

# Welcome to

# FAMILY

engineering

- Come on in and begin working with the various short Family Engineering activities set up around the room.
- Agenda
  - 3:45 – 4:00 – work on short activities
  - 4:00 – 4:15 – presentation
  - 4:15 – 4:20 – icebreaker – “Are you an engineer?”
  - 4:20 – 4:35 – activity “Team Up”
  - 4:35 – 4:55 – activity “Blast Off”
  - 4:55 – 5:00 – Wrap up

# Family Engineering

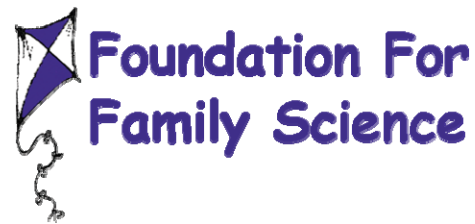
*For Parents & Elementary-Aged Children*

*ASEE K-12 Workshop*

*June 19, 2010*

*Neil Hutzler, Michigan Technological University*

*Ron Terry, Brigham Young University*



Supported by the



National Science Foundation

The demand for scientists and engineers will grow by 44% in ten years.

U.S. Bureau of Labor Statistics

# The Challenge

85% of kids aged 8-17 are not interested in a future engineering career.

Only 20% of parents have or will encourage their children to consider an engineering career.

American Society for Quality Survey (Harris Interactive, 2008)

