

Spring 2019

Mad Scientists Club

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NEBRASKA HONORS PROGRAM
CLC EXPANDED LEARNING OPPORTUNITY CLUBS
INFORMATION SHEET

Name of Club: Mad Scientists

Age/Grade Level: 2nd-3rd, and 4th-5th

Number of Attendees: 12-15

Goal of the Club:

The goal was to expand the children's knowledge of basic science principles through demonstration and hands on experiments.

Resources:

University of Nebraska Lincoln Honors Program

Content Areas: (check all that apply)

- Arts (Visual, Music, Theater & Performance)
- Literacy
- STEM (Science, Technology, Engineering & Math)
- Social Studies
- Wellness (Physical Education, Health, Nutrition & Character Education)

Outputs or final products:

The club did not have a final product, but during many of the weekly experiments we made items the children could take home to show their friends and family.

Introducing your Club/Activities:

I led a science club to two groups of kids at separate times. Through experimentation I taught the kids basic natural science fundamentals. We did an experiment each week and a mini lesson to describe the experiment after.

General Directions:

Each week once we got to the classroom I took attendance, introduced what we were doing that day, then performed either a demonstration or an experiment with the students. After the experiment was finished we cleaned up then I explained how and why the experiments worked the way they did.

Tips/Tricks:

While working through the experiments it worked out best to perform each step with the students and all work at the same pace.

LESSON PLAN WORKSHEET

(copy table as needed)

Lesson Activity

Name: Introductions & Plasma Ball

Length of Activity: 15-20 minutes

Supplies: Plasma ball

Directions:

During the first club meeting we started with an ice breaker to meet each other, then we went over basic rules and expectations for the club. Next, I turned off the lights and plugged in a plasma ball and let the students come up one by one to touch it and see how it worked.

Conclusion of the activity:

The students understood what was expected of them each week and learned about electrodes and electric currents, which is how a plasma ball works.

Parts of activity that worked:

Touching the plasma ball worked and was interesting to the kids.

Parts of activity that did not work:

At the end I tried to show the kids that the plasma ball will light up to the beat of a song, but the sound from my phone was not loud enough and the plasma ball did not light to the beat. We also had excess time at the end of club, since I did not anticipate this and did not have anything planned, we played heads up seven up.

Lesson Activity

Name: Hydrophobic Pepper

Length of Activity: 40 minutes

Supplies: Water, bowls, pepper, dish soap, tooth picks

Directions:

I gave each individual a bowl of water, they took turns shaking pepper on the top of the water. Then I passed out a toothpick with dish soap on it to each student and they dipped it in the water. After we had a discussion about what had happened to the pepper.

Conclusion of the activity:

When the toothpick was dipped in the water the pepper moved to the outskirts of the bowl. The students learned that this happened because pepper is hydrophobic, which means it is not attracted to water. The pepper moved to the sides because the soap broke the surface tension of the water.

Parts of activity that worked:

Most of the kids' pepper moved and they understood why and how.

Parts of activity that did not work:

Some of the kids' pepper fell to the bottom of the bowl and did not drastically move when the toothpick was dipped in the water because the pepper had sat in the water too long.

Lesson Activity

Name: Invisible Ink

Length of Activity: 30-40 minutes

Supplies: White printer paper, white crayon, water colors, paintbrushes, water cups

Directions:

Hand out a piece of paper to each student and a white crayon. Allow them time to draw in crayon or write a secret message on the paper. Next, pass out watercolors, paintbrushes, and water cups. Tell the students to paint their entire paper however they want to and watch as their secret message appears.

Conclusion of the activity:

The students learned how wax from the crayon was hydrophobic and repelled the water color paint so their secret message or drawing showed up through the paint. This activity allowed students to be creative, use their imagination, but also learn about the science behind the homemade "invisible ink:

Parts of activity that worked:

All of the students' art turned out and the white crayons showed through the water colors! It was stark and easy to see!

