Science and Engineering Connections:
Unique & Compelling K-12 Curriculum Offerings

Engineering Our Future NJ Conference
May 11, 2007
• **CIESE** established in 1988
• Curriculum and professional development expertise
• Research new methodologies to strengthen STEM education
• Impacted more than 20,000 educators in US, and throughout the world
Unique & Compelling Internet Applications

**Unique**
Cannot be done without Internet technology

**Compelling**
Provides students with real world learning experiences

CIESE Recognition
Unique & Compelling Internet Applications

Real-Time Data

Telecollaborative Projects

Primary Source Material

Publishing Student Work
Air Pollution: What’s the Solution?

The Global Water Sampling Project
An Investigation of Water Quality

The Noon Day Project
Measuring the Circumference of the Earth

The International Boiling Point Project

The Gulf Stream Voyage

Population Growth

Bucket Buddies

Human Genetics
Is the dominant trait most prevalent?

Square Of Life
Studies in Local and Global Environments

Down the Drain
How much water do you use?

Musical Plates
A Study of Earthquakes and Plate Tectonics

The Stowaway Adventure
Adventures on the High Seas

The Global Sun Temperature Project

Navigational Vectors

Wonderful World of Weather

Take a Dip:
The Water in our Lives

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Center for Innovation in Engineering and Science Education
Unique & Compelling Internet Projects Engage Students in....

- Problem-based Learning
- Cooperative Learning
- Authentic Learning Experiences
- Constructivist Approaches
- **Scientific Inquiry**
K-12 Engineering Projects Engage Students in....

- Problem-based Learning
- Cooperative Learning
- Authentic Learning Experiences
- Constructivist Approaches
- Engineering Design Process
Why Include K-12 Engineering?

- Team work
- Multidisciplinary
- Fosters innovative problem-solving
- Encourages creativity and risk-taking
- Increases knowledge of scientific/technical careers
- Technologically literate citizens
### Scientific Method
- Identify Research Question
- Gather Information
- Develop a Hypothesis
- Make a Prediction
- Do the Experiment
- Revise Hypothesis
- Communicate Results

### Eng. Design Process
- Identify Problem
- Gather Information
- Brainstorm Solutions
- Build a Prototype
- Test and Evaluate
- Redesign
- Communicate Results
Science Lesson: Local Environment
Students observe and record the living and non-living things found in a square meter in their school yard

Engineering Lesson: Design an Ant Habitat
Students design and construct a container/habitat for keeping and observing ants for one day
Science Lesson: Earthquake and Plate Tectonics
Students discover the relationship between earthquakes, volcanoes and plates using real-time data

Engineering Lesson: What Type of Substrate to Build On?
Students design an underlying substrate capable of maintaining structural integrity during an earthquake
Science Lesson: What Makes Water Boil?
Students pool and analyze experimental data from around the world

Engineering Lesson: Design a Simple Distillation System
Students figure out how to collect steam from boiling polluted water & condense it
Square of Life Project
Example Ant Habitat

ANT
DAY CARE
CENTER
Square of Life Project
Example Ant Habitat
Musical Plates Project
Example Building & Substrate
Questions?

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