Building a Paper Bridge

Standard:

NGSS Standard: 4-ETS1-2 – Engineering Design

Objective:

Students will design and build a paper bridge using engineering principles, then test its strength by adding weight and measuring its load capacity.

Materials:

- Construction paper (multiple sheets)
- Scissors
- Ruler or measuring tape
- Masking tape
- Small weights (e.g., washers or small bags of sand)
- Blocks or books (to create a gap for the bridge)
- Pen and paper for recording results

Safety Precautions:

- Ensure students use scissors carefully to avoid injury.
- If using small weights, handle them carefully to avoid any accidental drops.
- Be cautious when using tape to avoid sticking fingers or other surfaces.

Procedures:

1. **Design Your Bridge**:
    - Think about how real engineers design bridges. Bridges need to be strong and stable.
    - Use your construction paper to create a bridge that will span across a gap (e.g., between two blocks or books).
    - You can fold or roll the paper to create support beams or try different designs like a simple flat bridge or a more complex arch bridge.
2. **Build Your Bridge**:
    - After planning your design, carefully cut and tape the paper to build your bridge. The bridge should be wide enough to hold a small weight.
    - Make sure the bridge is sturdy, and test it by gently placing the bridge on the two blocks to see if it stays stable.
3. **Test the Strength**:
    - Gradually add weights to the center of the bridge, one at a time. Keep track of how much weight your bridge holds before it collapses.
    - Record the amount of weight your bridge was able to hold in your notebook.
4. **Improve Your Design**:
    - After testing, think about what worked and what didn't. Did the bridge hold the weight as expected? What parts of your design might need to be stronger or more stable?
    - Make changes to your bridge and test it again to see if it holds more weight.
5. **Reflection**:
    - Write a short reflection about the process. What did you learn about designing bridges? Did your design improve with changes? What might engineers do to improve their designs in the real world?

Note 1: Clean-up

- Be sure to clean up your workspace by gathering all materials and disposing of any paper scraps or leftover tape.
- Store your bridges for future testing or for display if desired.

Note 2: Accommodation for ELL, ESE, etc.

- Provide visual aids such as pictures or videos of different types of bridges to help students understand design concepts.
- Offer sentence starters or graphic organizers for students to track their design and test results.
- Allow extra time for students who may need additional support and pair them with a peer for collaborative learning.