

How to Incorporate Agriculture into Family STEM Night

A Senior Project

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Introduction and Background

Family STEM Night is an evening for students and their families to come together and complete hands-on science, math, and engineering activities. This event will usually include a variety of interactive projects in different topics and connections to STEM careers. Incorporating agriculture science is a beneficial and productive way to connect people in the community to agriculture. The author will research the importance of agriculture in STEM, create and implement an agriculture-based STEM project to present at Monarch Grove Elementary School's STEM night in San Luis Obispo, California.

The need for agriculture in STEM education is prevalent. When asking a child the question, "What is a farmer?" The clipart image of a man in overalls holding a pitchfork with a smile on his face is what often is described. Introducing children to the idea farmers not only grow food but do so by being engineers, mathematicians, and scientists may open the door into an interest in a field to which they had no prior knowledge.

Connecting content knowledge, STEM knowledge, real-world issues, and problem-solving skills are all interchangeable factors that play a role in both, (Stubbs & Meyers, 2015) Twenty-seven percent of the careers in agriculture, food, and natural resources are STEM (Soergel, 2015). Children are natural learners as they are inquisitive and eager to connect what they are taught to the world around them. Learning by doing comes effortlessly, especially in educational settings where they are given the opportunity to do so. All students have the opportunity to benefit from STEM programs. It allows them to explore greater depths of all subjects while it also encourages teamwork, knowledge application, tech use, problem-solving, and adaption, (Lynch, 2019).

Methodology

Monarch Grove Elementary School plans to host a STEM night on February 21, 2020. After reaching out to California Polytechnic State University professor Ann DeLay, a student representative (the author) chose to participate in the event connecting agriculture. The author first researched recommendations for choosing a successful STEM night.

1. Recommendations for stations included:
 - a. quick and hands-on
 - b. under 10 minutes in presentation length
 - c. accessible to all ages
 - d. shortlist of readily available material presentations covering a wide range of topics
 - e. providing a sign and a tri-fold for each station with additional topic information
2. Not recommended includes
 - a. talks or presentations in lecture format
 - b. time-consuming or extensive activities
 - c. two stations with the same type of activity

For the above reasons, the author will be making butter with students and their families. Participants will explore what happens to cream when it is shaken. The author then gathered

supplies for this project including the butter making and tri-fold board. The author also typed and printed on what would be on the board. The research included the science behind making butter as well as supplies. The author also included farm facts relevant to dairies to help make the agriculture connection to families. It was written in basic terms so any age or grade would be able to understand.

1. Tri-fold board supplies
 - a. Tri-Fold Board
 - b. Glue
 - c. Scissors
 - d. Print out of what will be on Tri-Fold board
 - i. Explanation of what to do
 1. Fill cup
 2. Create a T-Rex hand to hold a cup
 3. Shake and observe (10 mins)
 4. Strain buttermilk from the butter
 5. Enjoy with a cracker
 - ii. What is happening (Science Buddies, 2013)
 1. Cream is made up of mainly water and fat.
 2. The fat is in the form of globules, which are like tiny balloons filled with fat molecules.
 3. When the cream is shaken fat, molecules separate from the liquid and cling together in a clump-forming butter. The liquid leftover is buttermilk!
 4. Butter is an emulsion of milk fat and water. An emulsion is a mix of two things that don't usually mix! Butter is a water in oil emulsion.
2. Butter making supplies
 - a. 2 64oz Heavy whipping cream
 - b. 125 5oz Plastic cups
 - c. 125 5oz Plastic lids
 - d. 2 Boxes of Keebler club crackers
 - e. Small Cooler to keep heavy whipping cream cool

Event Timeline:

1. Set up area at least fifteen minutes prior to event start time.
 - a. Tri-fold
 - b. Crackers with plastic knife
2. Prepare cups
 - a. Pour about 2-inches of whipping cream into at least 5 cups
3. Create an example set to show end result of butter.
4. Set up cracker station
5. Engage with families
 - a. Talk to them about what is happening as they shake heavy whipping cream
 - b. Allow students to shake the “done” example to see what theirs should feel like when they are done
 - c. Answer questions
 - d. Ask children what they think is happening inside the cup
 - e. Assist children when shaking becomes too tedious
 - f. Reference the Tri-Fold board when students were creating butter
6. Take photos of children participating in butter science

Results and Recommendations

The butter science booth was a heavy traffic area as families navigated STEM night. Students were excited about being able to create and taste science. The sample cup was helpful for children to have a reference of when their own butter will be done. Students read the tri-fold board while shaking their butter and were able to understand the science behind it as well as make the farm to table connection from the Farm Facts section. Many teachers came up to compliment the project on its popularity and the author was asked to return next year.

As successful as this project was, there were areas of it that could be improved. It is recommended to reach out for a proper estimate of how many families the school expects to participate. Only about 50 people participated so only half of the supplies were needed. It is also recommended to have more than one representative go to the STEM night. It would be helpful as many children needed initials for their worksheet, help with the butter, or assistance with spreading it onto a cracker. To do all these things along with answering questions and explain the process would run much smoother with more than one representative. Lastly, the butter making process itself took longer than most students wanted to stand there for. Next time this is done it could be helpful to bring an electric hand mixer, or having students pair up to make the process go faster. For data purposes, it would be helpful to have someone record the number of participants.

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