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## Elementary Wooden Challenge Design Brief

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**Client:** Lincoln Elementary School in Wauwatosa, WI

**Target Consumer:** Elementary Age Students

**Designer:** \_\_\_\_\_

### Problem Statement:

Elementary aged students in the Wauwatosa School District are not exposed to technical education courses at an early age. Experience with tools and construction at an early age encourages students in taking technology education related courses in high school. Elementary aged students should be exposed to age appropriate projects to peak their interests.

### Design Statement:

One of the best ways to introduce elementary students to STEM is to have high school STEM students design simple projects created using wooden fabricated items with step by step directions that an Elementary student could follow to assemble the high school students design using simple tools.

### Materials:

1. Tools
  - a. Hammer
  - b. Screwdriver
  - c. Pliers
  - d. Drill
  - e. Hand miter box and saw
  - f. Tape Measure
  - g. Speed Square
  - h. Power Miter Box
2. Fasteners
  - a. Nails
  - b. Screws
  - c. Eyehook Screws
3. Consumables
  - a. 1"x4" pine board
  - b. 1"x6" pine board
  - c. ¼" pine dowel
  - d. ½" pine dowel
  - e. ¾" pine dowel
  - f. 1¼" pine dowel
  - g. 1½" pine dowel
  - h. 2" pine dowel

- i. 1/8" pressboard
- j. Twine
- 4. Additional Materials
  - a. Drill Bits
  - b. Hole saw
  - c. Tape measure
  - d. Speed Square
  - e. Gallon Bags
- 5. Hardware & Software
  - a. AutoCAD Inventor
  - b. 3D Printers

## Constraints:

1. The wooden object must be able to be assembled by an elementary aged student using only a hammer and a screwdriver.
2. The wooden object must consist of a minimum of two nails and two screws.
3. At least one component must be 3D printed.
4. The wooden object must have step-by-step directions that an elementary aged student could understand in order to replicate the wooden object.
5. Must produce a complete kit for an elementary aged student to assemble that is under \$5.
6. Detailed Report of Manufacturing Process and Cost must be calculated.
7. Each group must produce an exemplar plus one elementary kit per group member.

## Material Costs:

### Specialty Tools

- 3D Printer/Plastic \$1 per hour
- Instructor Cut or Plane \$1
- Printing Instructions \$0.10 per page B&W \$0.25 color.

### Fasteners

- Nails \$0.01 each
- Screws \$0.02 each
- Eyehooks \$0.07 each
- Sisal \$0.01 per foot
- Gallon Plastic Bag \$0.07

### Dowels

- ¼ in. Pine Dowel \$0.13 per foot
- ½ in Pine Dowel \$0.25 per foot
- ¾ in Pine Dowel \$0.50 per foot
- 1¼ in Pine Dowel \$ 0.87 per foot
- 1½ in Pine Dowel \$1.29 per foot
- 2 in Pine Dowel \$1.95 per foot

### Boards

- 1/8" size in. pressboard \$3.39 for 2x4 ft sheet
- 1x4 in. Pine Board \$0.37 per foot
- 1x6 in. Pine Board \$0.57 per foot

### Manufacturing Labor

- \$15 Per Hour