

BIOL2299 Service-Learning

- Each Service Learning Group in BIOL2299 taught STEM Lessons to different after school groups around Boston
- I have included sections of each groups lesson plans to highlight the different ways these fun activities were planned
- Each group navigated different teaching tactics as they got to better know the community of students they were serving

ACCESS makes Ooblek

Main Idea:

Teach kids states of matter using ooblek. Use smaller activities with water to talk about its properties, such as how water bends light. Use ice water / shortening experiment to show how animals stay warm in winter.

Learning Plan:

1. Explain the basic states of matter.
 - a. What are some examples of each state of matter?
 - b. What makes a solid different from a liquid and a liquid different from a gas?
2. Do the ooblek experiment.
 - a. Is the ooblek acting like a solid or a liquid?
3. Explain properties of water
 - a. Reflection and refraction
 - b. What happens when you look at writing through a glass of water?
4. Refraction and pencil experiments
 - a. Why isn't the water spilling out of the bag with pencils in it?
 - b. Do we see any reflection or refraction in the bag?
5. Insulation experiment
 - a. How do animals stay warm when it's really cold outside
 - b. Why does this help them stay warm?
 - c. How do we stay warm when it's cold?



ACCESS extracts DNA

This week our activity involved extracting DNA from strawberries with the students. To begin we explained DNA's structure and shape with a worksheet that displayed the double helical form of DNA. Next, we allowed the students to mash up their strawberries and then put some chemicals in the dishes that aided in the extraction process. Students then got to pick out the DNA which formed in heavy clumps and most of the students were amazed by getting to see the DNA in real life as were we.



systemic Flow works with soil

Steps:

1. In a plastic bag crush a few oreos and transfer SOME NOT ALL of the crushed oreos into the bottom of your plastic cup
2. Take a few chocolate chips and put them on top of the oreo layer in the cup
3. Using a spoon, take a nice scoop of chocolate pudding and put it in the cup, on top of the chocolate chips
4. Taking the rest of your crushed oreos, put some in the cup, on top of the pudding layer
5. Take some green coconut shavings and put it on top of the oreo layer
6. Lastly, add the gummy worms!

Using a sticky note or post it tab, write the layers of soil as shown in the picture.



