both teacher practices and student standards. The standards addressed were:

- K-2-ETS1-1 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 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.
- K-2-ETS1-3 Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

IV. Summary of Project

The purpose of my PD was to increase teacher awareness of STEM Education. I wanted teachers to learn at least one practice they could immediately implement into their classrooms. I also wanted them to become aware of at least one resource they could use to support their implementation of teacher practices in STEM Education.

V. Pre-questions Survey List

The participants had three response options:

Yes No Unsure/Undecide

Science Mini-Session

- I currently use phenomena to drive instruction and engage students in learning.
- I can define what phenomena are in science and engineering.
- I can explain why centering science education on phenomena is important.
- I understand how phenomena are related to the NGSS.
- I am aware of how teachers can use phenomena to drive instruction and engage students in learning.
- I can explain what makes using phenomena effective.
- I can identify two or more online resources for phenomena that are aligned with my grade level standards.

Technology Mini-Session

- I currently incorporate the use of 1:1 devices during science or math instruction.
- I am aware of how to use Padlet as a collaboration space in my classroom.
- I am aware of how to use Kahoot! as a game-based learning platform.
- I am aware of how to use Quizizz as a game-based learning platform.

Engineering Mini-Session

- I currently engage my students in the engineering design process.
- I am aware of NASA's BEST Engineering Design Model.
- I know where to find online activities that engage students in the engineering design process.

Math Mini-Session

- I currently incorporate the 4Cs into math lessons.
- I can identify the 4Cs students need to be successful in today's global economy.
- I am aware of online resources that support using the 4Cs in math.

VI. Brief Description of the Actual Professional Development Training

I offered the “What is STEM Education?” training on two Early Release Mondays during the K-2 PLC planning time. Initially, only four out of thirteen available K-2 teachers signed up to participate in the training. I gained teacher’s willingness to attend the PD a variety of ways. First, I revised the training by offering the four mini-sessions as a menu of four choices, rather than treating the training as a single PD. Teachers had the flexibility to attend specific mini-sessions they were interested in, rather than committing to taking an entire training. Second, I made arrangements with an administrator to offer 30 minutes of comp time for each mini-session they attended. Third, I offered prize drawings after each mini-session. Last, I visited each teacher individually and discussed the professional benefits of attending the training. As a result, twelve out of thirteen available teachers attended the training.

The content of the training was implemented as described. The science mini-session focused on using phenomena to drive teacher instruction and student learning. The technology mini-session focused on incorporating the use of 1:1 devices into science or math instruction. The purpose of the Engineering Mini-Session was to introduce teachers to the engineering design process. The Math Mini-Session addressed ways to incorporate the 4Cs.

VII. Brief Outline of the Activities in the Pick-up Unit

Science Mini-Session

1. Video: *NGSS EQuIP Rubric: Using Phenomena to Engage Students in Science*
 - a. What are phenomena?
 - b. Benefits of Using Phenomena
 - c. How Phenomena Drives Teaching and Learning
 - d. Phenomena and the NGSS
2. Article: “Using Phenomena on NGSS-Designed Lessons and Units”
 - a. Why is centering science education on phenomena important?
 - b. What makes phenomena effective for classroom use?
3. Resources
 - a. Phenomena for NGSS
 - b. NASA Image Gallery
 - c. NASA eClips
4. Reflection Question
 - a. Does the lesson provide students with authentic opportunities to make sense of meaningful phenomena, questions, and/or problems by developing and using the three dimensions?

Technology Mini-Session

1. Padlet overview
 - View example Padlets
 - o <https://padlet.com/salimbakare/3Dshapes>
 - o <https://padlet.com/salimbakare/habitat>
 - o <https://padlet.com/salimbakare/expressions>
2. Kahoot! overview
 - Play a Kahoot! game
3. Quizizz overview
 - Play a Quizizz game

Teachers were given opportunities to ask questions during and after each activity. We also debriefed after each activity to discuss the benefits, challenges, and logistics of using each technology tool.

Engineering Mini-Session

1. NASA's BEST Engineering Design Model
 - View example Projects
2. Engineering Design Challenge
 - Pom-Pom Slingshot Challenge - Can you construct a slingshot that will launch a pom-pom the farthest distance?
3. Engineering Resources
 - NASA BEST Activity Guides
 - PBS Kids Design Squad

Math Mini-Session

1. Video: *21st Century Skills: The 4Cs*
2. Discussion: The 4Cs – Why is it important for students to develop these skills?
3. Discussion: How can the 4Cs be incorporated into existing math lessons?
4. Work with PLCs: Explore the “Using the 4Cs in Math” website.

