SCED 545 Final Paper

James H. Wieder

NASA Leadership Seminar

SCED 545 Spring 2021

Dr. Kristen Crawford

April 27, 2021

Final Paper; Professional Development

The PD that was performed for my school was entitled “PD on NASA Resources”. As the title suggests I concentrated on the wealth of NASA web resources, many of which I was to find out were unknown to my colleagues.

I teach eighth grade life science in a non-co-ed Parochial k-8 school in Passaic N.J., Passaic County, called Hillel Academy. Passaic is located within 15 miles of NYC and is considered a middle-class urban community. Our school has almost 900 students with 4 sections of each grade consisting of two boys classes and two girls classes. We have four principals, over 60 teachers, approximately 20 support staff and numerous assistants for the elementary grades.

When the current principal arrived, she appointed me as the Science Chair, and we strengthened the elementary science curriculum. We decided that instead of covering many topics each year, each grade would cover only two; inch-wide and mile-deep. As chair I chose to implement a system whereby all the elementary classes would have a scheduled time to come to the middle school science lab where I would start a topic, do projects/demonstrations, play games, and help them perform experiments. This was the system until Covid. I also give short lessons to those teachers who need more help with the actual science. The fourth through seventh grade teachers were invited to the PD by me with the permission of Mrs. Natalie Lichtman, our elementary, general studies school principal. The names of attendees along with a copy of the pre/post survey questions, and the NGSS standards of the activities during the PD can be found in the appendix.

Summary

Our fourth-grade curriculum begins with astronomy and ends with energy. Our fifth-grade curriculum is general chemistry. Sixth and Seventh are Earth science and physics, respectively. Ten teachers were invited to the PD, six attended, including my principal. My goal for this PD was to enhance the science curriculums of each grade by introducing my teachers to the numerous websites and resources that NASA has and that were conveyed to me by the Endeavor STEM Project Certificate program. My major focus for the fourth graders and my Earth science teacher, was to offer as many resources as possible that directly affect them. My secondary focus was to introduce the resources to the chemistry and physics teachers as well. My last goal was to instill an appreciation for all that NASA does for us. I wanted to make sure that they walk away with the notion that NASA is not only about space.

Method

The method I prefer to use during a PD is called the D E B method. The letters stand for define, explore, and build. I start off with a hook much like the 5E method of teaching. Then I proceed to define the new technology or idea I am presenting. Next, we move into the explore phase where we explore the different websites, briefly spending some time on each. It is in this section where I will have them partake in a project session of my own construction or an example from

the websites that I am showing. Next, I have breakout sessions for the teachers to build and plan their own lesson using the tools I have shown them. Let them get their hands dirty, so to speak.

The participants were emailed invitations to the PD along with a pre-PD survey. The PD began with a glass filled to the brim with water and ice sitting on the table. I asked the participants to write down their prediction as to what would happen. Would the water overflow, stay the same or decrease? The glass was then placed out of view of the participants. I projected a copy of a NY Times article by Christopher Flavelle (2020) titled, "New Data Shows an 'Extraordinary' Rise in U.S. Coastal Flooding". I gave them a chance to skim the article, even though it does not produce any hard facts or sources. I asked the audience what methods could be put into play to measure and warn citizens of possible flooding. Several teachers mentioned The National Oceanic and Atmospheric Administration (NOAA). NOAA's job is indeed to watch over our weather and water by using weather stations, radar, and satellites. The NASA/NOAA Suomi NPP satellite is in orbit looking at the Earth's oceans. We explored both the NOAA (n.d.) website, "How are satellites used to observe the ocean?", and the NASA (2019) website "Suomi NPP". There was some interest by the fourth-grade teachers to download the Suomi mission brochure from the website for their classes.

One of the main objectives of the PD was to introduce two websites that would be invaluable in helping teachers prepare lessons, show videos, and otherwise engage their students, be it in astronomy, chemistry, and Earth science. To that end the next web site we visited was NASA's website, "Climate Kids". We explored different subjects and then the lessons/videos of those subjects. Prior to the PD I had set up an activity from the Climate Kids website. We explored the lesson plan and videos regarding climate change, sea-level rise, and Jason-3, the NASA satellite that uses radar to map sea rise. I used the NASA Climate Kids (2021) lesson "How do we measure sea level rise?" and the associated project. The teachers followed the directions and performed the experiment.

The experiment consisted of two foil pans (sea ice model, land ice model) with clay acting as land. Water was poured into both, ice cubes into one. Both water levels were measured as a starting point, ice was placed on the clay for the land ice model. Measurements of the water were taken every 5 minutes to determine how much the sea level rose. We used the Sea Level Rise – Melting Ice worksheet from NASA JPL's Project: Education page. The consensus was that the sea ice did not raise the water level, but the land ice did. I then produced the original cup of ice. The ice almost completely melted but did not overflow.