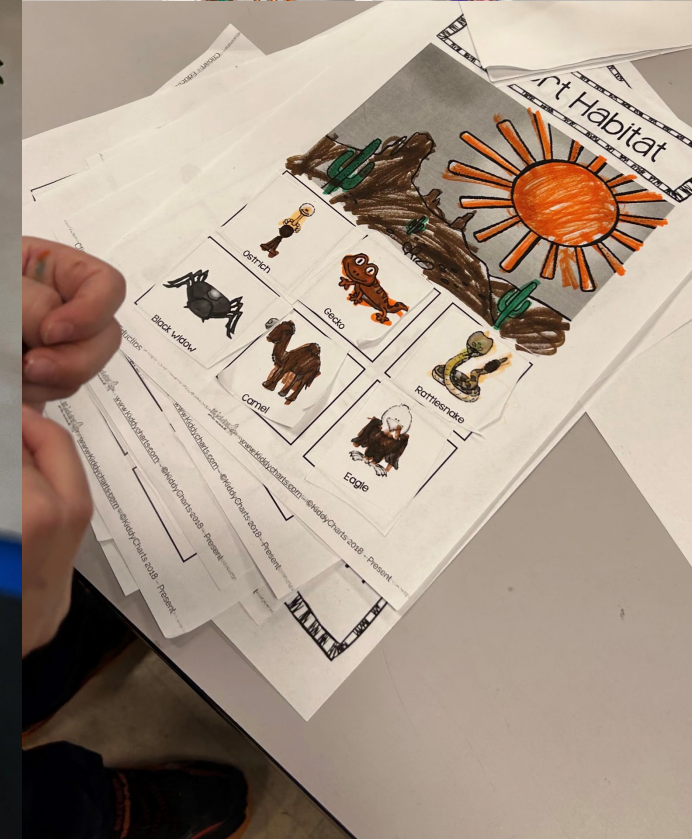
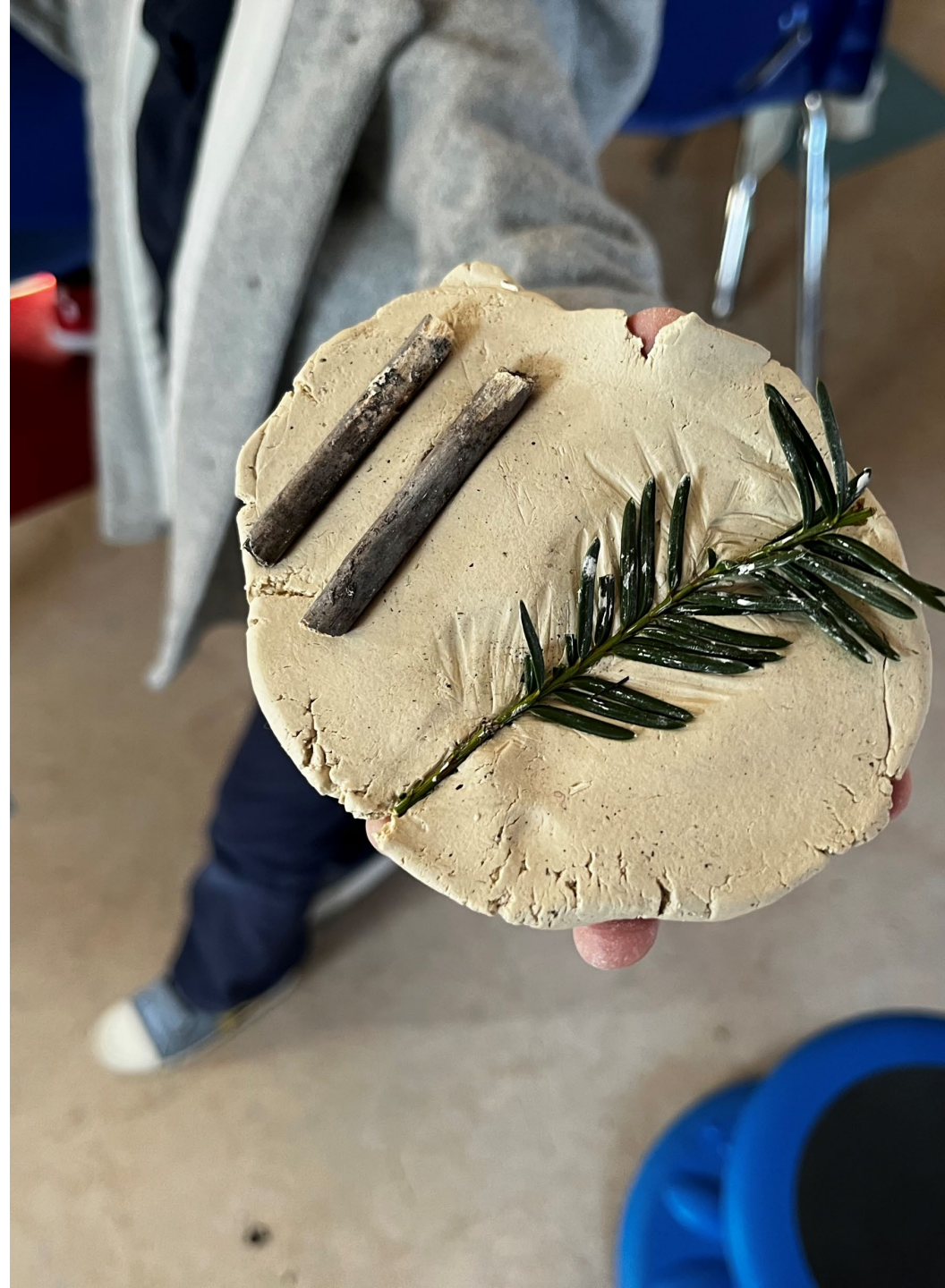
USES Studies Fossils

What is a fossil?

- The remains and impressions of a prehistoric organism/animal preserved in a petrified form as a mold or a cast in rocks
- Sometimes, when animals or plants die, their bodies get buried under layers of sand or dirt. Over time, these layers can become rock. And if the animal or plant remains are still there, they can become a fossil.