VIII. What NASA data did you include?

Science Mini-Session

Participants can use the following resources can to locate engaging phenomena to anchor science learning and inspire students to build engineering knowledge.

- NASA eClips videos
- NASA Image Gallery

Engineering Mini-Session

Participants can use the following resources to gain an understanding of the engineering design process and access ready-to-use lessons they can implement in their classrooms. Participants can also see more than one approach to the engineering design process, as well as the engineering design process in action.

- NASA's BEST Engineering Design Model
- NASA's BEST Educator Guides: Grades K-2
- PBS Design Squad resources (in collaboration with NASA)

IX. Follow-up Activities & Post-questions Survey List

Follow-up Activities

Science Mini-Session

1. Work with your PLCs to identify NASA eClips videos that are aligned with the science standards for your grade level. Identify the appropriate grade level(s), topic, and standards.

Technology Mini-Session

2. Choose one activity.
 - a. Make a Padlet with your class that is aligned with science or math standards.
 - b. Play an existing Kahoot! game with your class or create your own Kahoot! game that is aligned with science or math standards.
 - c. Play an existing Quizizz game with your class or create your own Quizizz game that is aligned with science or math standards.

Engineering Mini-Session

3. Choose one activity,
 - a. View the NASA BEST Educator Guide for Grades K-2. Identify an activity your grade level PLC is willing to implement with the students. What support and/or resources do you need to implement the lesson?
 - b. Watch the PBS Kids Design Squad One Activity: Start to Finish Slide Show. <http://pbskids.org/designsquad/parentseducators/workshop/activity.html>
Compare and contrast the similarities and differences between NASA's BEST Engineering Design Model and PBS Kids Design Squad Engineering Design Process.
 - c. Have your students participate in an engineering design challenge. Submit a brief write-up of the activities and evidence of student work.

Math Mini-Session

1. Explore the “Using the 4Cs in Math” website.
 - o <https://sites.google.com/site/usingthe4csinmath/home>
2. Work with your grade level PLCs to choose one activity or resource to develop each of the 4Cs.

Post-questions Survey List**Science Mini-Session**

- I will begin or continue using phenomena to drive instruction and engage students in learning.
- I can define what phenomena are in science and engineering.
- I can explain why centering science education on phenomena is important.
- I understand how phenomena are related to the NGSS.
- I am aware of how teachers can use phenomena to drive instruction and engage students in learning.
- I can explain what makes using phenomena effective.
- I can identify two or more online resources for phenomena that are aligned with my grade level standards.

Technology Mini-Session

- I will begin or continue incorporating the use of 1:1 devices during science or math instruction.
- I am aware of how to use Padlet as a collaboration space in my classroom.
- I am aware of how to use Kahoot! as a game-based learning platform.
- I am aware of how to use Quizizz as a game-based learning platform.

Engineering Mini-Session

- I will begin or continue engaging my students in the engineering design process.
- I am aware of NASA’s BEST Engineering Design Model.
- I know where to find online activities that engage students in the engineering design process.

Math Mini-Session

- I will begin or continue incorporating the 4Cs into math lessons.
- I can identify the 4Cs students need to be successful in today’s global economy.
- I am aware of online resources that support using the 4Cs in math.

X. Outcomes. Final Data Collection and Analysis

a. Survey Results/Comment on the content included in the project

Science Mini-Session

Pre-session survey results indicated that 1/12 participants currently use phenomena to drive instruction and engage students in learning, 9/12 do not use phenomena, and 2/12 are unsure/undecided. Post-session results indicated that 12/12 participants will begin or continue using phenomena to drive instruction and engage students in learning. The other results were as follows:

- I can define what phenomena are in science and engineering.
 - PRE: Yes – 1/12 No – 9/12 Unsure/Undecided – 2/12
 - POST: Yes – 12/12 No – 0/12 Unsure/Undecided – 0/12

- I can explain why centering science education on phenomena is important.
 - PRE: Yes – 0/12 No – 11/12 Unsure/Undecided – 1/12
 - POST: Yes – 12/12 No – 0/12 Unsure/Undecided – 0/12

