Lesson 2: Explore

**Big Idea:** Organisms that are best suited for their environment survive and reproduce. Organisms that are least suited for their environment rarely survive long enough to pass on their favorable traits through reproduction.

**Lesson Objective:** Students will design and evaluate an “organism” that will maximize the mass of food gathered.

**Lesson Essential Question:** How well suited is your organism for its environment?

**Materials Needed:** Upcycled materials
- Binding materials (tape, glue)
- Electronic Balance
- Chart paper/butcher paper (or Google drive)
- Cups

**Vocabulary:** engineering design process, trait, favorable, advantage, mass, average

**Lesson Flow:**

1. **Brainstorm: (Engage)**
   a. Teacher poses the question “What are the different ways birds gather food?”
   b. Students answer using prior knowledge.
      i. Possible student answers include: scooping, grabbing, scavenging, etc.
   c. Teacher shows videos of different ways birds gather food.
      i. Pelicans scooping fish out of the ocean
      ii. Crows dropping snails to crack them open
      iii. Woodpeckers pulling grubs out of a tree
      iv. Finch cracking a nut open with its beak
      v. Toucan pulling fruit out with its tongue
   d. Short class discussion on different food gathering techniques.

2. **Organism Creation Using the Engineering Design Process (Explore)**
   a. Teacher introduces the task:
      i. Students (in groups) must design and build an “organism” that will gather at least 5g of food from its environment.
   b. Student groups receive their environments and brainstorm best techniques for collecting the food sources. Students record their brainstorm on their worksheet.
   c. Teacher introduces the materials that can be used to create their organism and the criteria for the organism.
      i. Must use at least 2 different base materials.
      ii. Must have a moveable part
      iii. Cannot use more than 5 different base materials.
d. Student groups brainstorm possible designs. Students must draw an initial design and have it approved by the teacher before receiving materials.

3. Class-wide Test (Explain)
   a. At the end of the allotted design time, teacher has all creation stop. Student then test their designs in final test.
      i. Students get 2 minutes in their environment to collect as much food mass as they can and record their data in a data table.
      ii. Students perform three trials, and take the average.

4. Class-wide Data Analysis (Extend)
   a. Students look at the class-wide data to determine the best 2 traits for each environment, and use the mass data to justify why those traits are the most favorable.

5. Thinking Toward The Future (Evaluate)
   a. Teacher poses the question “If you were to receive an environment with all 4 food sources in it, how would you redesign your organism so that it will survive?”