Snowy Egret

Life Science | Engineering Design Process

Engineering Challenge

Visible Elements in Photo

- A white egret standing on dark rocks in shallow water
- Blue water with reflections of overhanging branches/vegetation
- Long, thin yellow legs supporting the bird's body
- Pointed beak (blue-gray coloring)
- Overhanging brown branches and moss-covered rocks framing the habitat

Reasonable Inferences

- From long, thin legs and shallow-water position: The egret needs legs designed to wade through water without sinking, suggesting a need for weight distribution over a large surface area.
- From the rocky shoreline habitat: The bird must navigate slippery, uneven surfaces while hunting, implying a need for grip and balance mechanisms.
- From the pointed beak: The egret hunts by spearing small fish, so its tool is optimized for precision and penetration in water.

Engineering Task

K-2 Challenge:

"Design Wading Legs for a Bird"

Imagine you are designing a bird that needs to walk through muddy water without getting stuck. Build legs using straws, thin sticks, or craft materials that can hold up a small toy or cup of water. Your bird's legs need to:
- Stand up tall and straight
- Not wobble or tip over when you add weight
- Keep the body high above a puddle of water

Try different leg shapes—skinny, fat, splayed out wide. Which design keeps your bird from sinking?

3-5 Challenge:

"Engineer Stable Wading Legs for Shallow-Water Hunting"

Design a set of legs for a wading bird (like the egret) that hunts in shallow water. Your legs must:
- Support a 500g weight (a small cup of water or sand) without buckling
- Span at least 6 inches tall when vertical
- Distribute weight across a wider footprint than a single point (use feet or padded bases)
- Be built from no more than 5 materials from your kit

Success criteria:
- Legs remain stable when the bird leans forward to "strike" at fish (simulated by tilting the body 30 degrees)
- The bottom of the legs can grip a slippery surface (test on wet tile or foil)
- You can explain why your design prevents sinking in mud or soft ground

EDP Phase Targeted

Ask / Define Problem — This phase fits best.

The photo shows a real organism solving a natural engineering problem: how to move safely and hunt effectively in a challenging environment. Students start by observing why the egret's legs are shaped the way they are, then define their own problem: "How can we design legs that work the same way?" This grounds the activity in authentic biomimicry before students move to imagining solutions.

Suggested Materials

1. Drinking straws or thin wooden dowels (for leg structure)
2. Foam sheets or rubber erasers (for feet/foot pads to prevent sinking)
3. Tape or hot glue (to join and reinforce joints)
4. Modeling clay or playdough (for weight and gripping surfaces)
5. Aluminum foil or plastic wrap (to simulate slippery water surfaces for testing grip)

Estimated Time

One 45-minute session (K-2) or Two 30-minute sessions (3-5)

Session 1: Observe the photo, brainstorm leg designs, build prototype.
Session 2: Test on simulated muddy/slippery ground, modify, test again, and discuss results.

Why This Works for Teachers

This task directly addresses NGSS ETS1.A (defining and delimiting engineering problems) by asking students to identify a functional need observable in nature and translate it into measurable design constraints that can be tested and iterated.