Introducing the Design Activity

• Use a hook to get students interested

Northridge earthquake (1994)

Tōhoku Tsunami (2011)

http://www.youtube.com/watch?v=xA86X5Fd5xI

http://www.youtube.com/watch?v=Ppo3UxJs68s

• Put lesson in context to keep students invested
  • Connect to curriculum
  • Explain real world implications
  • Relate to the experiences of the students
Design Phase

• Design before building
  • Do not show completed examples
  • Help the students develop strategies instead

Strike-Slip Fault

Strategies for Earthquake resistant building:
http://www.youtube.com/watch?v=iZoHoPFHAtw

• Written templates can be used to guide student design

• Redesign stage
  • Teaches students real-world iterative design techniques
  • Gives students a chance to explain what needed to be fixed, and how they fixed it
  • May or may not be written
Design Variables and Goals

• Limit design variables:
  • Materials
  • Constraints
  • Goals

• Students can be overwhelmed with too many options

• Constraints simulate real engineering

Building Requirements

- Cost: $100 or less
- Height: 12 inches or taller
- Base: 36 inches square or larger
- Earthquake test: 10 seconds on shake table without falling
- Tsunami test: 1 tsunami without falling or getting water inside
Design Testing

• Testing phase can be fun and engaging

• Incorporate scientific discussion:
  • What worked/did not work?
  • Why or why not?
  • What would you do differently?

• Can take the form of final written lab report or oral presentation
Other Things to Consider

• Group Sizes
  • Small enough that everyone can contribute
  • Large enough to limit material usage

• Materials
  • Distribute before class, from a central location during class, or picked up by students
  • Determine material limits ahead of time

• Time
  • Plan enough class time for building
  • Written designs, re-designs, and final reports can be completed at home

• Goal of design lesson
  • Design lessons are a great way to teach problem solving, teamwork, and hands-on design
  • May not be the most efficient way to teach content