Models of sea ice and land ice

We then explored the other NASA resources that I had planned on, namely My NASA Data (n.d.) which is excellent for lesson plans for older children. The Earth System Data Explorer site was chosen for last, as it is necessary to learn how to navigate the site. I felt that many teachers would probably not bother trying, thinking it too hard.

I introduced Howard Gardner's theory of Multiple Intelligences (MI). Dr. Gardner lists eight intelligences that all children have in varying degrees. They are linguistic, logical-mathematical, spatial, bodily-kinesthetic, musical, interpersonal, intrapersonal, and naturalist. In his book Thomas Armstrong, chooses "to use terminology that more clearly and directly reflects the essential nature of each intelligence", (2018). The terms Dr. Armstrong uses are word smart, number-logic smart, picture smart, body smart, music smart, people smart, self-smart, nature smart.

Gardner and Armstrong explain that no one intelligence exists by itself. I suggested that they try to find demonstrations, experiments, and projects for their classes that would involve as many of the intelligences as possible. In this experiment we employed word smart activities such as reading the NY Times. Logic smart activities include problem solving exercises. For the picture smart we have graphics and videos. The body smart student will excel in the building and designing of the models while working in tandem with others who may be people and self-smart. The whole experiment appeals to nature smart individuals.

Lastly, I allowed the teachers time to build their own project using any of the websites that we explored.

Reflection

I enjoyed giving the presentation. I have a good working relationship with the staff, so it was easy to do. Informally I make videos for my staff explaining certain science concepts that I want them to impart to the students. The teachers liked the sea-level rise experiment. There was much discussion as to coastal flooding and I found that many of them have very different views. Some do not believe in coastal flooding and temperature rise at all. That being said, I believe that most of the fourth-grade teachers will put this experiment into their repertoire in next years' curriculum. My goal is for them not to be hand-held but to make them self-sufficient. I also did the sea level experiment with my fourth-grade girls' classes. They liked it as well.

I feel that teacher leaders should be available to the staff at regular intervals. To be on call, all the time would create a burn-out situation and would not be healthy for the teacher leader or the staff. I am lucky that the administrative staff of my school is supportive and dedicated to the benefits of the children.

The teachers that attended were not aware of the websites that I presented. In our discussions, they wanted to know more about each one. When asked in a post PD questionnaire (see appendix) which resources they would like more information on, one of them simply said, "all". I believe most teachers approach PD's in much the same way, in terror, at least I do. I tried to make my PD fun and engaging. My teachers all liked the PD and were not afraid to attend

because of our prior relationship. In-house PD's by teacher-leaders would probably be a much more welcome PD rather than bringing in a one-and-done personality. I also find that many of the PD's that I was required to attend by these 'one-and-dones', basically regurgitated the information they were presenting over and over to fill time. I told my audience that I sometimes speak quickly and to make sure they slow me down when I get going.

I had a few moments to ask some of the teachers informally about the PD after I finished. Most were quite impressed by the Climate Kids website and wanted more information or at least some more investigation into the site. I think that I might just make a video for the whole staff regarding the Climate kids and My NASA Data sites. An instructional video showing STEM connections would be helpful to all elementary grades and it would not be presented as a formal PD so the teachers could view it at their own leisure.

Data Analysis

I decided to have teachers fill out a questionnaire via a Likert-type rating scale. Three dimensions were used in the pre-PD and one for the post PD. The three pre-PD dimensions were 1) knowledge about NASA resources, 2) attitudes towards PD's in general, and 3) attitudes towards tech in the classroom. The post dimension was knowledge of NASA and its resources. The scale, 1-10 would give me a general average of the dimension. In the post PD questionnaire, I asked more pointed questions, (see appendix).

As far as knowledge regarding NASA's resources and missions, the score was 22 out of a possible 50. As I found out in the post interview, the teachers really had no idea that NASA had that many websites and that so many could be used in the classroom. Three of the teachers, Mrs. Aisenman, Mrs. Kwestel, and Mrs. Paul had used NASA sites prior to the PD, although they were still amazed at the sheer volume of resources available.

"I have been seeing more NASA information the last 2 years as my son is a student at Caltech and I get emails. However, I did not know they have specific lesson plans and so much information for kids of different levels." Jenny Paul

"I would do a mini-lesson [from the resources] for Earth day". Claire Kagel

The second section regarding attitudes toward PD's, generated a 21 out of a possible 50, leaving no doubt that PD's are not what these teachers would prefer to do. The technology section scored a high mark of 41/50 which could indicate that technology has indeed taken a big step in traditional classroom, although we most likely did not need a survey to prove it.

