



COMMUNICATING FOR CHANGE:

SENDING THE RIGHT MESSAGES ABOUT
SCIENCE, TECHNOLOGY, ENGINEERING, AND MATH

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THE UNIVERSITY OF TEXAS AT AUSTIN

**Women in Engineering
Program**



WEPAN
Women in
Engineering
ProActive
Network
*Transforming culture
in engineering education*

Overview



- ❑ Changing the Conversation
- ❑ Why So Few?
- ❑ National Institute for Women in Trades, Technology & Science
- ❑ Talking Points
- ❑ Engineer Your Life



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CHANGING THE CONVERSATION: MESSAGES FOR IMPROVING PUBLIC UNDERSTANDING OF ENGINEERING

National Academy Of Engineering (NAE) Report
http://www.nap.edu/catalog.php?record_id=12187



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The Study

- In-depth interviews, youth “triads” (same-sex groups of three 9-11 year olds), and adult and teen focus groups
- Online survey that oversampled for African Americans and Hispanics
 - 3,600 teens and adults
- Input from a cross section of the engineering community and others



Youth today...

- ❑ Teens have limited understanding of engineering or engineers *(or STEM)*
- ❑ Want well-paying jobs that make a difference
- ❑ See engineers *(or STEM workers)* as helping people, but not directly
- ❑ See engineers *(or STEM workers)* as desk jockeys, disconnected from people
- ❑ Few teens (<15%) describe engineering as nerdy or boring





Boys vs. Girls



- ❑ Both believe engineering is a very good career choice
- ❑ African American boys (more than girls) think salary extremely important to job choices
- ❑ African American girls want a job that makes a difference
- ❑ Hispanic girls (more than boys) think engineers are nerdy and boring
- ❑ Hispanic boys are more likely to believe engineering has a positive effect on people's everyday lives



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Qualitative Gender Findings

Real gender differences

- Boys like space exploration and designing video games
- Girls gravitate to using DNA evidence to solve crimes

 Teen girls not sold! Engineering is creative? Work is rewarding? Engineers have a positive effect on people's everyday lives?



Qualitative Gender Findings

- Younger girls pick images involving female engineers; boys more likely to pick images that features “things”



Engineering[^] Messages Recommendations (or STEM)

- ❏ Stop reinforcing the images of 'nerdy and boring'
- ❏ Stop focusing on math and science as the needed inputs and instead focus on:
 - **Outputs**
 - **Career opportunities**
 - **Making a difference in the world**
- ❏ Use the word **create**, not build



Most Appealing Messages

- ▣ Engineers are **creative problem-solvers**
- ▣ Engineering is **essential to our health, happiness and safety**
- ▣ Engineers help **shape the future**
- ▣ Engineers make **a world of difference**
- ~~▣~~ Engineers **connect science to the real world***

* Least appealing overall, especially among teen girls



Engineering[^] Messages Recommendations (or STEM)

- ❑ Use **images of people**, not things: especially avoid using gears and mechanical looking things
- ❑ Use the following five words in describing engineering: **discovery, design, imagination, innovation, contribution**
- ❑ Describe engineer as **creative problem solvers, essential to health, happiness and safety**
- ❑ Emphasize that engineers **shape the future**
(and scientists)



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WHY SO FEW? WOMEN IN SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS

AMERICAN ASSOCIATION OF UNIVERSITY WOMEN

<http://www.aauw.org/learn/research/whysofew.cfm>



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Research Summaries

- Growth mindset important for females
 - When teachers and parents tell girls that their intelligence can expand with experience and learning, girls do better on math tests and are more likely to say they want to continue to study math in the future. That is, believing in the potential for intellectual growth, in and of itself, improves outcomes.
- Interest in an occupation is influenced by many factors, including a belief that one can succeed in that occupation



Research Summaries

- Bias, often unconscious, limits women's progress in scientific and engineering fields
 - Most people associate science and math fields with "male" and humanities and arts fields with "female"
 - Implicit bias (<https://implicit.harvard.edu>)
- Women working in STEM fields tend to have higher earnings than do other women in the workforce, although a gender pay gap exists in STEM occupations as in other fields.



