

Biomimicry:

A bite-sized introduction

Advance Copy, v.1



Lesson 4

Learning to Explore and Communicate about Functional Design Research

Duration: 1 class period (~50 min) + work time

Grades: 6-12

What students do:

Students continue exploring functional design research. They are introduced to the AskNature.org website and learn how to write biological strategy pages.

Learning objectives:

1. Students gain further experience researching and communicating about functional design.
2. Students become familiar with the AskNature.org website.
3. Students gain experience sharing their work.

Materials:

- None required

Background

AskNature (AskNature.org) is a free catalog of biological and ecological phenomena organized by function. It was created by the Biomimicry Institute to facilitate the practice and learning of biomimicry. On AskNature you will find Biological Strategy pages (how organisms do specific things, or functions), Innovation pages (solutions inspired by biological models), and Collections of inspiring strategies and innovations organized by particular themes. You can also browse a library of educational resources.

Getting Ready

- Review the AskNature website and become familiar with how it is organized.

Procedure

Check in

Have students share entries from their biomimicry journals.

Introduce AskNature

Engage students by introducing them to the [AskNature](#) website. Explain the purpose of the website. (To help inventors find biological inspiration for innovation.) Show examples of the main components of the website, including Biological Strategy pages, Innovation pages, and thematic Collections. Demonstrate how to search and filter the database.

Activities

Explore AskNature. Have students **explore** AskNature by having them read several Biological Strategy pages of their own choice. Discuss as a class or in small groups. Do they notice any patterns to how the Biological Strategy pages are written? What's similar between them?

Write an AskNature strategy. Have students find a research paper about an organism, biological system, or ecosystem and write a Biological Strategy page in the style of the AskNature website.

To find a research paper, have students go to Google Scholar and search for "biological function" or "adaptation" + [organism of interest, e.g., "ants"]. (Note: students may be familiar with this process from the extension activity in Lesson 3).

- In 2-4 paragraphs, describe the organism, its habitat and environment, and what the featured adaptation (biological strategy) of the organism (or system or ecosystem) does. Give a detailed description of how the adaptation works (the mechanism) and why it is adaptive/beneficial to the organism. Include all the relevant scientific information, but make it understandable by anyone.
- Write for a 7th- 8th grade general audience, defining or explaining any technical terms you use. A tool that may be helpful is the [De-Jargonizer](#).
- As applicable, indicate how this biological strategy is sustainable (e.g., avoids toxic chemicals, works at ambient temperatures, conserves energy, etc.).
- At the end, if you can think of some, add some ways in which humans could adopt or be inspired by this strategy for better design, engineering, social strategies, etc.

Discussion

Facilitate an open-ended discussion about this activity once students have turned in their work, to give students an opportunity to reflect on and **evaluate** what they learned. Does the process of learning and communicating about nature's abilities (i.e., functional designs, biological

strategies) change how you feel about nature? Does it change how you feel or think about other aspects of life? How so?

Lesson Feedback

This lesson is part of an advance release of five lessons within a ten-lesson unit of study that is currently in development. If you teach this lesson, we would love to hear how it went and any thoughts you may have for improving it. Please share your feedback via the following survey link: <https://forms.gle/EVciYX9iQbXVymbg7>

Resources

- AskNature <asknature.org>
- Google Scholar <scholar.google.com>
- De-Jargonizer <scienceandpublic.com>

Standards Alignment

Next Generation Science Standards (NGSS)

Science and Engineering Practices

- Engaging in Argument from Evidence.
- Obtaining, Evaluating, and Communicating Information.
- Engaging in Argument from Evidence.
- Constructing Explanations and Designing Solutions.
- Connections to Nature of Science: Scientific Knowledge is Based on Empirical Evidence.
- Connections to Nature of Science: Scientific Investigations Use a Variety of Methods.
- Connections to Nature of Science: Scientific Knowledge is Open to Revision in Light of New Evidence.

Crosscutting Concepts

- Structure and Function.
- Systems and System Models.
- Connections to Engineering, Technology, and Applications of Science: Interdependence of Science, Engineering, and Technology.
- Connections to Nature of Science: Science is a Human Endeavor.
- Connections to Nature of Science: Scientific Knowledge Assumes an Order and Consistency in Natural Systems.

Common Core State Standards (CCSS)

- ELA-LITERACY.W (Writing). 6-12.1/2/4/5/7/8/9
- ELA-LITERACY.RI (Reading Informational Texts).6-12.1/2/3/4/5/6/7/8
- ELA-LITERACY.RST (Science & Technical Subject).6-8/9-10/11-12.1/2/4/7/8/9/10
- ELA-LITERACY.W (Research to Build and Present Knowledge).6-12/7/8/9