

STEM PD Final Paper

Title: *What is “STEM” and what does “Integrated STEM” look like?*

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I have selected this topic to share with the teachers, what I have learned through the Endeavor STEM teaching certificate project, especially all the information that I learned about the NGSS, CCSS, and 5E Instructional Model in the Methods of STEM course as well as the tools and resources I gathered from The E in STEM, and Climate Change with NSF SPRINTT courses. I also wanted to share about the integrated STEM and how the integration works in a lesson or a project to clarify the misconceptions they had about the benefits of STEM in the Montessori classrooms.

I work at Montessori Country Day School and we have 11 classroom teachers and assistants (5 Lead Teachers, 6 Assistant Teachers), 4 specialists (Music, Art, Spanish, and STEM), and 2 administrators. We also have 4 before-care and after-care staffs. The total number of Educators in attendance were 11: 5 Lead teachers, 3 Assistant teachers, 1 Spanish Specialist teacher, and 2 Administrators. We currently have the following age groups and grades enrolled: Toddlers: 18 mos - 3 yrs old (1 class with 3 teachers and 15 children)
Primary: 3 - 6 yrs old (3 classes with 2 teachers in each class and 35 students)
Elementary: 1st - 3rd graders (1 class with 2 teachers and 14 students)

My goal for the teachers is for them to be familiar with Integrated STEM and help them understand that it will enhance the students learning by helping the students connect the concepts in all areas of the Montessori classroom

such as the Math, Language, Science & Culture, and Practical Life. I would like for the teachers to see that the connections will happen as the students engage in STEM lessons using hands-on materials and actively participating in the activities, and projects.

For the months of October and November, the topic was “Apples and Pumpkins” because, in the fall, Apples and Pumpkins are a couple of abundant fruits in our area, which the students are familiar with. I began the unit with apple investigation using five senses as well as reviewing the Montessori lessons of its parts and life cycle. In addition, students were engaged in experiments such as apple oxidation, sink or float, and apple tower challenge. It was followed by Pumpkin investigation as well as reviewing its parts and life cycle, sink or float, planting pumpkin seeds inside the pumpkin, and watching the pumpkin decompose. Students also got to taste the roasted pumpkin seeds and the elementary students made pumpkin muffins.

Standards Addressed for Primary students:

NGSS: K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.

K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.

CCSS Connections: *ELA/Literacy* - **RI.K.1** With prompting and support, ask and answer questions about key details in a text. (K-ESS2-2)

Mathematics - **K.CC** Counting and Cardinality (K-ESS3-1)

K.MD.A.2 Directly compare two objects with a measurable attribute in common, to see which object has “more of”/ “less of” the attribute, and describe the difference. (K-LS1-1)

Standards Addressed for Elementary Students:

NGSS: 2LS2-1. Plan and conduct an investigation to determine if plants need sunlight and water to grow.

CCSS Connections: *ELA/Literacy* - **W.2.8** Recall information from experiences or gather information from provided sources to answer a question. (2-LS2-1), (2-LS4-1)

Mathematics - **MP.5** Use appropriate tools strategically. (2LS2-1)

An extension to the apples and pumpkins topic, students will learn about the environmental needs of the apples and pumpkins from the NASA Climate Kids website. The students will learn about what NASA does and how NASA help us with the food we produce. Students will also learn about the ecosystem, how it affects us and what we can do to help make the ecosystem healthy for the apples and pumpkins to grow.

<https://climatekids.nasa.gov/menu/plants-and-animals/>

During the two half-hour PD sessions, I shared with the teachers what I have learned from the Endeavor STEM Teaching Certificate Project by showing them google slides of the Endeavor website and information of all the courses that I took. I shared how I learned about the NGSS, CCSS, and 5E instructional model and how these standards are what we as educators can use to make sure that we are teaching students the necessary skills in the appropriate levels. I explained to the teachers that I will be teaching integrated STEM lessons in their classrooms and how it will enhance their Montessori lessons. I showed them a sample lesson and asked them a question: "What will you find inside an apple?" Most of the teachers named the parts inside the apple. When I laid the apple on its side and cut the apple in half and showed them the cross-section of an apple, they realized that they were not expecting the answer to be the star shape inside the apple. This activity showed them that they needed to think from a different angle when making a hypothesis. Making an educated guess is a part of the process of investigation which will lead to finding the clues to draw a conclusion. I explained that this concept will connect with their lesson when they introduce the parts of the apple, and the students will think and guess what is inside the apple before they cut them to reveal different parts of the apple.

