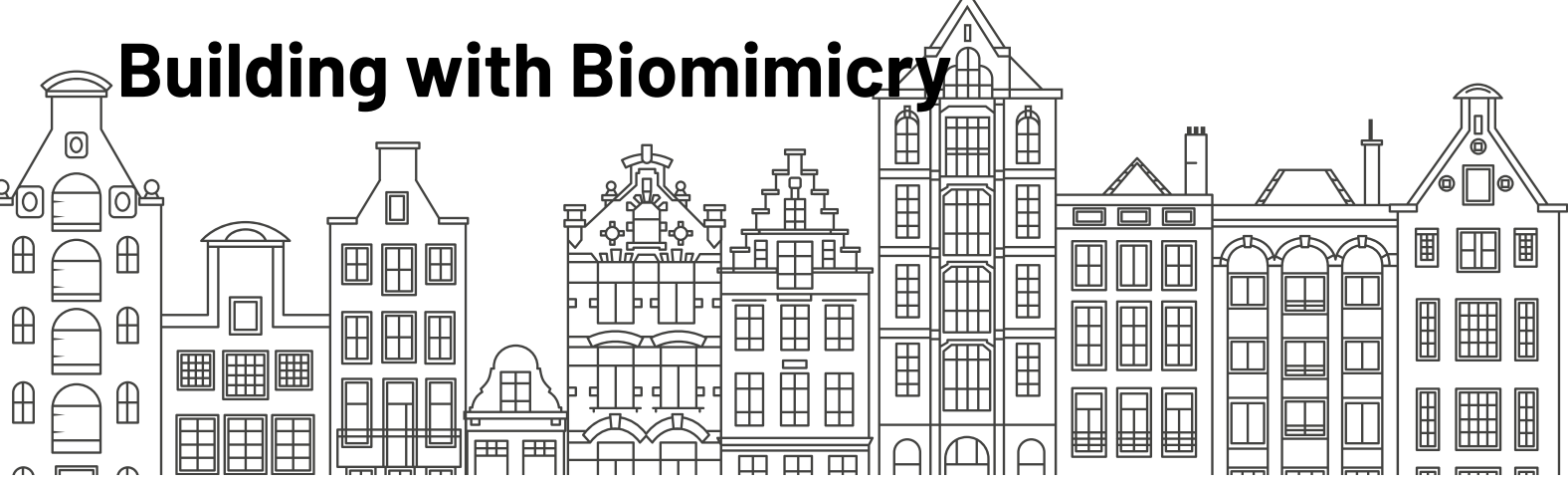


Building with Biomimicry



Subject: Biomimicry

Grade Level: 7-12

Topic: Architecture

Time: 100-150 minutes

Learning Objectives

Students will:

- understand the concept of biomimicry and how it influences modern architecture.
- explore natural systems and how they can inspire sustainable building designs.
- analyze real-world examples of biomimetic architecture.
- design a conceptual building based on a biological model.

Materials

Whiteboard or projector, Internet access and/or pre-downloaded videos, paper, pencils, markers, access to design software (optional: Tinkercad, SketchUp, etc.), images/examples of natural organisms and architectural structures, cardboard, glue, scissors (for physical models)

Procedure

Engage: To promote student curiosity, Ask: *"What are some amazing things you've seen in nature?"*

Show a few striking images (e.g., termite mounds, seashells, bird nests). Introduce the term biomimicry. "Biomimicry is a practice that learns from and mimics the strategies used by living organisms to solve challenges comparable to the ones we face as individuals and societies."

🌐 [What is biomimicry - The Biomimicry Institute](#)

Explore: Help students build understanding by having students participate in an activity where they learn about tropisms. Introduce key tropisms: Phototropism (light), Gravitropism (gravity), Thigmotropism

(touch), Hydrotropism (water), Chemotropism (chemicals) Assign groups of 2-4 students. Each group will be assigned a type of tropism. They will research real-life examples and create a one page poster or slide.

Explain: Have students begin to show what they have learned. Have each group explain about the tropism examples they found. Have a class discussion about the examples.

Ask: *How do these tropisms help plants survive?*

If students have not been introduced to the concept of biomimicry, spend time discussing the concept and providing examples.

Ask: *Can you think of any other examples of biomimicry?*

Elaborate: Have students use their new knowledge by designing a tool, structure, or technology that solves a human problem using inspiration from plant tropism. Examples: A building that shifts solar panels based on sunlight like a sunflower; A robot arm that wraps around objects like a vine; A water-seeking probe that mimics hydrotropism. Have students brainstorm and sketch ideas, then create rough prototypes using craft or recycled materials or create labeled diagrams.

Assessment

Evaluate: Evaluate student learning by having students present their designs in a mini "innovation fair." Encourage peers to ask questions and give feedback. Have a class discussion.

Ask: *What did you learn from plants? How can biomimicry help us create sustainable designs?*

Have students do a reflection writing on what they learned.

Extension Activities

- Invite a local biologist, engineer, or architect to talk about biomimicry.
- Create a digital portfolio with student designs and explanations.
- Explore tropisms in space farming or agriculture.

NGSS Alignment

Middle School (7–8)

MS-LS1-8 - Gather and synthesize information showing how organisms respond to stimuli.

MS-ETS1-1 - Define criteria and constraints of a design problem with environmental considerations.

MS-ETS1-2 - Evaluate competing design solutions.

High School (9–12)

HS-LS1-3 - Plan and conduct investigations to provide evidence that feedback mechanisms maintain homeostasis.

HS-ETS1-2 - Design solutions to complex real-world problems by breaking them into smaller, manageable problems.

HS-ETS1-3 - Evaluate solutions based on trade-offs.



Created by the Ohio Space Grant Consortium