Fungi02

Life Science | Engineering Design Process

Engineering Challenge

Visible Elements in Photo

- Small mushrooms (toadstools) with tan/beige caps and thin brown stems growing in clusters
- Dark, fragmented wood chips or mulch covering the ground
- Decaying wood pieces (various sizes) mixed throughout the mulch
- Scattered white/pale wood debris among darker material
- Small green plant seedlings visible in background

Reasonable Inferences

- From mushrooms + decaying wood: Fungi break down dead plant material and need moist, nutrient-rich environments to grow. The mushrooms are decomposing the wood chips, which implies moisture and organic matter are present.
- From dark mulch bed + multiple fungi: This is a purposefully maintained growing environment (garden bed, landscaping, or compost area) where conditions support fungal reproduction.
- From mushroom variety in size and stage: Growth takes time; some are just emerging while others are fully mature, suggesting this is an active, ongoing decomposition process.

Engineering Task

K-2 Challenge:

Design a cozy home for mushrooms! You have wood chips, soil, and a container. Build a mushroom home that keeps moisture in and gives mushrooms a place to grow. What will you use to make the walls? How will you keep it wet but not soggy? Test your design by sprinkling water on it and seeing if it stays damp for one whole day.

3-5 Challenge:

Design a controlled decomposition chamber that simulates the growing conditions visible in this photo. Your structure must (1) hold at least 2 cups of mixed wood chips and soil, (2) maintain moisture for at least 5 days without adding water, (3) allow air to reach the materials, and (4) be built using only recycled or natural materials. Measure moisture levels daily using a simple water-absorption test. Success = mushrooms or mold growth appears within 2–3 weeks.

EDP Phase Targeted

Ask / Define Problem — This phase fits best because the photo shows a natural problem (dead wood needs breaking down) and an existing organism solution (fungi doing the job). Students should first ask: Why are mushrooms growing here? What do they need? How can we create those conditions? This anchors the engineering challenge in real-world decomposition ecology rather than starting with a pre-designed solution.

Suggested Materials

- Compost, garden soil, or potting mix
- Wood chips or shredded bark (from landscaping suppliers or free from tree-trimming services)
- Clear plastic containers or plastic bags (to observe growth and retain moisture)

- Spray bottle (for misting to maintain moisture)
- Thermometer (optional, to monitor temperature changes)
- Simple moisture meter or paper towel test strip (to track humidity)

Estimated Time

One 45-minute session to build the chamber + ongoing observation phase of 2–3 weeks (5 minutes daily to water and observe). Alternatively, a two-session format: Session 1 (30 min) design and build; Session 2 (30 min, one week later) to examine growth and troubleshoot.

Why This Works for Teachers

This task directly addresses NGSS 3-5-ETS1-1 (Define a simple design problem) and K-2-ETS1-1 (Ask questions, make observations, and gather information about a situation people want to change) by grounding engineering in visible ecosystem processes, turning a backyard observation into a testable prototype that produces observable biological results.