Elephant Inspired Buildings

Connections to Africa: Biomimicry Design Challenge

Grade Level

Grades 4-6

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 observed elephant behavior inspire new building designs?

1. Begin this lesson by asking your students if they remember what an ethogram is. They used an ethogram to help record elephant behavior during their Zoo visit. (An ethogram is a list of observed behaviors generated by a scientist to help them better record and understand an animal's behavior)
2. Working in groups, have your students recall which of the behaviors on the ethogram they observed the elephants doing during their Zoo visit. (Option: For groups unable to visit the Zoo, elephant behaviors can be observed through videos posted on the Zoo's Online Resource Library).
3. Students can use the ethogram behavior cards to refresh their memories (*these cards are also included in the backpacks used during the onsite visit at the Zoo*). Have students select out the cards that represent the behaviors they observed and share what those behaviors are and why elephants might do them.

Explain

4. Discuss with the students how observing animal behavior can help us learn a lot about animals: why they act the way they do and why they have certain adaptations. Studying animals can also show us better ways to act and to adapt as humans.
5. For this activity, we are going to look at the elephant: its behavior and its body, to get inspiration for how to build a new city: buildings, roads, water systems, etc. We can look to the elephant and how it works to design a new city in that same image.
6. Recalling the behaviors selected from the ethogram behavior cards, pass out the second set of cards, the "Challenge Cards."
7. Have the students find those same observed behaviors in this set of cards and share the information presented. Record at least a few examples on the board in the classroom.

(Option: add additional features to inspire the design of the city by allowing students to explore and incorporate all of the cards, not just the ones representing their observed behaviors.)

Expand

8. Either as a class or in small groups have students brainstorm and share some ideas of how they might meet the challenges represented on the cards. Record a few of those ideas on the board in the classroom.
9. In small groups, have each group choose one idea from the class brainstorm list to actually design together. Students work together in this group to decide which element(s) from the elephant they are going to mimic in their city design and what addition to the city they want to make (buildings, roads, water systems, etc.).
10. For further research opportunities, students can visit the Zoo's Online Resource Library to access more information about elephants and can visit asknature.org to discover more information about biomimicry to help develop their ideas.
11. 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

12. Following the presentations, work with the entire class to discuss what they learned. How were the elephant inspirations different for each of the designs? Were there any inspirations that were the same? If so, how were those same inspirations used differently in each building design?
13. 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 5 Life Science Topic: Interactions with Ecosystems Organisms perform a variety of roles in an ecosystem

Next Generation Science Standards
Engineering Design 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. MS-ETS1-1 Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principals and potentials impacts on people and the natural environment that may limit possible solutions. MS-ETS1-2

Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
Structure, Function, and Information Processing 4-LS1-1 Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

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Supplemental Materials

Research Plan

1. Questioning
State the problem.
Make a hypothesis.

How can observed elephant behavior inspire new building designs?

2. Planning
Make a plan by asking these questions (think, talk, write)

3. Implementing
Gather the materials.
Follow the procedures.
Observe and record the results.

4. Concluding
Draw a conclusion.

5. Reporting
Share my results (informal)
Produce a report (formal)