Function Junction

Biomimicry is possible because biology and human design have a concept in common—the concept of function. For example, one function of both a tree and a skyscraper is to stay upright.

In this simple, hands-on activity, students are given one or more functions and asked to look for examples in the biological world that exhibit that function. This activity doesn’t require biological knowledge and instead focuses on honing observation, analytical, and communication skills.

Duration: 30-45 minutes

Objectives
- Students will identify biological functions evident in different organisms.
- Students will relate the biological functions they’ve identified to human challenges in design and technology.

Materials
- Slips of paper or preprinted Function Junction cards
- A natural outdoor setting that students can safely explore
Background
In biomimicry “function” is a bridge that links biology to human technological challenges. The reason is simple: function is what biology and design have in common. For example, a bear must climb trees without its claws breaking. Likewise, a bulldozer must move earth without damaging its scoop. In order for students to be able to understand and apply biomimicry, they need to grasp the concept of function as it relates both to biology and design. Once a student can begin to identify functions being served by biological structures or processes, they can begin to relate biological solutions to human technological challenges.

Preparation
• Identify an outdoor location where you can do the activity. A space where you can observe organisms in their native habitat is best, but other outdoor spaces can work as well. When possible, try to find a place that has wild vegetation (vs landscaped).
• Print the Function Junction cards or write out several functions on slips of paper.

Activity
1. Divide the class into teams of 2-3 students. Explain that you are going to give each team one or more slips of paper with a word or phrase on it that represents a function (i.e. something that both people and the rest of nature do). Provide a definition of function as needed. (See Vocabulary below.)
2. Tell students that once they have their function(s) they will work together in their teams to find an example in nature of the given function(s). Either hand each team one (or more) functions, or have a member of each team draw them from the stack or a hat.
3. After the students have had time (10 or more minutes) to explore the area and identify organisms accomplishing their function(s), call students back together as a class to discuss what they found. Ask for a volunteer to share what their function was and what they found. When a volunteer speaks up, ask that team to lead everyone to the example they found and to explain how the biological structures or processes they identified helps the organism meet the listed function. [The level of detail of the explanation or its accuracy is not important here; the point is for students to develop an ability to see and speculate about function in nature.]
4. Ask questions such as the following: How do you think this example meets your function? How would you go about finding out if your hypothesis is correct? Are there any other functions you can think of that your example might meet? Encourage all students to chime in with their observations.
5. Next, ask if any of the other teams found something nearby. Go to the next location and discuss what students observed. Continue until each team has had an opportunity to share.

Suggestions

- It can be fun to give all students the same function (e.g., "stabilize") without them knowing it. The result tends to illustrate how nature can achieve the same function in many different ways.
- When selecting functions for this activity, consider the ecological factors that have influenced the organisms in your area and what functions students are likely to see evidence of. For example, in a fire-adapted ecosystem, have students look for functions like “resist fire.”

Vocabulary

- **Function**: In biology, functions describe what a characteristic or process does or how it performs, within the context of natural selection. Discussions of function seek to explain why an object or process occurs in an organism or ecosystem. “Function” is closely related to “adaptation,” which is a functional characteristic of an organism. More generally, function refers to the purpose or operational result of any mechanism, so we can speak of parallel functions that exist in both the natural and human-built worlds. For example, adhesion occurs both in geckos and in human-made products like medical bandages.