Food Chain

Life Science | Engineering Design Process

Engineering Challenge

Visible Elements in Photo

- A small lizard (appears to be a desert or arid-climate species) with textured, grayish-brown skin
- Dry soil and rocky ground with scattered wood chips, leaf debris, and small stones
- Dead wood and bark fragments mixed into the soil
- Sparse vegetation (minimal green growth visible in background)
- Sunlit, exposed habitat with no visible shelter structures

Reasonable Inferences

- From lizard's coloring and habitat: This creature relies on camouflage to hide from predators; the ground provides its primary protection.
- From dry soil and sparse vegetation: The environment has limited water and shade; the lizard must have a way to regulate temperature and find shelter quickly.
- From exposed ground with debris: Natural hiding spots (under rocks, logs, burrows) are critical for survival in this open habitat.

Engineering Task

K-2 Challenge:

"Build a Safe Home for a Desert Lizard"

Your lizard needs a place to hide from the hot sun and stay safe. Using rocks, sticks, soil, and leaves, design and build a cozy shelter on a patch of ground. Your shelter should:
- Be big enough for the lizard to fit inside
- Keep the lizard hidden (so a pretend hawk can't spot it!)
- Use only natural or recycled materials from outside

Test your shelter: Can you hide a small toy lizard inside where someone can't find it right away?

3-5 Challenge:

"Engineer a Microhabitat That Provides Camouflage and Thermal Regulation"

Desert lizards need shelters that hide them from predators AND keep them cool. Design a small enclosed shelter (no larger than 15 cm × 15 cm × 10 cm tall) that meets these criteria:

Must-Have Features:
- Entrance hole(s) no larger than 3 cm wide
- Interior that matches the surrounding ground color for camouflage
- At least two different materials used (e.g., soil, sand, bark, small rocks, dried plants)
- A shaded interior area that stays cooler than exposed ground nearby (test with a thermometer after 10 minutes in sunlight)

Success Metrics:
- A toy lizard can enter and exit without the shelter collapsing
- The shelter interior is at least 2°C cooler than open ground
- An observer cannot immediately spot the shelter from 1 meter away

EDP Phase Targeted

Ask / Define Problem

This phase fits best because the photo shows a real-world survival need (a small creature needing shelter in an exposed habitat). Students begin by observing the animal's actual environment and asking: "What does this lizard need to survive here? What problems does an open desert present?" Before building, they must understand the dual problem of predation and heat exposure, grounding their engineering work in authentic biological need rather than jumping to solutions.

Suggested Materials

- Soil, sand, and pebbles (collected or classroom-sourced)
- Small sticks, bark chips, and dried leaves
- Thermometer (for 3-5 temperature testing)
- Small cardboard box or plastic container (optional frame for 3-5)
- Tape and ruler (for 3-5 to measure dimensions)
- Toy reptile or clay model (for testing fit)

Estimated Time

- K-2: One 30-45 minute session (build and test shelter)
- 3-5: Two 40-minute sessions (Session 1: observe, plan, and gather materials; Session 2: build, test temperature, and refine design)

Why This Works for Teachers

This task directly addresses NGSS 3-5-ETS1-1 (Ask defining questions and make observations about products to determine what problems they are meant to solve) by having students observe a real animal in its natural habitat and engineer a solution to a genuine survival challenge, bridging life science with engineering practice.