How can fossils provide information about past generations of animals?

- When different organisms lived
- A general idea of what different organisms looks like
- How different organisms have evolved over time



USES braves the Weather

Activity: Water Bottle Tornadoes

Video and demonstration

- Make a model of the activity → a plastic bottle with water and food coloring in it - Have each of them spin it to demonstrate how a tornado works

Explanation of Concepts: - How likely is it to happen in a place like Boston? The south? The Midwest?

Activity: Different types of clouds with water cycle

1. Show a video on the different kinds of clouds
- 2. Have them draw the different kinds of clouds
- 3. Make models of them with the cotton balls
4. Draw out the water cycle on paper -

Explanation of Concepts: - Practicing cloud type naming and recognition - Explain how the water cycle works → evaporation, condensation, precipitation - Cold = snow



USES makes Elephant Toothpaste

Vocabulary for the Day

Chemical reaction: When one or more substances are converted to one or more different substances.

Five signs of a chemical change:

- Change in color
- Producing an odor
- Change in temperature
- Producing a gas (bubbles)
- Precipitate (forms a solid)



Reactant: The substance that undergoes the change in a chemical reaction, or what you start with

Product: The substance that you make in a chemical reaction, or what you end with

Catalyst: A substance added to a chemical reaction that speeds up the process.

Physical vs Chemical Change

Elephant Toothpaste

text

PHYSICAL CHANGES

In a physical change, matter changes form but not chemical identity.

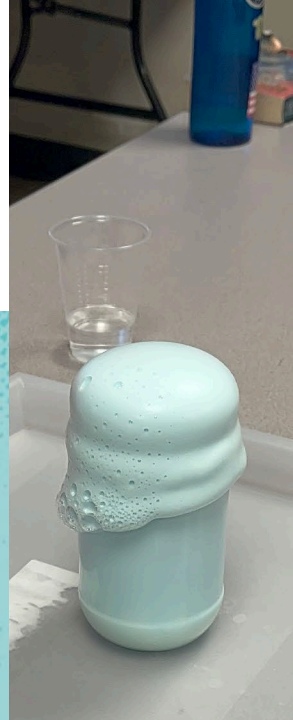


CHEMICAL CHANGES

In a chemical change, a chemical reaction occurs and new products are formed.

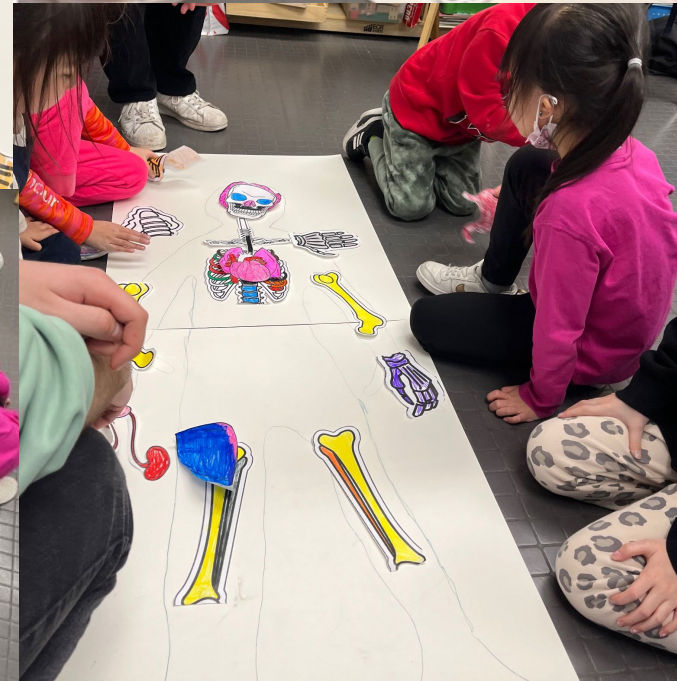
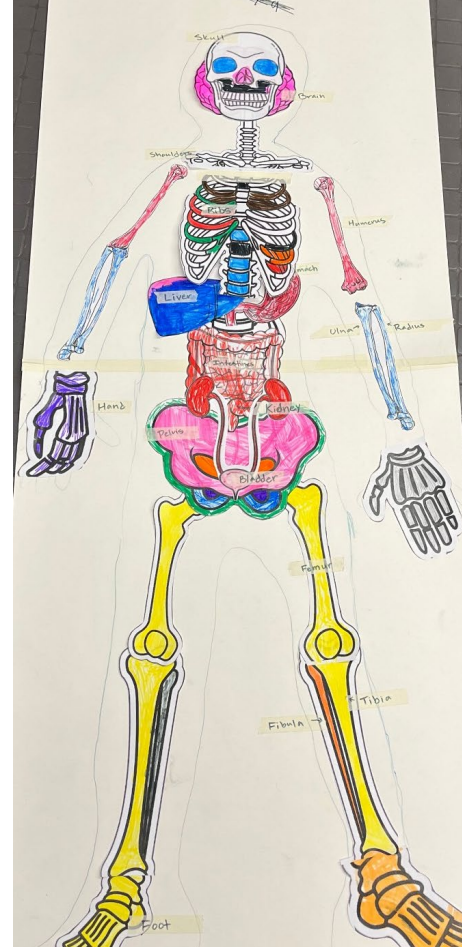