Parts of activity that did not work:

Since the paper and crayon were white it was difficult for the younger ones to draw and they were a little confused and asked to restart a few times. Also, this experiment was only performed with 2nd-3rd graders because I thought it would be a little too boring for the older kids.

Lesson Activity

Name: How Clouds Work

Length of Activity: 25 minutes

Supplies: Clear cups, water, shaving foam, food coloring, syringe

Directions:

Fill each student up a cup of water that is half full. Spray shaving cream about 2 inches thick on top of the water. Mixed food coloring and water and walk around and drop a few food coloring/water drops on top of each student's shaving cream.

Conclusion of the activity:

The shaving cream slowly let the colored water seep through and it looked like falling rain as the colored water fell into the clear water at the bottom of the cup. I explained that this is how clouds

work, they fill up with water and when they are too full they release water from the bottom and it rains.

Parts of activity that worked:

Sometimes it took some time, but all of the students made “rain.”

Parts of activity that did not work:

Initially the plan was to just drop food coloring on the shaving cream, but the food coloring was too viscous to seep through the shaving cream cloud so the food color was mixed with water and dropped on with a syringe.

Lesson Activity

Name: Lava Lamps

Length of Activity: 25 minutes

Supplies: Clear cups, food coloring, Alka-Seltzer tablet, oil (vegetable or baby), water

Directions:

Mix water with food coloring. Fill each student’s clear cup up about $\frac{3}{4}$ oil and $\frac{1}{4}$ colored water. Allow time for the oil and water to separate and settle. Give each student half an Alka-Seltzer tablet and allow them to drop it into their cup. Discuss what happened.

Conclusion of the activity:

When the tablet was dropped in the cup it caused bubbles in the colored water to float up through the oil and to the top of the cup, it looked like a lava lamp. The students all learned about the difference in density of oil and water and why they do not mix. They also learned about the density of air and carbon dioxide and why the tablet made bubbles which floated to the top of their cups.

Parts of activity that worked:

All the lava lamps worked great! The students were impressed and interested. The lamps moved until the tablet was completely dissolved. Half a tablet lasted about 3-4 minutes. More tablets could be added after if extra materials are available.

Parts of activity that did not work:

Some of the students wanted to take their lava lamps home but since we made them in cups they could not because the cups did not have lids. This experiment could be performed in water bottles and the students could take home the oil and water and add more Alka-Seltzer later.

Lesson Activity

Name: Snow Fluff

Length of Activity: 40 minutes

Supplies: Corn starch, shaving cream, food coloring, paper bowls, popsicle sticks or plastic spoons

Directions:

Mix equal parts of shaving cream and corn starch. Each student can make their own. Tell the students to mix it in their bowl with the popsicle stick. Add a few drops of food coloring to everyone's mixture (optional). Tell the students once their mixture is almost homogenous they can mix it with their hands and build sculptures with it. If the mixture is too sticky add corn starch, if the mixture is not sticky enough add shaving cream.

Conclusion of the activity:

I informed the students that the small pieces of corn starch mix into the shaving cream and become suspended in the mixture. Shaving cream is made of tiny bubbles, and the surface tension on the surface of the bubbles helps 'float' the corn starch particles when the two mix. Making a moldable "snow" like structure.

Parts of activity that worked:

Most of the students made snow fluff that they were able to mold and work with, similar to play-doh.

Parts of activity that did not work:

If the food coloring was added directly onto the cornstarch it dried up and did not color the snow fluff. Also the experiment was very messy and newspaper should be put down on the tables to help with the messes.

Lesson Activity**Name:**

Fluffy Slime

Length of Activity:

40 minutes

Supplies:

Glue, foam shaving cream, borax, cups or bowls, popsicle sticks or spoons, water, zip locks to take slime home, newspaper for messes

Directions:

Give each student a cup with $\frac{1}{4}$ cup glue and $\frac{1}{4}$ cup shaving cream. Allow them to mix the two together with a popsicle stick. Also add a few drops of food coloring and tell the students to mix it in. Make a separate mixture with 1 teaspoon borax and half a cup of water and stir. Add a teaspoon of this mixture to each students' glue/cream mixture and tell them to mix again. Once the slime sticks together they can touch it and play with it with their hands. If the slime is too sticky another teaspoon of the borax mixture can be added.