Universities in the United States had 11% fewer engineering graduates in 2005 than in 1985.

(Carroll, *Power Engineering*, 2007)

High-tech companies have been issuing the “crisis warning” about engineering shortages for at least the past two decades.

(Brown and Linden, 2008)

Too few under-represented and women engineers




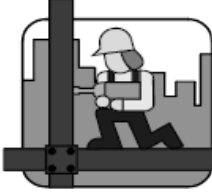
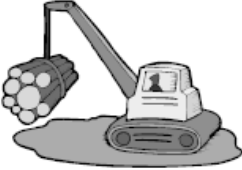











# Public Perceptions Relevant to Engineering

- There is no public face to engineering.
- Engineering work is a sedentary desk job.
- Engineering is strongly linked to math and science, but not to other vital aspects, such as creativity, teamwork, and communication
- Engineers are not seen as directly helping people.
- Many kids want a well paying job that makes a difference.

*Changing the Conversation*, National Academy of Engineering, 2008

# “What Does An Engineer Do?”

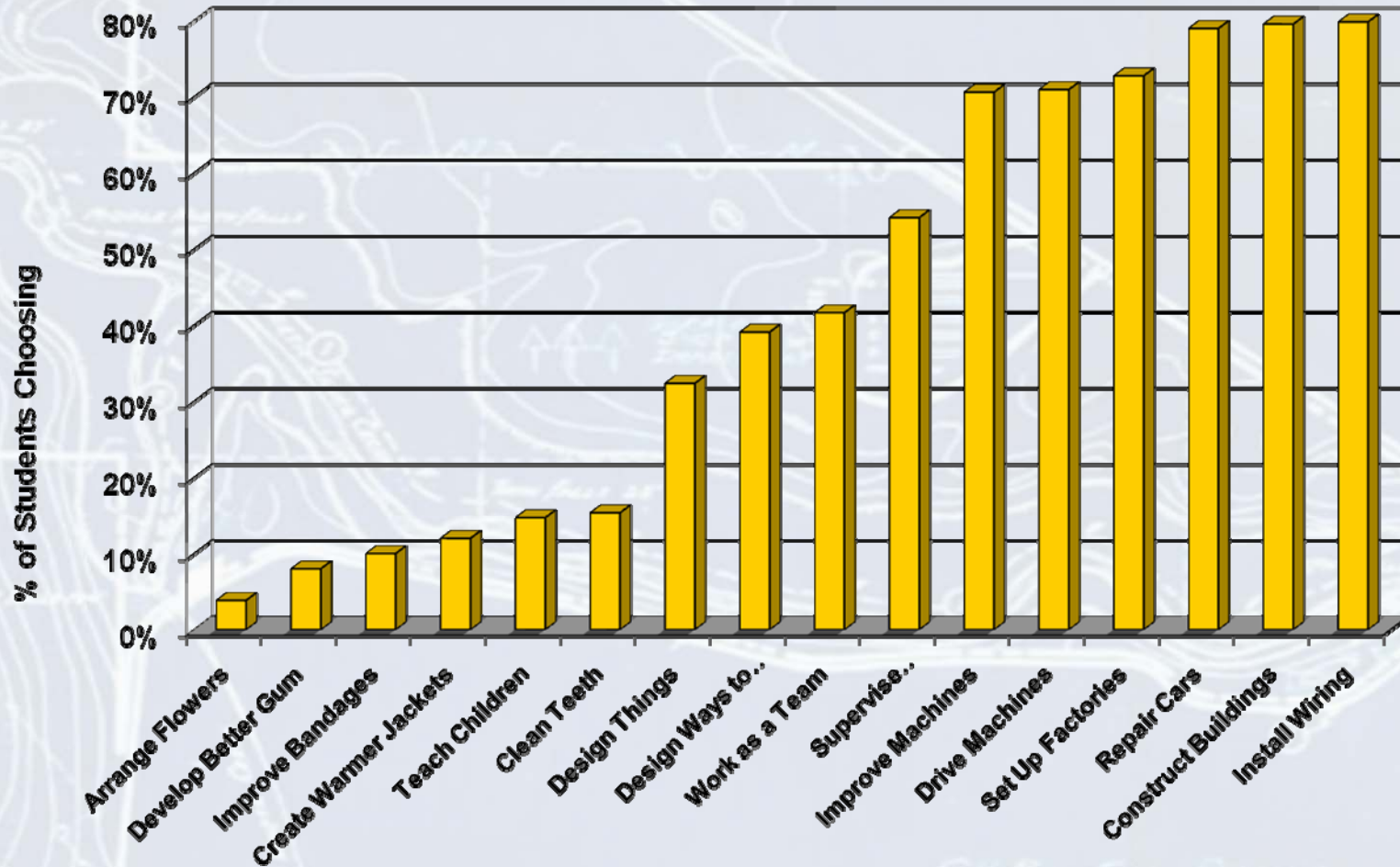
Student page excerpted from *Engineering is Elementary* classroom curriculum seeks to clarify student misconceptions about what engineers really do....