Research Summaries

- Occupational choice is influenced by a person's values as well as expectancy for success. Well-documented gender differences exist in the value that women and men place on doing work that contributes to society, with women more likely than men to prefer work with a clear social purpose.
 - Most people do not view STEM occupations as directly benefiting society or individuals.



Positive Impact on Recruitment

- Positive reinforcement and counteracting stereotypes
 - Positive statements about students' abilities to meet the demands of engineering [and science/tech] careers and counteracting stereotypes of engineering [and science/tech] as an antisocial, unusual career for women while emphasizing the people-oriented and socially beneficial aspects of engineering [and science/tech]
- Role models and examples on impact
 - Educating high-achieving, mostly minority, high school girls about what scientists and engineers [and technicians] actually do and how they contribute to society





NATIONAL CENTER FOR WOMEN & TECHNOLOGY: TALKING POINTS

<http://www.ncwit.org/resources.res.outreach.talking2.html>



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What Should We Say

- IT's Important
- IT's Creative
- IT's Valued, Respected & Flexible
- IT's Team-oriented
- IT's Everywhere



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Talking Points



☐ Meaningful Work

- Save Lives
- Solve Health Problems
- Improve the Environment
- Keep Us Connected

☐ High Salaries with a Bachelor's Degree

☐ Flexibility and Variety



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NATIONAL INSTITUTE FOR WOMEN IN TRADES, TECHNOLOGY & SCIENCE:

RECRUITMENT STRATEGIES

http://www.iwitts.com/html/recruiting_strategies.html



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Recruitment Strategies

- ❑ Send a strong message you want women in your classes
- ❑ Proactively recruit women/girls to your classes
- ❑ Hold a women in technology career orientation



Engineer Your Life (www.engineeryourlife.org)

Engineer **Your Life**™
Dream big. Love what you do.

A guide to engineering
for high school girls

Why Engineering?
Meet Inspiring Women
Find Your Dream Job
Making It Happen

For Counselors & Parents
For Engineers
For Middle School Girls
(see engineergirl.org)

Engineer Your Life

Why Engineering?

Ten great
reasons
why you'll
love it

ASK an Engineer! >

- 1 ▶ *Love your work, AND live your life too!*
- 2 ▶ *Be creative.*
- 3 ▶ *Work with great people.*
- 4 ▶ *Solve problems, design things that matter.*
- 5 ▶ *Never be bored.*
- 6 ▶ *Make a big salary.*
- 7 ▶ *Enjoy job flexibility.*
- 8 ▶ *Travel.*
- 9 ▶ *Make a difference.*
- 10 ▶ *Change the world.*

What IS
an engineer?



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Why Engineering?
Meet Inspiring Women
Find Your Dream Job
Making It Happen

For Counselors & Parents
For Engineers
For Middle School Girls
(see engineergirl.org)

Meet Inspiring Women



Tanya Martinez
helps Native
Americans expand
their renewable
energy sources.



*make a world of
difference >*



*explore
possibilities >*



*creativity
has its rewards >*



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The TxGCP connects organizations and individuals across Texas committed to informing and motivating girls to pursue careers in science, technology, engineering and mathematics (STEM).



Sign up to receive the TxGCP eNewsletter

Learn about STEM activities, webinars, events across the state & beyond
Learn about research and resources about STEM outreach & education

Sign up on the NGCP Program Directory

Share resources and gain access to collaborative partners
Become eligible for mini-grants

Participate in the Waterworks Underwater Robotics Program

Have access to LEGO robotics curriculum, software and materials
Be a part of a national NSF-funded project and be a leader in Texas

<http://texasgirls.engr.utexas.edu> ★ texasgirls@engr.utexas.edu



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