The Invent-a-Lure Workshop: Engineering for Anglers

Materials Needed

- **Lure Body (Choose 1-2):** Old plastic bottle caps, plastic spoons (the bowl part), wine corks, small pieces of scrap wood, buttons, or even old keys.
- **Flash & Attraction (Choose a few):** Aluminum foil, small beads, feathers, brightly colored yarn or string, sequins, strips of a plastic bag.
- **Hardware:** Paper clips (large and small), fishing hooks (with adult supervision!), small split rings or key rings, small weights (like fishing split-shot or small nuts from a hardware store).
- **Tools:** Pliers (needle-nose are best), scissors, permanent markers, hot glue gun or super glue (with adult supervision), small drill or awl (optional, for making holes; adult use only).
- **Design & Record:** A notebook or paper for a "Lure Design Log," pencil, colored pencils.
- **Testing Area (Optional):** A bathtub, large sink, or clear bucket filled with water.

Learning Objectives

By the end of this lesson, you will be able to:

- **Design:** Sketch and label a unique fishing lure design based on principles of fish attraction (color, movement, sound).
- **Engineer:** Construct a functional fishing lure using common household materials, solving small problems during the building process.
- **Analyze:** Predict how your lure will perform in the water and justify your design choices in a design log.
- **Connect:** Explain how a lure mimics natural prey to attract a target fish species in a local ecosystem.

Curriculum Connections

This project-based lesson connects to several key learning areas:

- **Science (NGSS Life Science):** Understanding animal behavior (predator/prey relationships) and how organisms adapt to and interact with their environment (ecosystems).
- **Engineering (NGSS Engineering Design):** Following the engineering design process: defining a problem (how to attract a fish), developing solutions (designing the lure), and optimizing the design (testing and reflecting).
- **Art & Design:** Applying principles of color, shape, and form to create an object that is both functional and visually appealing.

Lesson Activities

Part 1: The Hook - What Makes a Fish Bite? (15 minutes)

Start with a discussion. The goal is to spark curiosity and activate prior knowledge. Ask questions like:

- If you were a fish, what would make you want to bite something? (Is it shiny? Does it look like a smaller fish? Does it wiggle like a worm?)
- Think about the last time you went fishing. What did the successful lures look like? What did they do in the water?
- We are going to be engineers today. An engineer is a problem-solver. Our problem is: **How can we build something from scratch that will convince a fish to bite?**

Part 2: The Fish Detective - Research Mission (30 minutes)

Before an engineer builds, they research! Your mission is to investigate what makes a great lure.

1. **Choose a Target:** Pick a fish you'd like to catch in your local area (e.g., Largemouth Bass, Rainbow Trout, Bluegill).
2. **Investigate Your Target:** Do a quick online search or look in a fishing book to answer these questions in your **Lure Design Log**:
    - What does this fish like to eat? (Insects, minnows, crayfish?)
    - What colors seem to attract this fish? (Bright colors in murky water? Natural colors in clear water?)
    - What are the three main types of lures used for this fish? (e.g., spinners, crankbaits, jigs). What does each one do? (Spin? Wobble? Sink fast?)

Part 3: The Lure Inventor - Design and Build! (60 minutes)

This is where your creativity comes to life. Follow these steps to become a lure inventor.

Step A: Blueprint Your Idea (15 mins)

In your **Lure Design Log**, sketch out your lure. Don't just draw it—be an engineer and label it! Answer these questions on your blueprint:

- **Name:** What is the creative name of your lure? (e.g., "The Spoon Wobbler," "The Bottle Cap Rattler").
- **Body:** What material will you use for the main body? Why?
- **Attraction:** What will you add for flash, color, or sound? (Foil? Feathers? Beads inside?). Label where these go.
- **Action:** How do you think it will move in the water? Will it spin, wobble, or dive? Sketch its path of movement.

Step B: Build Your Creation (45 mins)

Using your blueprint as a guide, build your lure. This is a process of problem-solving. You might discover that your original plan needs to change, and that's what engineers do! Remember to get help from an adult for any cutting, drilling, or gluing.

Builder's Tips:

- Use pliers to carefully bend a paper clip into a wire frame that can run through your lure's body, creating loops at both ends for tying the line and attaching the hook.
- A spoon bowl naturally wobbles. A bottle cap can be filled with a few tiny beads before sealing to create a rattle.
- Feathers or yarn tied to the back of the hook can hide it and create a pulsing action in the water.

Part 4: The Field Test & Reflection (20 minutes)

You don't need a lake to test your lure's action. Use a bathtub, sink, or a large clear bucket of water.

1. Tie a piece of string to your lure and pull it through the water.
2. Observe carefully. What does it do? Does it spin? Wobble? Sink? Float?
3. Does it perform the way you predicted on your blueprint?

Complete your Lure Design Log by answering these final reflection questions:

- How did my lure move in the water compared to my prediction?
- What design feature worked the best? (e.g., "The aluminum foil really flashed when it wobbled.")
- If I were to build Version 2.0 of this lure, what is one change I would make to improve it and why?

Assessment

Your awesome work will be assessed on the completion of your project, focusing on your thinking process, not just the final product:

- **The Lure Design Log:** Is it complete? Does it show thoughtful research, a clear blueprint, and insightful reflection?
- **The Finished Lure:** Does the lure show creativity and effort? Does it match the design in the log?
- **The "Engineer's Pitch":** Can you explain clearly why you made your design choices and what you would improve next time?

Differentiation & Extension

For Extra Support:

- Provide pre-bent paperclip frames to build upon.
- Offer a "kit" of pre-selected materials that work well together (e.g., a bottle cap, some beads, and foil).
- Watch a short video together on how a specific type of lure (like a spinner) moves in the water to give a clearer design goal.

For an Extra Challenge:

- **The Biomimicry Challenge:** Instead of a general lure, try to perfectly imitate a specific local baitfish or insect in its look and action.
- **The Physics of Fishing:** Research and explain the forces acting on your lure in the water (drag, lift, gravity). How could you change its shape to make it dive deeper or wobble wider?
- **Build a Balanced Lure:** Experiment with adding weights to different parts of the lure. Document how adding weight to the front, middle, or back changes its action in the water.