Conclusion of the activity:

The students made slime that they got to play with and take home. They learned about polymers and how they are made up of a long chain of molecules and that slime is an example of a polymer. I told them that borax is the activator and changed the position of the glue molecules which is cross linking.

Parts of activity that worked:

Most of the students made high quality, fluffy slime. The students were able to follow the directions and make a product.

Parts of activity that did not work:

If too much borax solution was added to the glue mixture the slime became hard and not stretchy, it was difficult to recover this. Start with only a little borax and add more as needed.

Lesson Activity

Name: Explosions

Length of Activity: 30 minutes

Supplies: Water bottles or clear plastic cups, baking soda, vinegar, plastic spoon, diet coke 2 liter, roll of Mentos mints

Directions:

Mix different parts of baking soda and vinegar to demonstrate how different amounts of each can cause a larger or smaller or longer or shorter. Also demonstrate the difference in speed of reaction when adding baking soda to vinegar versus adding vinegar to baking soda. Then drop as many mentos in a bottle of diet coke and watch the coke explode.

Conclusion of the activity:

The students learned that 2 tablespoons of baking soda with $\frac{3}{4}$ cup of vinegar created the longest and largest reaction. They also learned that adding vinegar to baking soda led to a faster reaction than the opposite.

Parts of activity that worked:

The baking soda and vinegar caused a reaction, as did the mentos and diet coke. The students were interested and excited. Make sure to stand back.

Parts of activity that did not work:

We had a little extra time and materials so we experimented by trying to add diet coke to baking soda and mixing vinegar and mentos. Neither of these mixtures created any visible reaction.

Lesson Activity

Name: Stress Balls

Length of Activity: 45-1 hour

Supplies: Corn starch, water, balloons, newspaper for messes, funnel

Directions:

Help the students a couple at a time by adding a little bit of cornstarch and a small amount of water to a balloon. Mix the two in the balloon before adding more, then add a little more of each and mix repeatedly until the balloon is close to full. A funnel can be used to transfer the cornstarch and water into the balloon. Tie the balloon for each child and let them take them home. Amounts of water and cornstarch can vary based on the feeling the child wants.

Conclusion of the activity:

This week was more fun than it was a learning opportunity. None the less we had a discussion during class about the future stress school can cause and that the stress balls we made can help. Each student made and took home a stress ball.

Parts of activity that worked:

Everyone's stress balls worked, none of them broke.

Parts of activity that did not work:

Since each child needs help and the activity was very messy this was very time consuming. The school that we did this at was a latex free school so special balloons had to be hunted down.

Lesson Activity

Name: Bouncy Balls

Length of Activity: 45 minutes

Supplies: Corn starch, borax, Elmer's glue, plastic bowls, popsicle sticks, bags to take balls home

Directions:

In a cup, mix 1 teaspoon of Borax with 2 tablespoons of warm water then stir until the borax is dissolved. Give each students a bowl with 2 tablespoons glue and 2 teaspoons of cornstarch. Have the students mix the two together. Next go around the room and add 1-2 teaspoons of the borax water mixture to each student's bowl. Have them mix with their popsicle stick until the product begins to stick together then they can roll it into a ball with their hands. Add more borax solution if the product will not stick together

Conclusion of the activity:

The students made bouncy balls and learned about polymers and how they are long chains of molecules. The bouncy ball we made was a polymer and the borax caused the glue and cornstarch to react and form a homogenous mixture which became harder than the compounds separately.

Parts of activity that worked:

Almost everyone was able to make their bouncy balls successfully.

Parts of activity that did not work:

If the bouncy balls are torn apart after adding the borax solution it is almost impossible to remold them back together.

This experiment was only performed with 4th-5th grades.