Imitate Nature's Design

Lesson Description

Take inspiration from your surrounding environment. Explore natural structures, layouts, shapes, and patterns from various creatures and environments. Choose your favorite challenge and create your design!

Lesson Objective

Explore plant and animal designs and adaptations that have helped them survive in their environments. Use nature's designs as inspiration to design your own solutions to man-made problems.

Materials

- *Engineering Design Process* diagram
- blank paper
- writing/drawing materials

Vocabulary

- adapt
- biomimicry
- climate
- ecosystem
- environment
- nature

Introduce

There is a lot to learn from the world around us. For millions of years, plants and animals have been **adapting** to their **environment**. Hot or cold, day or night, rain or shine - no matter the **climate**, plants and animals have to eat, reproduce, and shelter themselves.

Our world comprises varying **ecosystems**, homes to millions of species living amongst and around us. All of these species need to adapt to their environment in order to survive. We can learn a lot from the adaptability of these species and apply these survival skills to enhance the way humans live. **Biomimicry** (bio=life; mimic=to copy) is the study of how great ideas from nature are copied and used to solve complex problems.

Investigate

Your Challenge: Now it's time to apply what you just learned from nature and create your own designs! Think about your favorite plant or animal. How have they adapted to their environment? Use that as your inspiration to design an invention of your own! Imagine how your inventions work, draw out a blueprint, and explain each part.

1. Take a walk. Observe the plants, insects, and other natural phenomena around the

community. If you cannot take a walk, look through the window and make observations.
2. Gain inspiration from nature and how systems interact to create a solution to a human problem.
3. Think about something you observed in nature.
    - Recall from memory.
    - Do a quick Google search to help you with inspiration.
    - Get creative!
4. Review the *Engineering Design Process* to work through the steps:
    - Decide on a problem you think can be solved with biomimicry.
    - Develop a design or model. Draw your design with as many details as you can.
5. Share your design with friends and family.

Wrap-up

Challenge Questions:

1. What is your favorite animal?
2. What unique characteristics does your favorite animal have to help them survive?
3. What are three facts about what your favorite animal does well to live and survive in its environment?
4. What survival instincts from your favorite animal can you apply to human environments?

Watch and read it!

With an adult or an adult's permission,

- Biomimicry: when technology is inspired by nature - Animated video providing examples of biomimicry
- The Lotus Effect - A short clip demonstrating the extreme waterproofing natural feature of the lotus leaf.
- Gecko Feet: How Do They Stick to Walls? - A video by National Geographic explaining and demonstrating how geckos climb walls.
- How Spider Silk Could Change The World - A video explaining the possibilities in biomedicine using synthetic spider silk.
- Follow us on social media:
    - Pinterest: @energyiseverything
    - Instagram: @energy_is_everything
    - Facebook: @EnergyiEverything
    - YouTube: Energy is Everything

Glossary

Word	Part of Speech	Definition
adapt	verb	To make suitable to or fit for a specific use or situation.
biomimicry	noun	An approach for innovating designs that uses

		inspiration from nature to increase human sustainability and adaptation.
climate	noun	The average condition of the weather over time.
ecosystem	noun	The relationship and interaction of living and nonliving things in a given area. This includes the water, air, land, and all of the living species.
environment	noun	The surroundings or conditions in which a person, animal, or plant lives or operates.
nature	noun	The phenomena of the physical world collectively, including plants, animals, the landscape, and other features and products of the earth, as opposed to humans or human creations.

Works Cited

Chen, A. (2017, October 19). *Butterfly wings inspire a better way to absorb light in solar panels*. The Verge. https://www.theverge.com/2017/10/19/16503258/butterfly-wings-engineering-solar-cell-energy-biomimicry.

Scientific American. (1997, November 24). *How do frogs survive winter? Why don't they freeze to death?* Scientific American. https://www.scientificamerican.com/article/how-do-frogs-survive-wint/#:~:text=Antifreeze!,It%20will%20appear%20quite%20dead.

Singla, S. (2019, December 24). *BioWAVE : A Unique Method for Generating Power from Ocean Waves*. Marine Insight. https://www.marineinsight.com/environment/biowave-a-unique-method-for-generating-power-from-ocean-waves/.

Wright, L. (2003, March 3). *Lotus Leaf Inspires Waterproofing Scheme*. Scientific American. https://www.scientificamerican.com/article/lotus-leaf-inspires-water/.