|   |   |   |  |
|---|---|---|--|
| <br>Improve Bandages | <br>Develop Better Bubble Gum      | <br>Design Ways to Clean Water | <br>Construct Buildings             |
| <br>Drive Machines    | <br>Arrange Flowers                | <br>Read About Inventions      | <br>Figure Out How to Track Luggage |
| <br>Work as a Team   | <br>Create Warmer Kinds of Jackets | <br>Install Wiring            | <br>Sell Food                      |
| <br>Repair Cars    | <br>Design Tunnels               | <br>Clean Teeth              | <br>Write Computer Programs       |

Engineering is Elementary @ Museum of Science, Boston.

# What Do Kids Think?

## What is Engineering?



The evidence is consistent, positive, and convincing: families have a major influence on their children's achievement in school and through life.

*A New Wave of Evidence: The Impact of School Family, and  
Community Connections on Student Achievement*  
Henderson and Mapp, 2002

**MichiganTech**  
Michigan Technological University

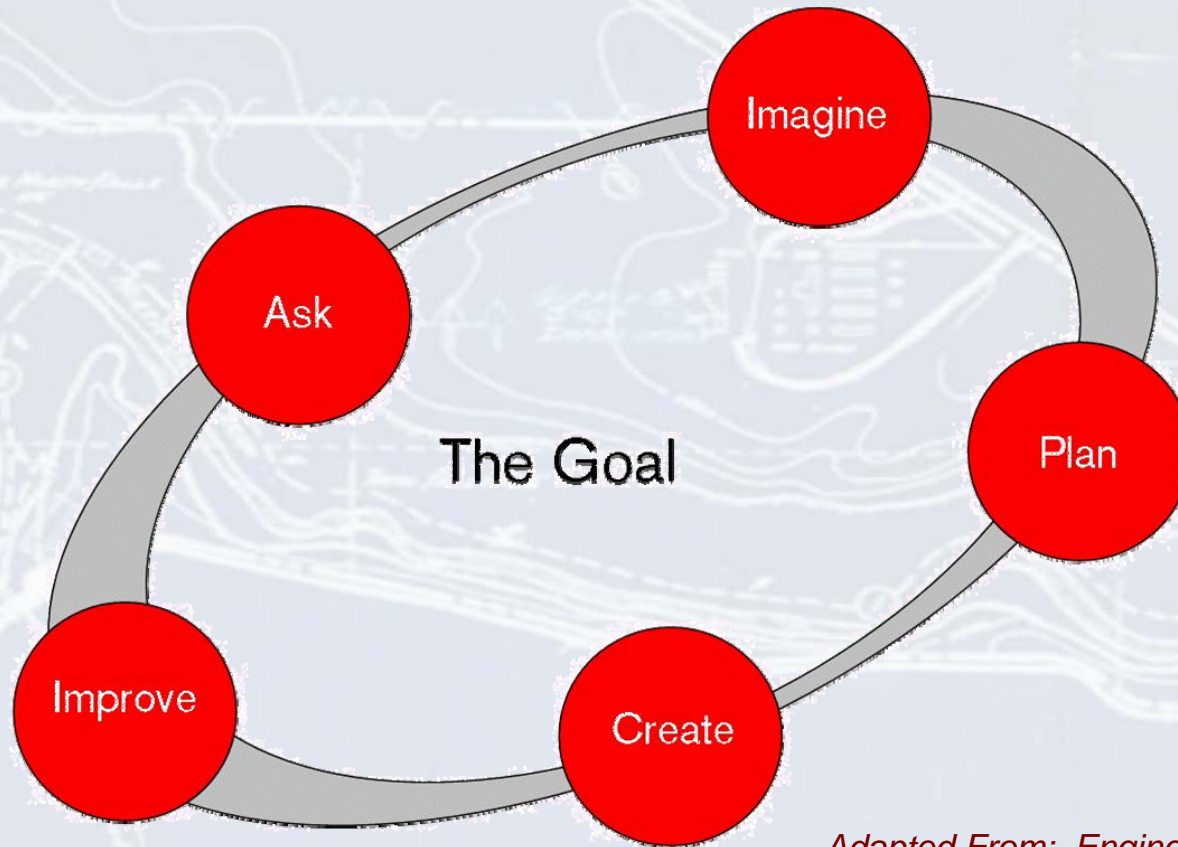


# Strategies for Effective Engineering Education for Children

- Encourage questions
- Foster curiosity
- Build confidence
- Use stuff
- Celebrate discoveries
- Allow time for inquiry & reflection
- Develop problem solving skills
- Enjoy the creative side of engineering
- Create safe environments for exploration
- Listen to children's explanations
- Challenge them to "Try it" themselves
- Engage parents in the learning adventure
- Demonstrate how engineering improves our lives
- Challenge stereotypes about who engineers are
- Make connections between school and career choices

# Engineering Design Process

The Engineering Design Process is a series of steps that engineers use to guide them as they solve problems.



*Adapted From: Engineering Is Elementary*



## Program Goals

Engage families in engineering with fun, hands-on activities in order to:

1. Increase understanding and appreciation of the role that engineering plays in everyday life.
2. Introduce children at an early age to the many career opportunities in engineering.
3. Increase parents' interest in and ability to encourage their children to pursue an engineering career.

Provide age-appropriate resources to support volunteers in conducting informal engineering education programs with elementary-aged children and their parents.

# FAMILY

engineering

***Michigan Tech***  
Michigan Technological University



**Foundation For  
Family Science**



# Family Engineering Program Elements

- **Family Engineering Activity Guide** (English and Spanish Language editions)
- **Professional Development Workshops**
- **Dynamic Website** ([www.familyengineering.org](http://www.familyengineering.org))
- **Network of Trained Volunteers Across U.S.**



# Family Engineering Program Development Process

**2009**

Activity Development  
Pilot Testing  
Revisions

Website Development and  
Launch

**2010**

National Field-Testing  
Expert Review

Professional Development and  
Event Facilitator Training

**2011**

Activity Guide Publication  
**May 2011**

Broad Dissemination and  
Implementation Through a  
Network of Trained Volunteers

# FAMILY engineering

## Activities and Events

- Fun and engaging
- Families learning together
- Simple materials
- Easy to facilitate



- Accessible and approachable
- Suitable for a variety of settings
- Promote problem-solving and teamwork
- Explore engineering disciplines and careers

