Seed Germination

Materials:

- 5 pre-cut plastic bottles
- Seeds
- Newspaper

Concept: Seeds are adapted to survive. During the process of germination, plants grown from seeds use up their stored energy reserves.

Context: This activity observes seed adaptations, and the process of germination. It investigates some of the factors influencing the growth of young seedlings

Time: 90 minutes for introduction and germination set-up. Activity continues with daily observations for 1.5-3 weeks

Introduction:

1. Introduce self
2. Introduce program briefly
    a. Humboldt, LIC
    b. Fun environmental activities
3. Ask how students engage with plants already
4. “Today we’ll explore how seeds grow, and how seeds adapt”
    a. “Today we’ll germinate seeds here in the classroom, and we’ll discuss how seeds are adapted to survive”

Activity:

1. Discuss: How do plants reproduce?
    a. Seeds! Seeds can be thought of as “plant eggs”. They contain a baby plant and baby plant food, wrapped in a protective covering. Ask students where they have found seeds. Seeds can be found inside fruits, vegetables, and seed pods
    b. Seeds have many **adaptations** to help the seed survive and disperse
    c. Recall: What is an adaptation?
    Adaptation: A behavior or trait in an organism that is the product of evolution and natural selection. It increases the fitness and survival of the

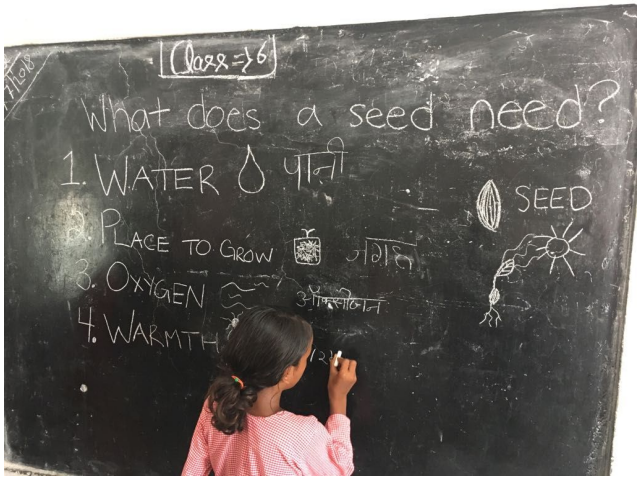
organism in its given environment.
    i. Diagram on chalkboard?
d. Consider why plants would **adapt** to have delicious fruits surrounding their seeds. (For animals to eat, and disperse the seeds elsewhere to grow).
    i. What other adaptations do seeds use to disperse themselves? Write student ideas on the board.
        1. Floats on air: dandelion, cattail, orchid, cottonwood
        2. Flies through air: maple, ash, tulip, poplar
        3. Floats on water: mangrove, coconut, cranberry
        4. Bounces and rolls: acorn, pecan, tumbleweed
        5. Eaten by animals: apple, peach, mango
        6. Stored by animals: acorn, hickory, beech
        7. Sticks to animals: burdock, cocklebur, wild barley
        8. Thrown from plant: locust, violet, witch hazel, lupine
        9. Released opened by fire: Lodgepole pine, Jack pine, manzanita
    ii. Why might it be important for seeds to be dispersed far away from parent plants?
        1. Adequate space and resources
e. What does a seed need to begin to grow? Write student ideas on board.
    i. Warmth, moisture, oxygen, a medium/place to grow (soil, paper towel, newspaper), and sometimes sunlight
    ii. Does a seed need sunlight or nutrients? Typically, seeds do not need sunlight to germinate! They are packed full of energy to begin growing until they sprout leaves and can take energy from the sun. There are exceptions though, as few seeds do need the stimulus of light to begin germinating.

2. <u>Experiment:</u> Seed germination
    a. Considering the things a seed needs to begin growing, let's try and germinate seeds in the classroom.
    b. Inform students they will be split into 5 groups (teachers choice, and have teacher divide groups). They will all be given access to a box of materials with everything needed to successfully germinate seeds. It's up to the students to decide how to set up proper conditions for seed germination.
        i. Different groups may use different methods. As time goes on, students can compare if methods work similarly, or if one is more successful.
        ii. Tell students they will have 15-20 minutes to set up seed germination.

iii. Hint to students that it's possible to set the seeds up so they're always visible

c. Split class into groups. One at a time, allow groups to box to pick their materials. They will be able to go back to the box once they begin. Students may choose to use one or multiple seeds.
    i. Now that they have seeds in their hands, ask if they notice any adaptations of these seeds.
        1. Hard outer shell to protect from the elements
d. When the student finish, ask for each group to appoint a speaker to describe their germination set-up to the rest of the class.
e. If you, the facilitator, notice germination methods that will not work (too much water, not enough water, no holes for oxygen), ask questions so students will come to the conclusion of what they should alter.
    i. For example, if students have too much water, have them think back to the things seeds need to germinate. Will they get enough oxygen if they're covered in water?
f. Create a germination station: an area where all the students germination set-ups will stay over the course of the next 2 or 3 weeks. Have students mark their bottles.

3. <u>Observation:</u> Over the next few weeks, students will take daily observations of their seeds.
    a. Assign a specific time in the day to take about 10 minutes for students to observe all the seeds. What is different about them? What are the first changes they're noticing? Why do sprouts develop in this order? They may also choose to draw pictures of their observations.
    b. Remind students to keep their seedlings moist, but not overwatered. Over the weekend, have specific students take responsibility to take them home and keep them from drying out.
    c. Discuss: When will the plants need sunlight? Why?
        i. They need sunlight when they start developing leaves, so they can photosynthesize to create energy and continue to grow.
    d. When plants are developed enough to plant (about 1 week), plant them outside with students.
    e. When back in the classroom, have students partner up and compare observation they took since beginning the germination process.
4. <u>Class discussion</u>: Recall: What things did the seeds need to germinate? What are some adaptations seeds use to survive? If they were to do this experiment over again, would they change anything about their set-up?


Class-6
What does a seed need?
1. WATER पानी
2. PLACE TO GROW
3. OXYGEN
4. WARMTH
SEED