

WE ARE NOT ALONE

Humans often feel that our species is categorically distinct from other species — that we are alone and face unique challenges. By contrast, the central message of biomimicry is that the organisms around us have faced the exact same technological challenges we struggle with, and that nature has solved these challenges ingeniously and sustainably. In other words, we are not alone: nature’s technologies address human challenges.

Biomimicry is learning from and then adapting nature’s best ideas to solve human challenges, in order to create a healthier more sustainable planet.

This activity is designed to make this point through an interactive exercise, in which the functions a building must perform are compared to the functions a tree must perform.

Background Information

While the technologies produced by the human race in the last two centuries have been extraordinary, they have one fairly consistent failing—their lack of sustainability. By and large, they pollute the environment, use large amounts of energy, and waste materials.

On the other hand, the technologies developed and used by the millions of organisms surrounding us have stood the test of time. To endure on Earth for the long term, species and ecosystems cannot afford to pollute or waste materials and energy. For example, take a close look at a meadow and you will discover many of the technological challenges facing humanity are being solved right there in that community of plants—clean energy generation, life-friendly manufacturing of materials and structures, sustainable food production, etc.

As sustainability has become more widely recognized as an important challenge for humanity, the natural world is acquiring new meaning as a resource for sustainable technological ideas. Instead of seeing technology, and our species, as somehow in contrast to the natural world, biomimicry helps us to see a way we can learn from the technological solutions all around us.

Goals

- Students will begin to see that the human race is not alone in its effort to survive sustainably on this planet, and that the natural world is full of answers to our technological challenges.

Objectives

- Students are able to understand and lead other people to the understanding that the natural world is a highly relevant place to look for answers to humanity’s technological challenges.

Materials

- Chalkboard

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Activity

DURATION: 10–20 minutes

PROCEDURE

1. Ask students to brainstorm out loud about the functions that a building must perform, and write the ideas students give up on a chalkboard under the heading “buildings.” The kind of answers you are looking for are things like: “shelter from the weather,” “withstand wind,” “house people,” “distribute water,” “circulate air,” “allow communication between inhabitants,” “use energy,” etc. (see list below).
2. Then, write the word “trees” next to the word “buildings” and ask the students to do the same things for trees. Write down the ideas students come up with in a column under the word trees. To be as effective as possible, keep encouraging students to give you more ideas until you have a list which is complete enough to match with all or most items in the buildings list.
3. Let students look over these two lists for a moment, and then ask students to help you compare the lists. Draw a line between the items in the list for buildings to comparable items in the lists for trees. For example, draw a line between “circulate air” and similar items under trees, such as “respiration”

Here are 2 possible lists to serve as a reference:

Functions trees perform	Functions buildings perform
<ul style="list-style-type: none"> • Maintain structural integrity • Generate energy • Transport and distribute liquids • Transport and distribute gases • Sequester carbon dioxide • Manage waste • Produce food • Perform services in return for services (ex, pollination) • Protect against weather • Protect against microbes 	<ul style="list-style-type: none"> • Stay upright, even in hurricanes • Use energy • Pump water • Ventilate for indoor air quality • Account for climate impact • Deal with waste produced • Sustain occupants • Attract customers/provide services • Protect occupants from weather • Maintain clean surfaces



When you do this in the exercise, you’ll start with one category and then move to the other. And the items in your lists won’t usually match up, so you’ll need to draw lines between them.

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CONCLUSION AND DISCUSSION

There is a cultural phenomenon of humans either believing or being instructed to believe that they are categorically different from other organisms on this planet. You may remember when people were taught that humans were different from other animals because, “humans use tools, and other animals do not.” Jane Goodall’s observations of chimpanzees using grass stalks to fish for termites then came to light, after which tool use was observed in species after species.

All species have their distinctive attributes, certainly, but what is so illuminating about biomimicry is the realization that, at least when it comes to our technological challenges, humanity is not alone. By comparing human technologies to natural ones, the similarities become apparent: namely, the similarity of function, or that all organisms—humans and other—have similar survival challenges. At the same time the discrepancies become apparent as well: namely, the sustainability of natural technologies versus the general lack of sustainability in human technologies. This exercise helps students to not only recognize the applicability of natural technological solutions to human challenges but also how compelling nature’s design innovations are in suggesting human technological aspirations (e.g., buildings use energy while trees generate their own...what if a building generated the energy that it used?).

EXTENSION

Try this exercise out with other pairs of human-made items and organisms. Try out “products” for the human-made item and this time, have students suggest organisms that likely have functional attributes which address the functions that “products” must achieve. For instance, under “products” you might have things like: “packaged,” “glued together,” “energy-efficient,” etc. The matching list of organisms might be “honeybee combs,” “geckos,” and “abalone shells.”

This lesson is a good lead-in to a design exercise, where students find their own inspirations from the natural world to help them with a design challenge.

For students in grades K-5, listen to the song We Are Not Alone on the biomimicry children’s album, *Ask the Planet*, and do the accompanying lesson plan (downloadable for free at <http://ben.biomimicry.net>)

Vocabulary

Technology: Technologies are commonly thought of as human-made contraptions or devices, such as cell phones. But in the broadest sense, technologies are simply ways of doing things, or any manner of attempting to accomplish a function of some kind. Shoes with laces are a technology, as is the particular manner the laces are tied, and the materials and manufacturing processes involved in making the shoes. Humans are, therefore, not the only species with technology. Natural technologies are simply the ways in which other organisms accomplish certain desirable ends. For example, the tools and techniques used by chimpanzees to fish for termites in termite mounds are technologies, as are the mounds themselves, which termites build to shelter themselves, and the hand which the chimpanzee uses to grasp the piece of grass it fishes with.