ThoughtCo.



ACCESS studies Anatomy

- Anatomy- testing peripheral vision, testing different reflexes, explaining pulse (how to measure pulse, how pulse gets faster when you exercise)
- Anatomy- making different organs out of playdough
- Anatomy- trace one student on piece of paper, and have different organs on smaller piece of paper. Have students try to figure out where to place each organ as a class. Explain where each organ goes and what it does
- Decided to do Anatomy activity with tracing of student and placing of organs, will do reflex and pulse activities if there is extra time



St. Stephen's Tackles the Egg Drop

Purpose: Teach students about forces, and contradicting forces.

Activities:

Egg Drop

Part 1: Making Prototype

Materials:

- Cotton balls
- 4 Small cardboard boxes
- Eggs
- Tape
- Plastic bags

Discussion:

How can you drop an egg without it cracking?

An egg cracks because of the forces that break the shell because it is delicate. When an egg is dropped there is force pulling it down, this is gravity. When the egg hits the group there is technically a force pushing it up. The force pushing up is much greater than the force pushing down. That extreme force is what makes the egg crack. In order for the egg to not crack we have to somehow decrease the force that is pushing upwards when the egg hits the ground. How do we do that?

Procedure:

- Kids will have a minute to get into groups of four. Then they will have 15 minutes to devise a prototype, before testing it by dropping it from an elevated height.

Part 2: Revise

Procedure:

- Using the same materials the kids will take 15 minutes to improve their construction. Once the allotted time is up, the kids will retest their construction by tossing it up and allowing it to fall from an even higher height.

Discussion:

What strategies worked the best? Why did some eggs crack and others didn't?



USES discovers Static Electricity

- Inflating Balloons with baking soda and vinegar

- Materials
 - Non-Latex balloons
 - Baking soda
 - Vinegar
 - Plastic water bottle

- Concepts:

- The reaction between baking soda and vinegar and how it creates gas
- Using a funnel, pour 2-3 tablespoons of baking soda into the balloon. Be careful not to spill the baking soda.
- Pour 1 cup of vinegar into the plastic bottle.
- Stretch the mouth of the balloon over the mouth of the plastic bottle without letting the baking soda spill into the bottle.
- When ready to inflate, carefully lift the balloon to allow the baking soda to fall into the vinegar.
- Watch the chemical reaction as the vinegar and baking soda mix, creating carbon dioxide gas which will inflate the balloon.
- After the balloon has inflated to the desired size, remove it from the bottle and tie it off.

- Activity: Static and Balloons

- Materials
 - Balloons
- Concepts:
 - How static works
 - Everything is made up of tiny particles called atoms.
 - Atoms are made up of positively charged protons, negatively charged electrons, and neutral neutrons.
 - When two objects rub against each other, some of the electrons from one object can transfer to the other object.
 - When this happens, one object becomes positively charged (because it has lost some electrons) and the other object becomes negatively charged (because it has gained some electrons).
 - This imbalance of charges is what creates static electricity.
 - When a balloon is rubbed against wool or hair, electrons are transferred from the wool or hair to the balloon, creating a static charge on the balloon.