Nearly all the teachers liked and want more information on the Climate Kids website. They found the PD helpful and will investigate many of the websites in the future. "[I'd like] more information on land and sea ice as it relates to energy," said Mrs. Aisenman. Only Mrs. Kagel had heard of Howard Gardner's theory of MI.

References

Armstrong, T. (2018). Multiple Intelligences in the Classroom. ASCD.

Flavelle, C. (2020, July 14) New Data Shows an 'Extraordinary' Rise in U.S. Coastal Flooding. *New York Times.* https://www.nytimes.com/2020/07/14/climate/coastal-flooding-noaa.html

"Lab picture" by James H. Wieder

NASA, (2019, August 8). Suomi NPP. https://www.nasa.gov/mission_pages/NPP/main/index.html

NASA, (2011, October). NPP Mission Brochure. https://www.nasa.gov/pdf/596329main_NPP_Brochure_ForWeb.pdf

NASA, (2021, March 31). How do we measure sea level? Climate Kids. https://climatekids.nasa.gov/sea-level/

NASA (n.d.). *My NASA Data.* https://mynasadata.larc.nasa.gov/

NASA, (n.d.). Jason-3. Ocean Surface Topography from Space. https://sealevel.jpl.nasa.gov/missions/jason-3/summary/

NASA (n.d.). *Project: How Melting Ice Causes Sea Level Rise*. Education. https://mynasadata.larc.nasa.gov/mini-lesson/stability-and-change-currents-change

NESDIS (2018, September 17). Gathering Environmental Intelligence form the World's Oceans. Jason-3. https://www.nesdis.noaa.gov/jason-3/

NGSS (n.d.). *Next Generation Science Standards*. https://www.nextgenscience.org

NOAA, (n.d.) *How are satellites used to observe the ocean?* National Ocean Service. https://oceanservice.noaa.gov/facts/satellites-ocean.html

Appendix A

NASA Resources pre-PD Questionnaire

NASA Knowledge

Using a scale of 1-10, 1 being the least, 5 being neutral, and 10 the most rate the following statements.

_____ I consider myself knowledgeable about NASA's overarching mission.

_____ I follow all of NASA's space missions.

_____ I am current with NASA's satellites that investigate land mass on Earth.

_____ I am current with NASA's satellites that investigate Earth's oceans.

_____ I consider myself knowledgeable about NASA's role in weather forecasting.

Attitude towards PD's

_____ I attend PD's that are not school required.

_____ I attend all the PD's that my school requires.

_____ I find PD's to be very helpful in my teaching.

_____ I find transferring PD application to my class easy.

_____ I like PD training sessions in general.

Attitude towards technology in the classroom

_____ I enjoy using Smart Boards and their like in my classroom.

_____ I use many websites as an adjunct to my teaching.

_____ Websites and technology have made my teaching career easier.

_____ I regularly use lesson plans directly from the web.

_____ I frequently go to NASA's website for information.

Appendix B

NASA Resources post-PD Questionnaire

NASA Knowledge

Using a scale of 1-10, 1 being the least, 5 being neutral, and 10 the most rate the following statements.

_____ I consider myself knowledgeable about NASA's overarching mission.

_____ I follow all of NASA's space missions.

_____ I am current with NASA's satellites that investigate land mass on Earth.

_____ I am current with NASA's satellites that investigate Earth's oceans.

_____ I consider myself knowledgeable about NASA's role in weather forecasting.

Have you heard of the resources in the PD before today?
Yes / No - Which one? _____

Do you think that any of the resources you saw today could be useful in your class?
Yes / No - Which one(s)? _____
_____

Which resource(s) would you like more info on?

_____

Do you consider the resources you saw today to be difficult to implement in your class?

Yes / No Why? _____

Has your concept of NASA's mission changed in any way due to this PD?

_____

Thinking about Howard Gardner's Multiple Intelligences (MI). Rate the statements as above.

Have you heard of Howard Gardner's work on Multiple Intelligences? Yes / No

_____ I believe that M I is a worthy idea to implement in the classroom.

_____ I plan on researching M I in the future for possible use in my classroom.

Comments:

_____

_____

_____

May I use your name and email address in my final paper? Yes / No

Name _____ email address _____

Thank you very much.

Names of those who attended and gave permission to quote.

Lori Aisenman – laisenman@ybhpassaic.org

Jenny Paul – jpaul@ybhpassaic.org

Claire Kagel – ckagel@ybhpassaic.org

Robin Kwestel – rkwestel@ybhpassaic.org

Appendix C

NGSS

ESS2-1. Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.

ESS2.A: Earth Materials and Systems

Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around.

4-ESS2-2. Analyze and interpret data from maps to describe patterns of Earth's features.

CCC

Patterns can be used as evidence to support an explanation. (4-ESS1-1)

DCI

3-5 ETS1 Engineering Design

3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

ETS1.B: Developing Possible Solutions

Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.

At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs

3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.