- I understand how phenomena are related to the NGSS.
 - PRE: Yes – 0/12 No – 11/12 Unsure/Undecided – 1/12
 - POST: Yes – 12/12 No – 0/12 Unsure/Undecided – 0/12

- I am aware of how teachers can use phenomena to drive instruction and engage students in learning.
 - PRE: Yes – 1/12 No – 10/12 Unsure/Undecided – 1/12
 - POST: Yes – 12/12 No – 0/12 Unsure/Undecided – 0/12

- I can explain what makes using phenomena effective.
 - PRE: Yes – 1/12 No – 9/12 Unsure/Undecided – 2/12
 - POST: Yes – 12/12 No – 0/12 Unsure/Undecided – 0/12

- I can identify two or more online resources for phenomena that are aligned with my grade level standards.
 - PRE: Yes – 1/12 No – 11/12 Unsure/Undecided – 0/12
 - POST: Yes – 12/12 No – 0/12 Unsure/Undecided – 0/12
 -

Technology Mini-Session

Pre-session survey results indicated that 2/12 participants currently incorporate the use of 1:1 devices during science and/or math instruction and 10/12 do not. Post-session results indicated that 10/12 participants will begin or continue incorporating the use of 1:1 devices during science and/or math instruction and 2/12 are unsure/undecided. The other results were as follows:

- I am aware of how to use Padlet as a collaboration space in my classroom.

- o PRE: Yes – 1/12 No – 11/12 Unsure/Undecided – 0/12
- o POST: Yes – 11/12 No – 0/12 Unsure/Undecided – 1/12

- I am aware of how to use Kahoot! as a game-based learning platform.
 - o PRE: Yes – 1/12 No – 11/12 Unsure/Undecided – 0/12
 - o POST: Yes – 11/12 No – 0/12 Unsure/Undecided – 1/12

- I am aware of how to use Quizizz as a game-based learning platform.
 - o PRE: Yes – 1/12 No – 11/12 Unsure/Undecided – 0/12
 - o POST: Yes – 12/12 No – 0/12 Unsure/Undecided – 0/12

Engineering Mini-Session

Pre-session survey results indicated that 0/11 participants currently engage students in the engineering design process, 10/11 do not, and 1/11 is unsure/undecided. Post-session results indicated that 11/11 participants will begin or continue engaging students in the engineering design process. The other results were as follows:

- I am aware of NASA's BEST Engineering Design Model.
 - o PRE: Yes – 1/11 No – 10/11 Unsure/Undecided – 0/11
 - o POST: Yes – 11/11 No – 0/11 Unsure/Undecided – 0/11

- I know where to find online activities that engage students in the engineering design process.
 - o PRE: Yes – 1/11 No – 10/11 Unsure/Undecided – 0/11
 - o POST: Yes – 11/11 No – 0/10 Unsure/Undecided – 0/10

Math Mini-Session

Pre-session survey results indicated that 1/10 participants is currently incorporating the 4Cs into math lessons, 6/10 are not, and 3/10 are unsure/undecided. Post-session results indicated that 10/10 participants will begin or continue incorporating the 4Cs into math lessons. The other results were as follows:

- I can identify the 4Cs students need to be successful in today's global economy.
 - o PRE: Yes – 1/10 No – 7/10 Unsure/Undecided – 2/10
 - o POST: Yes – 10/10 No – 0/10 Unsure/Undecided – 0/10

- I am aware of online resources that support using the 4Cs in math.
 - o PRE: Yes – 1/10 No – 9/10 Unsure/Undecided – 0/10
 - o POST: Yes – 9/10 No – 0/10 Unsure/Undecided – 1/10

b. Survey Results/Comment on the pedagogy in the project

Science Mini-Session

The focus was on the teacher practice of using phenomena to drive instruction and student learning. As a trainer, I use the *NGSS EQUIP Rubric: Using Phenomena to Engage Students in Science* video to ensure that participants had a clear understanding of what phenomena are. The video includes a wonderful example that prompted one of the participants to yell, “What was that!? What happened!?” I simply responded, “Exactly!” I further pointed out that effective phenomena compels our students to ask questions and want to learn. I also gave participants an opportunity to explore the resources and determine how the resources could help them identify phenomena that are aligned with standards.

