Tropism--Learning from Plants

Subject: Biomimicry

Grade Level: 6-10

Topic: Tropisim

Time: 90-120 minutes

Learning Objectives

Students will:

- understand the different types of tropism in plants.
- explore how plants adapt and respond to their environment.
- apply principles of biomimicry to design a solution inspired by plant tropisms.
- communicate their ideas through sketches, models, or presentations.

Materials

diagrams/photos/videos of plant tropisms (e.g., time-lapse of sunflower movement), chart paper or whiteboard, markers, paper, scissors, tape, and recycled building materials, Internet access or *Handouts for Plant Tropism Examples*, projector or screen (optional)

Procedure

Engage: To promote student curiosity, show a time-lapse video of a plant exhibiting phototropism or thigmotropism (e.g., sunflower following the sun, vines wrapping around a pole).
Changing the direction of the light during plant growth - Time lapse #greentimelapse #gtl #timelapse

Ask: *How do plants know where to grow? What are they responding to?*

Explore: Help students build understanding by having students particiate 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 to design 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.

Students brainstorm and sketch ideas, then create rough prototypes using craft materials or present with 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

Life Science Connections

MS-LS1-4 - Use argument based on evidence to explain how characteristic behaviors and specialized structures affect the probability of survival and reproduction.

MS-LS1-5 - Construct a scientific explanation based on evidence for how environmental and genetic factors influence growth.

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

HS-LS4-4 - Construct an explanation based on evidence for how natural selection leads to adaptation.

Engineering Design Connections

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

MS-ETS1-2 - Evaluate competing design solutions.

HS-ETS1-2 - Design a solution to a complex real-world problem by breaking it into manageable components.

HS-ETS1-3 - Evaluate solutions based on prioritized criteria and trade-offs.

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