Get to the Other Side: Designing Bridges

Using EiE to integrate an innovative engineering design

Kathy Kennedy – Stevens Institute

Carolyn McLain – Morris School District

Developed by the Museum of Science, Boston

Agenda

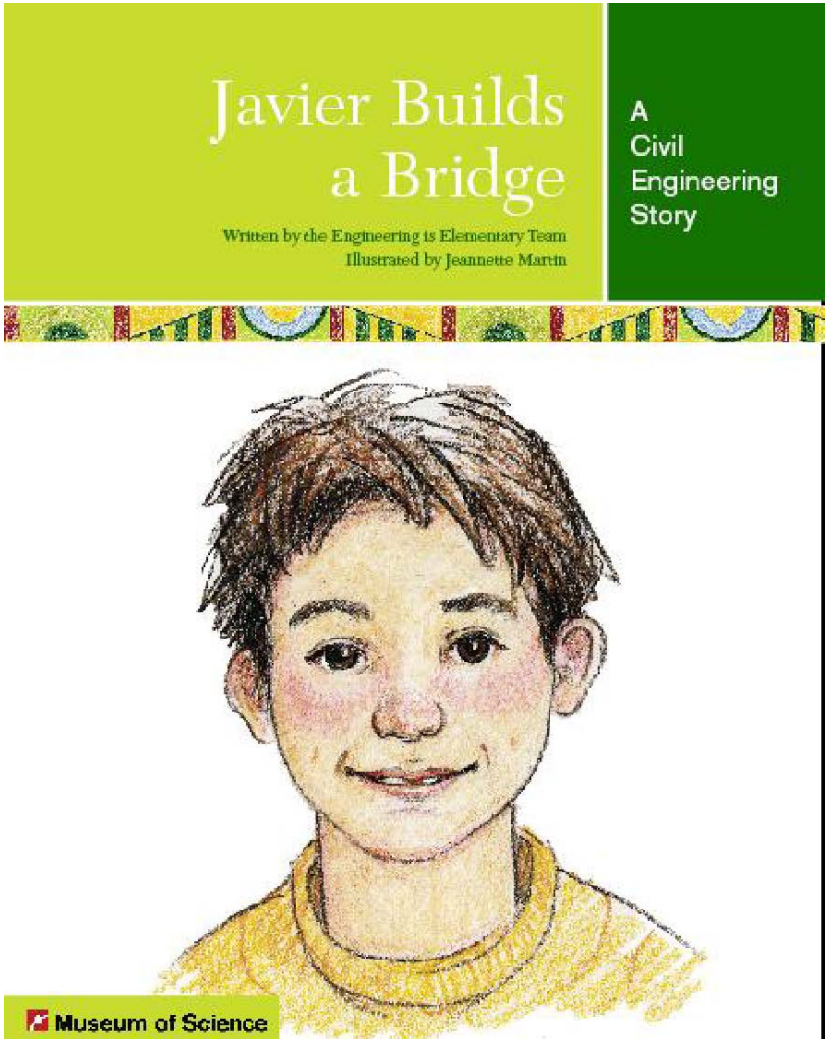
Introduce concepts of technology and engineering

Develop an understanding of how to use EiE materials

- Engineering Story
- Engineering Field Overview
- Engineering Design Process
- Testing to inform Engineering Design
- Engineering Design Challenge

Engineering Story

- Incorporates literature.
- Written from a child's perspective.
- Introduces a study of engineering, the Engineering Design Process, and vocabulary.



Engineering Field Overview

Engineers use science, math and creative thinking to solve problems or design things.

Civil Engineers design, build, supervise, operate, and maintain construction projects and systems, including roads, buildings, airports, tunnels, dams, bridges, and systems for water supply and sewage treatment.

ASCE Youtube video "What Do Civil Engineers Do?"
https://www.youtube.com/watch?v=cJaRjI7K-Lw

The Engineering Design Process

What are some solutions?
Choose the best idea.

What is the problem?
What have others done?

Imagine

Ask

The Goal

Plan

Improve

Create

Draw a diagram.
Decide what
materials
I will need.

How can I
make my
design better?
Try again!

Build my design.
Test it out.

EiE Engineering is Elementary.

Developed by the Museum of Science, Boston

Testing to inform Engineering Design

Lesson 2 - Forces: the pushes and pulls on the structure from gravity and wind.