Technology Mini-Session

The goal of this mini-session was to provide teachers with some technology tools they could use to enhance instruction, engage students, and assess learning. My role as a trainer was to model what participants would do in their classrooms. I was “the teacher.” and the participants were “the students.” After participating in each activity, we discussed the benefits of using each technology tool, such as formative assessments. The participants also had opportunities to ask questions. For example, after playing both Kahoot! and Quizizz games and noting the similarities and differences, one participant asked, “Can I assign Quizizz for homework?” After viewing an example Padlet and student uploaded work, another participant asked several questions about a Sway presentation she saw and requested that I offered a training about how to create Sway presentations.

Engineering

I simply presented NASA’s BEST Engineering Design Process and provided one K-2 example and one 3-5 example. Then, I engaged the participants in an engineering design challenge. I guided the participants just as a teacher would guide the students. Much like our K-2 students, many participants wanted to skip steps. For instance, one group quickly built a slingshot without going through the process. Their slingshot didn’t work very well. Consequently, they learned the value of brainstorming, sketching, and planning first. Their 2nd attempt was successful. They also learned the value of teamwork when one participant exclaimed, “I hate to draw,” and another teammate was very happy to draw. All of the participants also experienced the value of making improvements to their designs.

Math

To introduce participants to the 4Cs, I had them watch the *21st Century Skills: The 4Cs* video on YouTube. A brief discussion of the 4Cs revealed that each teacher was confident s/he could incorporate the 4Cs into existing math lessons, as well as other lessons. Teachers were given the gift of time to work with their PLCs to explore the Using the 4Cs in Math website.

c. Was your professional development successful?

I believe the PD was a success, because several teachers have begun implementing what they learned. For example, a few teachers incorporated Kahoot! and Quizizz into their lessons the following day and several more throughout the week. One participant, who was originally undecided/unsure due to her lack of confidence in using technology, was motivated by the joyful noise of her teammate's students. Less than a week after the Technology Mini-Session, several teachers asked me to offer additional mini-sessions. Other teachers have also reported incorporating phenomena into science lessons and the 4Cs into math, as well as other content areas.

Based on participant feedback, the principal asked me to develop the STEM training into a 3-hour district training and offer an additional session, so participants could receive credit for the course on their official district in-service training record.

d. How did this project relate to the readings? Cite two examples.

This project relates to the Lustick's (2011) article regarding effective PD. Many study participants rated Collaborating with Colleagues as an effective PD activity (Lustick, 2011). Collaborating with Colleagues also had the greatest pre to post gain when considering ratings of PD over time. I view my PD as a collaborative activity with colleagues. My colleagues at a previous school introduced me to STEM Education and shared their knowledge and resources with me. I'm simply paying it forward. I will also take it one step farther than what I experienced at my previous school year and create Padlets for our follow-up activities. As a result, participants will be able to share their work and resources and save each other a lot of planning time.

This project also relates to the Fulton (2011) article, because teachers had multiple opportunities to work with their PLCs to explore resources and determine which resources would be useful for their grade levels and individual classrooms. Many of the mini-session activities required teamwork and several follow-up activity options allow participants to work with their PLCs to complete tasks. In fact, many participants breathed a sigh of relief whenever they had the option to work with their teams, rather than work individually. Hopefully, the likelihood participants will implement the new practices over a period of time will increase.

e. Will the teacher do these activities again?

Yes, the participants will continue to implement the teacher practices they learned during the PD. The goal of the training was for teachers to learn new practices they could begin and continue implementing immediately. If a teacher needs additional support to implement the new practices, I will make the time to provide assistance either after school or during the school day. For example, during the school day, my students and I can go to a classroom and assist with the implementation of Padlet. We can also help students with engineering design challenges. I will also make myself available to provide 1:1 or PLC support after school.

f. Reflection

What went well

It was my goal to create an awareness of STEM Education and provide teachers with a “taste” of each content area. I wanted teachers to leave each mini-session with at least one new teacher practice they could implement immediately and at least one resource they could use to support their implementation of teacher practices in STEM Education. Overall, my goal was met.

In addition, some of the training and follow-up activities allotted time for participants to work with their grade level PLCs. Several participants commented that they appreciated the opportunity to divide and conquer. They felt supported and more confident in their abilities to successfully complete the follow-up tasks and implement the practices in their classrooms.

Areas for improvement

The training was rushed, because each 30-minute mini-session went by very quickly. Although it was my intention to give teachers only a little “taste” of each area of STEM, I would still address fewer topics in the future. After the first mini-session, I recognized how quickly the time flew by and reduced the number of objectives for the remaining mini-session. In addition, I didn’t have enough time to support teacher implementation during the training. For example, teachers played Quizizz; however, I didn’t have time to walk teachers through the process of creating an account and creating their own game.

