



Background and extension activity

Biomimicry: linking form and function to evolutionary and ecological principles

What is biomimicry?

Biomimicry is “the design and production of materials, structures, and systems that are modelled on biological entities and processes” (Oxford Languages Online). It describes the process through which engineers, scientists, architects, designers, and others look to nature for examples and inspiration for their own inventions, innovations, and designs. Nature is a great example because the adaptations that exist in organisms result from thousands of years of evolution to develop the characteristics best suited for a particular function or purpose. Typically, these traits or adaptations are highly effective and efficient.

[Biomimicry is not a new idea](#). In fact, many argue that humans have always looked to nature for examples and inspiration. We can see examples of biomimicry in ancient structures and architecture dating back to 6000 BCE or the pyramids in ancient Egypt. During the Renaissance, Leonardo Da Vinci learned much from the natural world and applied this in his inventions.

A note on terminology

With a deeper dive into the topic of [biomimicry and related terms](#), it is possible to find similar terms, such as biomimetics, bionics, or bioinspired design (technically biomimicry is a verb and the others are nouns). These all refer to similar approaches and are often used interchangeably, although biomimicry is sometimes used specifically for purposes with a focus on sustainability and environmentalism. You may even come across the term biomorphic design, which is completely different and simply refers to designs that resemble natural objects or creatures in looks rather than function. For the purposes of teaching students, focus on the idea that biomimicry is the act of humans looking to nature for inspiration in their designs and inventions.

Additional modifications and extensions

A possible extension of this activity is to allow students to prototype and test their product.

Allow students to use everyday materials or materials found in a maker space to develop a prototype. It does not have to be fancy equipment; household supplies, trash, and recyclable material work well. If you have access to a 3D printer, it is possible to create more advance prototypes. For this procedure, students construct experimental design diagrams that include



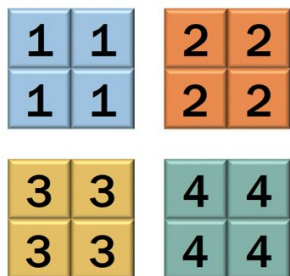
identifying independent, dependent, and control variables; write a hypothesis; and develop methods to collect data regarding the performance of their product. This engages students in experimental design. For each prototype, students collect data that they analyze. They can then adopt an iterative process by making small changes. It is important that students use the same tests to measure performance and only change one aspect of the design at a time, so that they can isolate which characteristics of their prototype have the most impact. Students can do two to three rounds of prototyping, testing, reflecting, and modifying their designs. While this option integrates many science and engineering skills, this extension is dependent on time and resources available.

Another modification includes having students share their design challenges using the jigsaw method shown below. They work in groups to develop their project. When students debrief, they are in mixed groups with only one representative from their original group working on the design challenge. During the debrief, each student will be required to present and speak on behalf of their group, since they are the only representative. Thus, each group member is accountable and engaged in the discussion.

JIGSAW

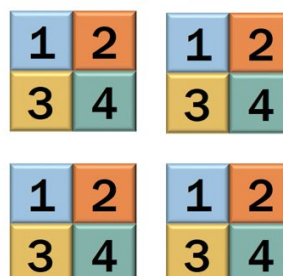
Round 1 – Focus Groups

Divide students into groups and give each group a different text to read and discuss.



Round 2 – Task Groups

Mix the groups so that students can bring their specific focus to a common task or problem.



Vanderbilt University Center for Teaching

Jigsaw developed by Aronson (1978)

Jigsaw/Vanderbilt University Center for Teaching. Permission for non-commercial use