Flower Power - Origami in Space

Subject: Biomimicry

Grade Level: 7-12

Topic: Engineering Design Process

Time: 60 minutes

Learning Objectives

Students will:

- recognize how a blooming flower was the inspiration for something made for space exploration.
- develop ideas for how origami can further benefit space travel.

Materials

Computer access for instructor, computer access for students or articles about patterns in nature, Make your own Starshade template printed on 11" x 17" paper, scissors, sticky notes

Procedure

Engage: To promote student curiosity, have students watch a video that shows how flowers open. *Ask: What plants have you seen that open this way? Did you notice a pattern to how the flowers open?* Have students explain their answers.

Time-Lapse: Watch Flowers Bloom Before Your Eyes | Short Film Showcase

Explore: Help students build understanding by having students do research to look for other things in nature that have patterns. This will help students to get involved in the topic of linking patterns to designs and build their own understanding. If students have computers, they can do guided research, if not, have a supply of articles and fact sheets available for study. Have students list ideas that are interesting to them as they do their reserach.

🌐 Patterns Found in Nature - CuriOdyssey .

🌐 Patterns in nature

🌐 Patterns in nature – letting nature back in

Explain: Have students begin to show what they have learned by having a discussion so students can share what they have learned about patterns in nature and how they can be helpful in the design process (and how nature helps us with this understanding). Have students post sticky notes with ideas they gained from their researach.

Elaborate: Have students use what they have learned by having the students create an origami folding creation.

First watch: Have students watch a video about an origami artist who creates for NASA.
🌐 How NASA Engineers Use Origami To Design Future Spacecraft

Next create origami sun shades:
🌐 Space Origami: Make Your Own Starshade – Engineering Project | NASA JPL Education

Assessment

Evaluate: Evaluate student learning by having the students share ideas about how origami folding and patterns in general could be helpful in other design applications especially as we explore the future of living on other planets. Have students share ideas on sticky notes or students can work together to make an informative slide or small poster.

Extension Activities

- Create a variety of origami figures. Afterwards, discuss the advantages and disadvantages of taking folded equipment into space. *Ask: What requirments might there be for the material used?*
- Discuss how folded equipment may play a part in living on another planet.

NGSS Alignment

Engineering Design

MS-ETS1-1 / HS-ETS1-1 - Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution.
MS-ETS1-2 / HS-ETS1-2 - Evaluate competing design solutions using a systematic process.
MS-ETS1-3 / HS-ETS1-3 - Analyze data and evaluate design solutions based on trade-offs.

Life Science Connections

MS-LS1-4 – Use argument based on evidence to support how structures affect function.
HS-LS1-2 – Develop and use models to illustrate hierarchical organization and structure–function relationships.

Physical Science Connections

HS-PS2-6 – Communicate scientific and technical information about why a design solution works.

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