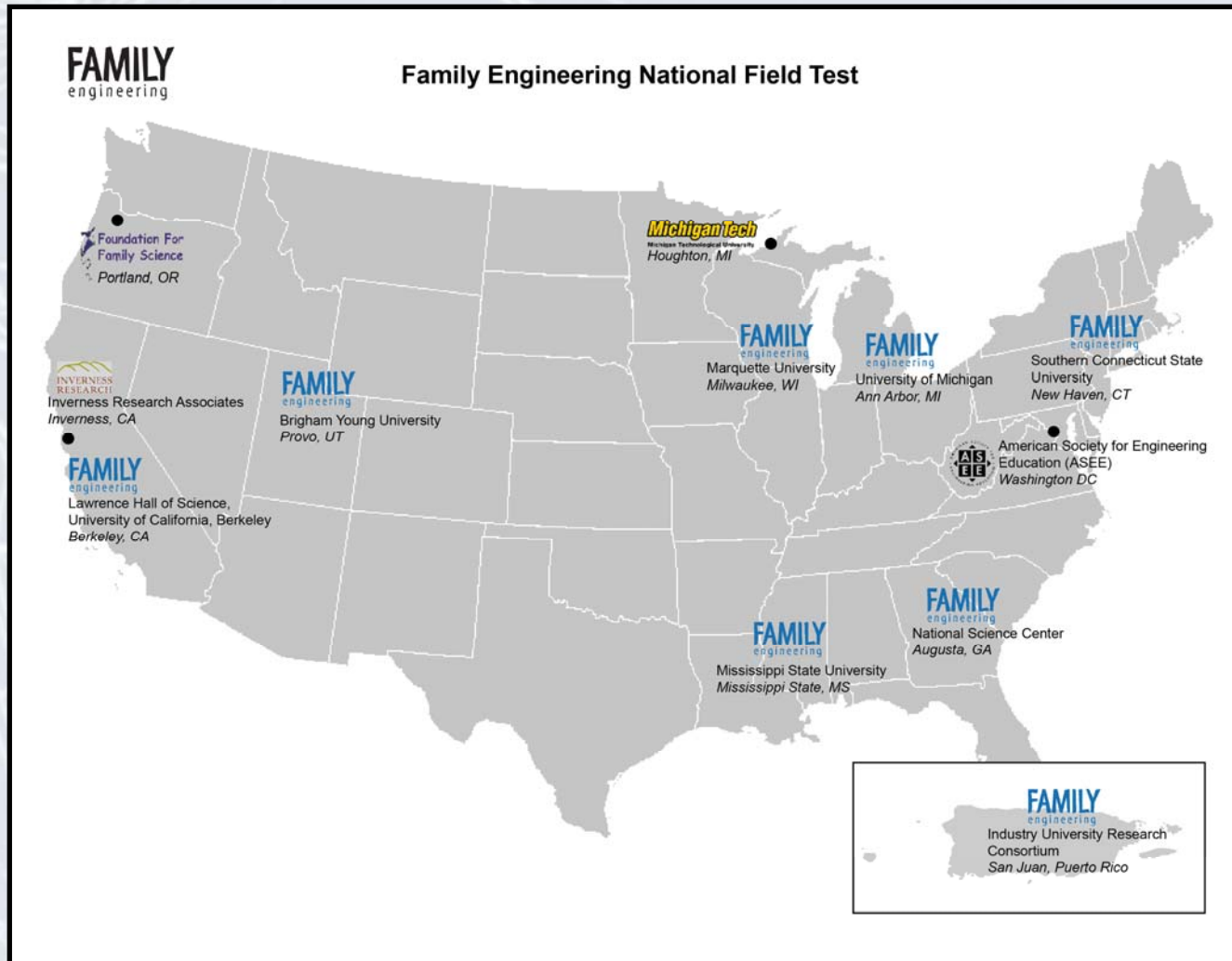
# Engineering Concepts In Activities

- *Engineering Design Process*
- *Teamwork*
- *Open-Ended Problem-Solving*
- *Communication*
- *Societal and Environmental Impact*
- *Design Under Constraints*
- *Role of Failure*
- *Reverse Engineering*
- *Systems*
- *Optimization/Trade-offs*
- *Spatial Visualization*
- *Modeling*
- *Properties of Materials*
- *Controlled Experimentation and Testing*

# Example of a Family Engineering Event

- Registration
- Several short, opening activities – self paced
- Icebreaker, overview of event
- Facilitated, longer activities – demonstrate the engineering design process
- Wrap-up – making the engineering connection

# Eight National Field Test Sites



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Michigan Technological University

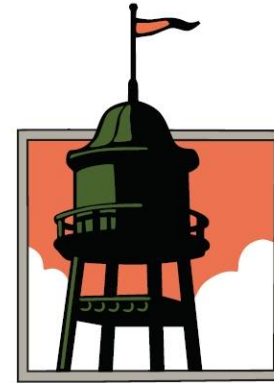


# Family Engineering at Brigham Young University



IRA A. FULTON

College of Engineering and Technology



## THANKSGIVING — POINT —

- Partnered with Thanksgiving Point (family-oriented destination)
- Six events
- All held at Thanksgiving Point
- BYU Technology and Engineering Education students acted as the facilitators
- Fun, learning experience for all!

**MichiganTech**  
Michigan Technological University





# Getting Involved in Family Engineering

## Who

- Parents
- Engineers
- K-5 teachers and administrators
- College STEM students
- Members of engineering societies/organizations
- Informal educators from museums, after school programs, scouts, etc.



## How

- Obtain a Family Engineering Activity Guide
- Participate in a Family Engineering Workshop
- Attend or host a Family Engineering Event



# Look for Future Training Workshops

- National Science Teachers Association Meeting, San Francisco, March 2010
- Association of Science – Technology Centers, Honolulu, October 2010
- International Technology and Engineering Educators Association, March 2011, Minneapolis
- ASEE Regional Conferences

# Family Engineering

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***[www.familyengineering.org](http://www.familyengineering.org)***