I also realized after the training that teachers wouldn’t be able to easily share resources, since the follow-up tasks were completed on paper.

Although the survey results look promising, I wish I created a post-test that assessed teachers’ knowledge of specific content.

Next Steps

1. Address fewer objectives for each mini-session. For example, an entire Technology mini-session could be devoted to Padlet only.
2. Create a Padlet for follow-up activities. As a result, participants will be able to share resources with each other.
3. Develop the training into a 3-hour course. Create and administer a post-test that assesses participant knowledge of specific training content.

XII. Include the names and contact information of four educators who attended the PD.

1. Brittany Miles brittany.miles@sdhc.k12.fl.us
2. Melissa Mohan melissa.mohan@sdhc.k12.fl.us
3. Warren Adderley warren.adderley@sdhc.k12.fl.us
4. Sheba Tartt-Walker sheba.tarttwalker@sdhc.k12.fl.us

XIII. Appendix

Participant Handouts

Science Mini-Session Summary

What are phenomena?

- Natural observable events that occur in the universe.
 - Science – Students can use their knowledge to explain or predict phenomena.
 - Engineering – Students can design solutions to problems that arise from phenomena and use explanations of phenomena to design solutions.

Why is using phenomena in the classroom important?

- Makes learning accessible to all students, including English language learners and students with limited background experiences.
 - Shared phenomena in the classroom levels the playing field.
- Hooks students' interests and compels them to ask questions about things that are relevant and interesting to them in their world.
- Keeps students working to "figure out" why or how something happens rather than "learning about."
- Helps students apply learning to real-world contexts.
- Provides a purpose for learning and motivates students to build science and engineering knowledge.

How can I implement phenomena in the classroom?

- Select phenomena that students find engaging, meaningful and relevant.
 - Video clip, photograph/image, discrepant event, common experience, current event
- Use phenomena as a thread that flows through the entire unit to drive student learning across the three dimensions combined to form each NGSS standard, or "performance expectation."
- Use phenomena plus student-generated questions about the phenomena to guide teaching and learning.

Phenomena Resources

- Phenomena for NGSS
 - A site where teachers can access and share engaging anchor phenomena for building science units.
 - <http://www.ngssphenomena.com/>

- NASA eClips
 - Short, relevant educational video segments that inspire and engage students and help them see real world connections.
 - Main website
<https://www.nasa.gov/audience/foreducators/nasaclips/index.html>
 - K-5 website
<https://nasaclips.arc.nasa.gov/video/ourworld/our-world-sun-position>

- NASA Image Gallery
 - <https://www.nasa.gov/multimedia/imagegallery/index.html>

- Teacher Video
 - NGSS EQuIP Rubric: Using Phenomena
 - <https://www.teachingchannel.org/videos/using-phenomena-achieve>

- Handout
 - Using Phenomena in NGSS-Designed Lessons and Units”
 - <https://www.nextgenscience.org/sites/default/files/Using%20Phenomena%20in%20NGSS.pdf>

Technology Mini-Session Summary

Padlet

<https://padlet.com/>

- An online collaboration space and electronic bulletin board.
- Can add images, links, videos, and more.
- Examples
 - Basic
 - <https://padlet.com/salimbakare/3Dshapes>
 - Advanced
 - <https://padlet.com/salimbakare/expressions>

Kahoot!

<https://kahoot.com/>

- A game-based learning and trivia platform
- Create, play and share engaging quizzes on any topic!

