Elephant Inspired Tools

Connections to Africa: Biomimicry Design Challenge

Grade Level

Grades 1-3

Engage and Explore

This activity is designed to start your students in recognizing themselves as scientists and thinking critically about problem-solving. The goal is to teach concepts through discovery and to encourage using scientific thought processes. As with all lessons provided, please feel free to adapt them according to your students' abilities. You may find it more successful to lead activities and discussions as a whole group as opposed to having your students' work in small groups. Certain scientific vocabulary may or may not be appropriate for your students' level of understanding. Take these ideas, make them your own and your students will have a greater chance at success.

How can an elephant's trunk inspire a new berry-picker design that will make it better at picking up small objects?

1. Ask the students to recall observing the elephants while at the Zoo during their field visit. Have them share some of the behaviors they remember seeing. (Option: If you have not visited the Zoo, you can watch elephant behavior through video recordings on CMZ's Online Resource Library.)
2. Ask the students to think about the ways they saw the elephants using their trunks. What were some of the things they remember noticing about the trunk? What do they think elephants use their trunks for? Are there multiple functions that it might have?
3. Have the students share which human body parts they think are most similar to the elephant's trunk. Remind them to think about the things that the trunk is used for. Which of our body parts help us to do those same things?

Explain

4. Using the Trunk Function cards, have students start to make comparisons between how they as humans are able to meet some survival needs (getting water, getting food, etc.) and how elephants are able to meet those same needs. Students can match the "elephant" card to the "human" card to show how each meets the same need.
5. Once all the Trunk Function card matches have been made have the group share what they found. What is it about the trunk that allows the elephant to use it in order to meet each need?
6. Ask the students if they think there might be things we can learn from an elephant's trunk to help us humans better meet our own needs? Allow some time for answers but don't demand responses as they likely might not be making these connections yet.
7. Introduce your students to the berry-picker tool. (There is an actual berry-picker in the Connections to Africa kit. If you do not have a kit, one can be checked out from the Zoo's

Library.) Allow your students to use/explore the berry-picker tool. While it can be used to pick berries from areas of a plant that would be otherwise unreachable, most students will likely be familiar with this tool as more of a novelty toy, used to pick items up off the floor or from across the desk. Gather a collection of items of varying sizes that students can try to pick up using the berry-picker (cards, balls, magnets, paper clips, markers, water bottles, sheets of paper, etc.).

8. Have students share which items were easy to pick up using the berry-pickers and which ones were more challenging. Why do they think the challenging items were more difficult to pick up?
9. Encourage your students to recall the elephant trunk. Were there things about the elephant trunk that helped the elephant to pick up small objects? Are there ways that we might be able to take the idea of the elephant trunk and apply it to the berry-picker to make it better at picking up small objects?

Expand

10. Either as a class or in small groups have students brainstorm different ways they might be able to redesign the berry-picker to mimic the elephant trunk so that it is better at picking up small objects. In classes of early readers/writers it might be best to do this as a large group so that the teacher can keep a list of the group's ideas.
11. If not yet divided, break the class into small groups. Each group chooses one idea from the class brainstorm list to actually design together. Students work together to design which elements from the elephant trunk they are going to incorporate into the berry-picker and how it will work. They also work together to draw a picture of what this redesigned berry-picker would look like. (Option: In classes where group work is not the best option, students can each design their own or the whole class can work to design one altogether.)
12. Provide each group with poster board, presentation paper, pens/pencils, markers and various art supplies for creating their design. Inform the groups that they will present their finished designs to the class.

Assess

13. Following the presentations, work with the entire class to discuss what was learned. Did they all identify the same ways in which to improve the berry-picker? Or did they identify multiple situations? Were they inspired in different ways by the elephant's trunk?
14. Share your work! When you and your class have completed this activity, we'd love to see what you came up with! Click the "Share Resources" button at the top of the Zoo's Online Resource Library at resourcelibrary.clemetzoo.com. From the dropdown menu, select "Document". Attach your file and complete the form on the page. Please include your school's name and the grade that you teach. When you're done, click "Submit". When we receive your submission, we'll share your class' work!

Standards

Ohio Academic Content Standards
Grade 1 Life Science Topic: Basic Needs of Living Things Living things have basic needs, which are met by obtaining materials from the physical environment.

Next Generation Science Standards
Engineering Design

K-2-ETS1-1 Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. K-2-ETS1-2 Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. 3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
Structure, Function, and Information Processing 1-LS1-1 Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.

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Supplemental Materials

Research Plan

1. What is my research question? Is it a good question?

How can an elephant's trunk inspire a new berry-picker design that will make it better at picking up small objects?

2. How can I get my information?

3. What will I do with this information?

4. How will I know I did my job well?