At the first PD session, the teachers were still unsure of how the integrated STEM will enhance their Montessori lessons. After the first month

of Integrated STEM lessons in their classrooms, all the teachers had a positive outlook on STEM and had a good understanding of how it worked in their classrooms. During the second PD session, all the teachers shared how happy they were with the hands-on lessons and to see the students eagerly participating and engaging in the lessons and projects. The teachers were also sharing that the students were excited to participate in their lessons as they introduced the parts of the apple.

I believe my PD was successful because, after the second PD session, I took a short anonymous survey and all the reviews were very positive. (I have included the survey results and comments following this report) Since I work as the STEM teacher at my school and go into each class once a week, for the STEM class, the teachers are very supportive of the activities and projects I do with the students. One of the teachers used the idea from my sample lesson: 'cross-section of the apple' to show her students the shape inside the apple. I really enjoy working with the students and I am happy to see their eyes light up when they find answers to the questions!

This experience made me feel like a real leader at my school. It reminded me of the quote "*every teacher is a leader in one way or another*" by Maddie Fannell in Teacher Leadership. A Report on the Fall 2014 ASCD Whole Child Symposium. After the PD sessions, I met with the teachers separately in their

classroom and they have shared with me how much they enjoy having me in their classroom and how helpful it is for them that I work with their students in STEM. This reminded me of the article [A Primer on Effective Professional Development](#) by Laura M. Desimone when she mentions that Professional Development can also be “*informal hallway discussions with other teachers.*” I was able to see that the teachers are getting familiar with integrated STEM and how it connects to the Montessori method and the lessons they provide.

Two Educators who attended the PD:

Melissa Cohen - Montessori Certified Primary Lead Teacher -

melissa.cohen@nlcinc.com

Maria Bouchard - Montessori Certified Spanish Specialist Teacher -

maria.bouchard@nlcinc.com

References:

Next Generation Science Standards. Retrieved from

<https://www.nextgenscience.org/>

(n.d.). Retrieved from

<https://climatekids.nasa.gov/menu/plants-and-animals/>

(n.d.) Retrieved from ASCD (2014) What is Teacher Leadership Report.

Fannell, Maddie. Teacher Leadership. A Report on the Fall 2014 ASCD Whole Child Symposium.

Desimone, L.M. (2011). A Primer on Effective Professional Development. Phi Delta Kappan, 92(6), 68.

STEM Professional Development Feedback Survey Results

Please rate how much you agree with the following statements:

1. The presenter was knowledgeable about the topic.

- Strongly Agree - (11 teachers)
- Agree
- Disagree
- Strongly Disagree

2. The powerpoint slides used by the presenter were appropriate in helping me understand the topic of this professional development.

- Strongly Agree - (11 teachers)
- Agree
- Disagree
- Strongly Disagree

3. The materials used and demonstrated were adequate and informative.

- Strongly Agree - (11 teachers)
- Agree
- Disagree
- Strongly Disagree

4. I gained knowledge and skills about Integrated STEM, NGSS, and CCSS standards.

- Strongly Agree - (11 teachers)
- Agree
- Disagree
- Strongly Disagree

5. My attitudes and/or beliefs has changed for the better about the topic through this professional development.

- Strongly Agree - (9 teachers)
- Agree - (2 teachers)
- Disagree
- Strongly Disagree

6. This professional development was effective in providing an interactive learning environment.

- Strongly Agree - (11 teachers)
- Agree
- Disagree
- Strongly Disagree

7. I feel that changes or improvements are needed for future STEM professional Development:

1 teacher - "Would love to see some tactile examples!"

8. Additional comments or suggestions are welcome.

1 teacher - "I personally feel that the more information I received about STEM was very helpful."

1 teacher - "Anna really takes time in her presentation and explains everything nicely. I enjoyed attending her sessions."

1 teacher - "Thank you Mrs. Suh for having these PD sessions as they help us to work as a team for the betterment of the children."