Extension: test various column shapes and/or sizes

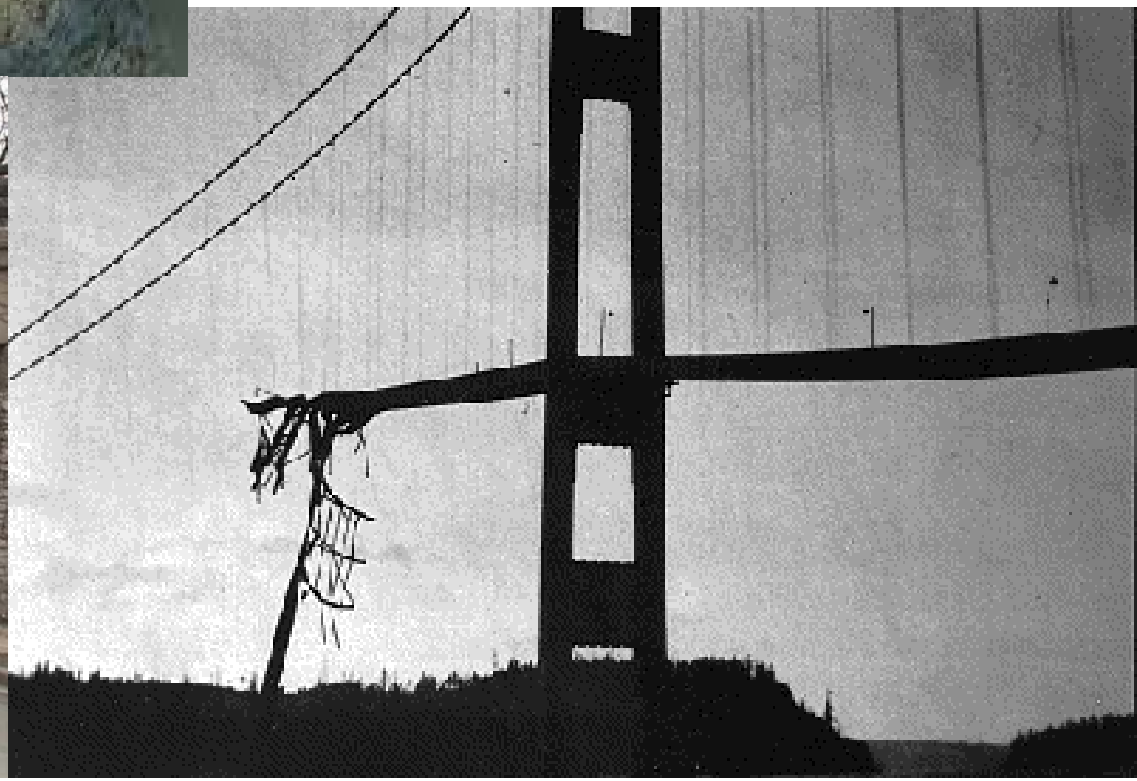
Lesson 3 - Understanding Bridging

Students test the strength of various bridge types (beam, arch, and deep beam)

** Bridge failure is not always a complete collapse.*

What are some reasons for having a bridge? Are all bridge designs the same?

Bridge Failures



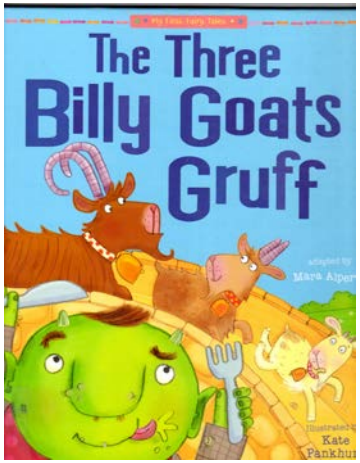
Engineering Design Challenge

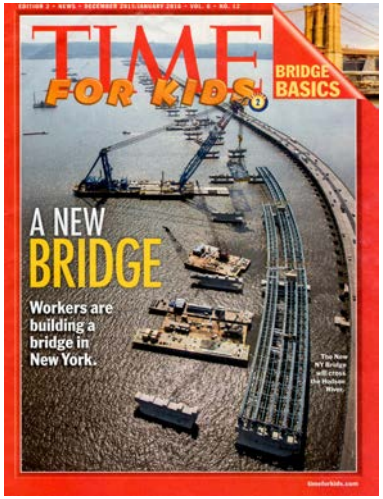
- Build a bridge that rests on 4 $\frac{1}{2}$ inch abutments and spans 15 inches.
- A 3x3 inch truck or boat must pass underneath.

Scoring Criteria:

- Cost
- Strength
- Stability (car successfully rolling across the bridge)

Additional Resources





Three Billy Goats Gruff picture book

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PBS Kids Design Squad http://pbskids.org/designsquad/

Suspension Bridge
http://nj.pbslearningmedia.org/resource/lsps07.sci.phys.maf.dssuspension/design-squad-suspension-bridge/

Truss Bridge
http://nj.pbslearningmedia.org/resource/lsps07.sci.phys.maf.dstruss/design-squad-truss-bridge/

NOVA: http://www.pbs.org/wgbh/nova/bridge/

Contact Information

Kathy Kennedy – Stevens Institute
kkenned3@stevens.edu

Carolyn McLain – Morris School District
teaches 3rd-5th grade science
carolyn.mclain@msdk12.net