

Family Engineering

For Parents & Elementary-Aged Children

Foundation for Family Science & Engineering

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Supported by the



National Science Foundation
WHERE DISCOVERIES BEGIN

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)

Public Perceptions Relevant to Engineering

- There is no public face to engineering.
- Engineering work perceived as sedentary desk job.
- Engineering is strongly linked to math and science, but not to other vital 21st Century skills, such as creativity, problem solving, teamwork, and communication
- Engineers are not seen as directly helping people.
- Many kids want a well paying job that makes a difference, but don't think about engineering.

Changing the Conversation, National Academy of Engineering, 2008

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

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Parental Involvement Impacts Students' Academic Success & Career Choices

- Student's attitudes about science, math and careers are often formed before the high school years and are influenced by their parents' values.
- 70% of waking hours are outside of school.
- Family participation in education was twice as predictive of student academic success as family socioeconomic status.
- Most consistent predictors of academic achievement and social adjustment are parent expectations.
- Greater parental involvement results in increased confidence as science learners.

Family Engineering Program Goals

1. Engage families in engineering with fun, hands-on activities.
2. Increase public appreciation and understanding of the role engineering plays in everyday life.
3. Introduce children at an early age to the many career opportunities in engineering.
4. Increase parents' interest in and ability to encourage their children to pursue an engineering career.
5. Provide age-appropriate resources to support volunteers in conducting informal engineering education programs with elementary-aged children and their parents.

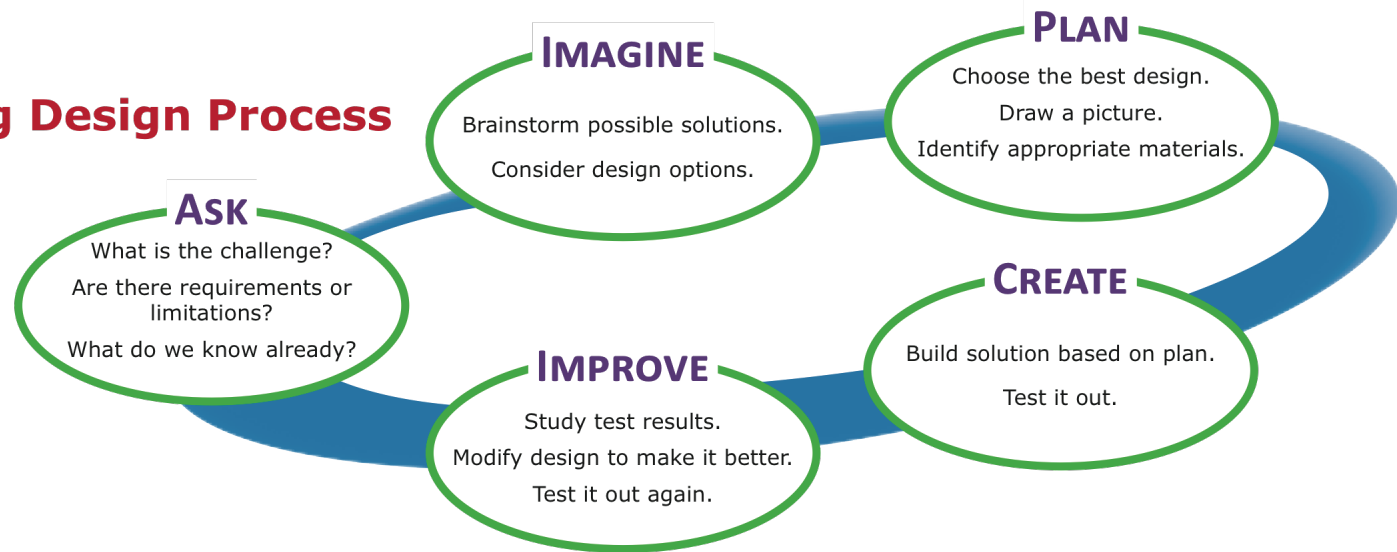
Family Engineering Engineering Concepts & Skills

- Engineering design process
- Teamwork
- Open-ended problem solving
- Societal and environmental impact
- Design under constraints
- Controlled experimentation and testing
- Role of failure
- Reverse engineering
- Systems
- Optimization/trade-offs
- Spatial visualization
- Modeling
- Properties of materials

Engineering Design Process

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

Engineering Design Process



Adapted From: Engineering Is Elementary

Family Engineering Program Development Partners And Funders

Michigan Tech
Michigan Technological University

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Family Engineering Program Development Process

