Cattle_egret

Life Science | Engineering Design Process

Engineering Challenge

Visible Elements in Photo

- A white egret (bird) standing on a rusted metal horizontal pipe/rail
- A brown cow visible behind and below the fence
- A multi-rail metal fence structure (appears to be livestock fencing)
- Open grassy pasture with trees in the background
- Thin metal bands or clamps securing sections of the pipe

Reasonable Inferences

- From the egret perching on the fence: Birds need safe, stable resting spots that give them a good vantage point to hunt or observe. The pipe must be narrow enough to grip but sturdy enough to hold their weight.
- From the cow-and-egret pairing: These animals coexist in pastures; the egret may be hunting insects disturbed by grazing cattle. A perch design must work in an active farm environment with moving livestock.
- From the rust and clamps visible on the pipe: The structure must withstand outdoor weathering and vibration from livestock activity without failing.

Engineering Task

K-2 Challenge:

Your job is to build a safe perch for a bird to stand on. The bird needs to hold on with its feet, rest comfortably, and see far away. Your perch must be strong enough that it doesn't break or wiggle too much when the bird lands on it. Build a perch from classroom materials and test if a toy bird (or your fingers) can hold on and balance without falling.

3-5 Challenge:

Design a perch rail system for birds visiting a farm pasture. Your perch must:
- Support a 1-pound test weight (or heavier) without bending more than ½ inch
- Have a grip surface (diameter or texture) that allows a model bird foot or clothespin to hold securely
- Withstand simulated "vibrations" from nearby cattle movement (gently shake the perch for 10 seconds)
- Be at least 3 feet long and mounted at a height that gives a clear view of the surrounding area

Measure and record which materials and design choices work best to meet all criteria.

EDP Phase Targeted

Ask / Define Problem

The photo shows a real-world animal behavior and an existing human-made structure that solves a perching need. Students should start by observing why the egret chose this particular spot and what problems a bird-perch design must solve (stability, grip, visibility, durability). This front-loads the challenge with authentic curiosity.

Suggested Materials

- PVC pipe (½" or ¾" diameter, cut into 3–4 foot sections)
- Metal rods or wooden dowels
- Rope or foam tubing (for grip texture)
- Sandpaper or grip tape
- Clamps, brackets, or wire to secure sections
- A 1-pound weight (or bag of sand) for load testing
- A toy bird or clothespin to simulate feet

Estimated Time

45–60 minutes (single session for K-2; two 30-minute sessions recommended for 3-5 to allow design iteration and testing)

Why This Works for Teachers

This task directly supports NGSS ETS1.A (defining design problems) and ETS1.B (developing solutions) by asking students to identify constraints (grip, load, environment) and test trade-offs between materials and structure in a real-world context inspired by animal behavior.