Quizizz

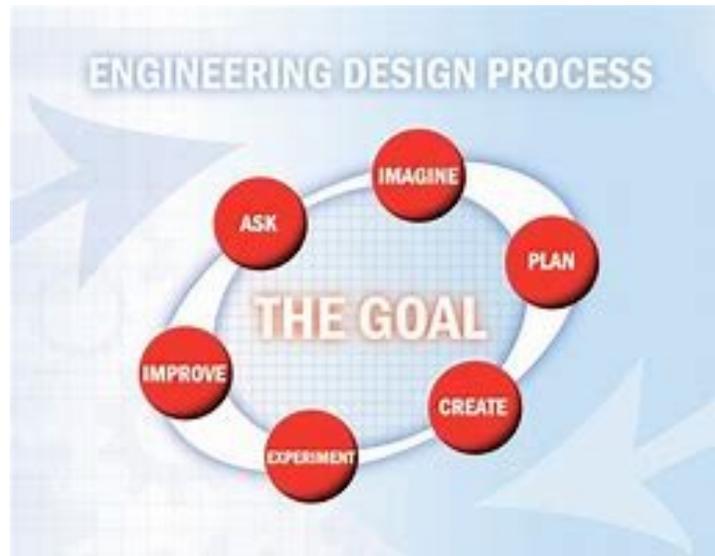
<https://quizizz.com/>

- Game-based learning and quiz platform
- Create, play and share engaging quizzes on any topic!
- Avatars, leaderboards, themes, music and memes!
- Students can review work afterwards.
- In-class or homework.

Engineering Mini-Session Summary

NASA's BEST Engineering Design Model

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



ASK: Students identify the problem, requirements that must be met, and constraints that must be considered.

IMAGINE: Students brainstorm solutions and research ideas. They also identify what others have done.

PLAN: Students choose two to three of the best ideas from their brainstormed list and sketch possible designs, ultimately choosing a single design to prototype.

CREATE: Students build a working model, or prototype, that aligns with design requirements and that is within design constraints.

TEST/EXPERIMENT: Students evaluate the solution through testing; they collect and analyze data; they summarize strengths and weaknesses of their design that were revealed during testing.

IMPROVE: Based on the results of their tests, students make improvements on their design. They also identify changes they will make and justify their revisions.

Engineering Design Process Resources

- NASA BEST Activity Guides
 - A site where teachers can access Educator Guides that couple NASA engineering content and themes to help teach students the engineering design process. The guides reflect NASA's role as a leader in space, technology, aeronautics, and science.
 - <https://www.nasa.gov/audience/foreducators/best/activities.html>

- PBS Kids Design Squad
 - A site where teachers and parents can participate in an online workshop about the engineering design process and access activities that engage students in the engineering design process.
 - <http://pbskids.org/designsquad/parentseducators/workshop/process.html>
 - <http://pbskids.org/designsquad/parentseducators/workshop/resources.html>

Math Mini-Session Summary

The 4Cs

- Collaboration
- Communication
- Creativity
- Critical Thinking

Video

21st Century Skills: The 4Cs

- https://www.youtube.com/watch?v=BXT2STtm_54

Resource for Using the 4Cs in Math

<https://sites.google.com/site/usingthe4csinmath/home>

1. Collaboration

- Working together
o <https://sites.google.com/site/usingthe4csinmath/collaboration>

2. Communication

- Sharing thoughts and ideas.
o <https://sites.google.com/site/usingthe4csinmath/communication>

3. Creativity

- Using new approaches to get things done
o <https://sites.google.com/site/usingthe4csinmath/creativity>

4. Critical Thinking

- Thinking about problems in new ways
o <https://sites.google.com/site/usingthe4csinmath/critical-thinking>

Assessment for 3-hour Course

What is STEM Education?

Participant Name _____

Science

Write T if the statement is TRUE. Write F if the answer is FALSE.

1. _____ Phenomena makes science accessible and equitable to all students.
2. _____ Centering science education on phenomena shifts the focus of learning from figuring out why or how something happens to learning about a topic.
3. _____ Natural phenomena are observable events that occur in the universe and that we can use our science knowledge to explain or predict.
4. _____ Effective phenomena must be flashy or unexpected.
5. _____ Learning to explain phenomena and solve problems is the central reason students engage in the three dimensions of the NGSS.

Technology

Read each description of a technology tool. Write the letter of the tool that matches the description.

A. Kahoot! B. Padlet C. 4Cs C. Quizizz

6. _____ An online bulletin board that can be used as a collaboration space in the classroom.
7. _____ This game-based learning platform can be used for classwork or homework at the student's pace. Students can review their work afterwards.
8. _____ This game-based learning platform requires students to play at the same time.

Engineering Design Process

Write the numbers 1-6 on the blanks to indicate the correct sequence of NASA's BEST Engineering Design Model.

_____ Plan

_____ Improve

_____ Ask

_____ Create

_____ Test/Experiment

_____ Imagine

Math

Write the appropriate “4C” on the blank next to its description.

1. Using new approaches to get things done _____
2. Working together _____
3. Thinking about problems in new ways _____
4. Sharing thoughts and ideas _____

Participant Photos