2009

Activity Development
Pilot Testing
Revisions

Website Development and
Launch

2010

National Field-Testing
Expert Review

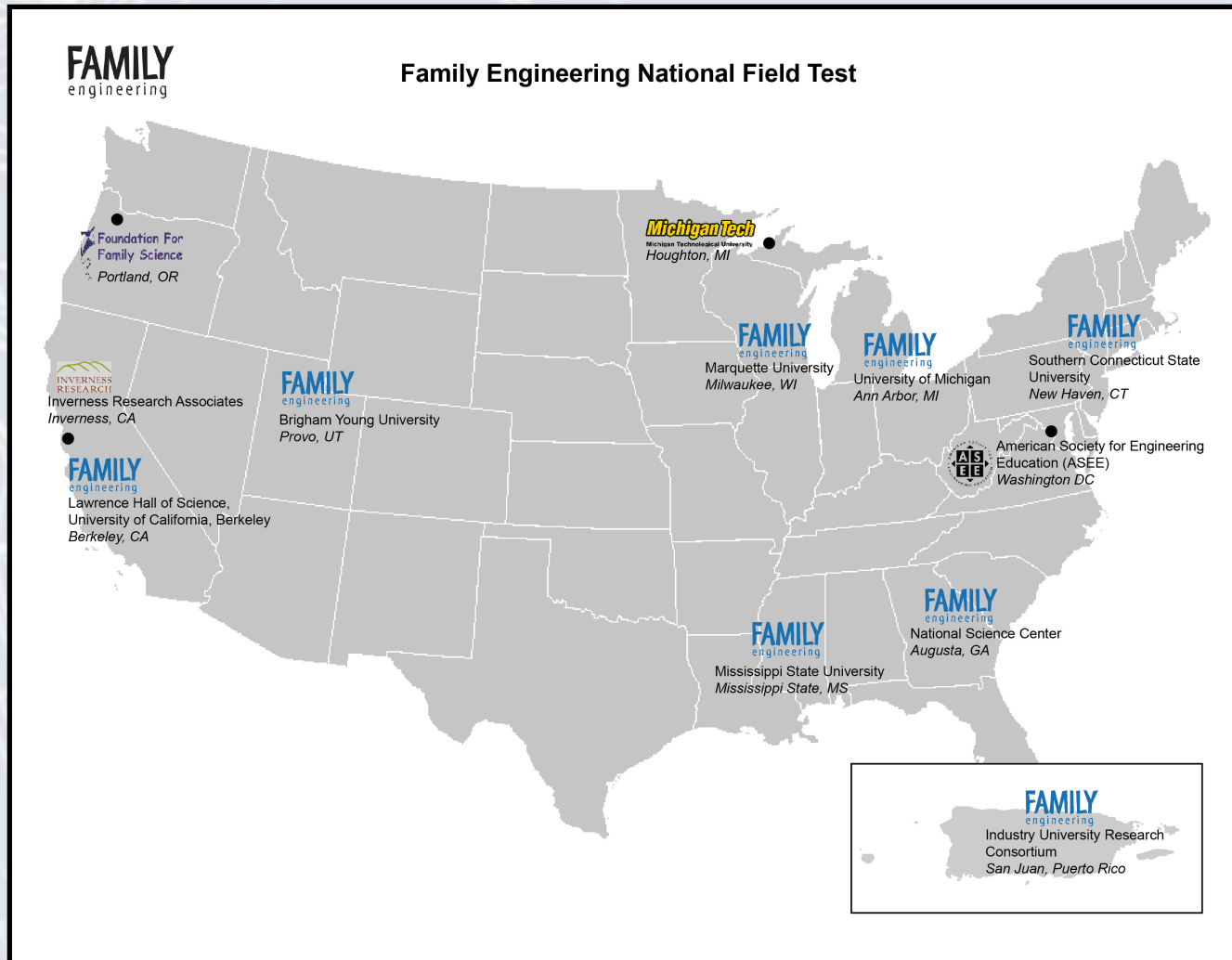
Professional Development and
Volunteer Training

2011

Activity Guide Publication

Broad Dissemination and
Implementation Through a
Network of Trained Volunteers

National Field Test Sites



Formative Evaluation Highlights

	Before attending Family Engineering we were	After attending Family Engineering we were ...
Interested in engineering.	3.52	4.53
Considering engineering as a possible career option for our child/children.	3.45	4.33
Aware of the connections between engineering and everyday experiences.	3.45	4.59
Aware of what engineers do.	3.53	4.67

- Family Engineering events had a significantly positive impact on families' interest in ,and awareness of, what engineers do.
- Majority of activities conducted at Family Engineering field test events received positive ratings by families, staff, and expert reviewers.
- Activities receiving the highest ratings were fun and the engineering principles could be easily applied to real-world experience.

Family Engineering Program Elements

- *Family Engineering: An Activity and Event Planning Guide*
- Professional Development Workshops
- Dynamic Website (www.familyengineering.org)
- Network of Trained Volunteers



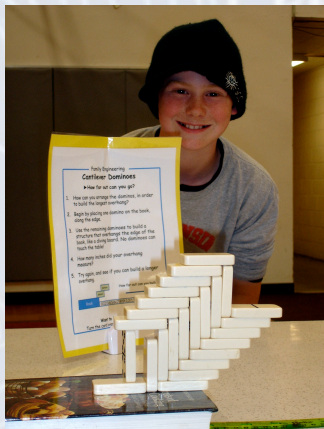
Family Engineering Activities and Events

- 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

What Does a Family Engineering Event Look Like?



Getting Involved in Family Engineering

Who

- Parents
- Engineers & Scientists
- K-5 educators and administrators
- College engineering 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



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Presenter Contacts

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