

Changing the Conversation: Messages for Improving Public Understanding of Engineering

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NAE Messaging Project: Goal

Encourage coordinated, consistent, and effective communication by the engineering community about the role, importance, and career potential of engineering to a variety of audiences.

Project Sponsor: National Science Foundation



Elements of the Project

Communications Audit – Review of previous research and communications materials

In-Depth Interviews – A diverse group of 12 educators, opinion leaders, and engineers.

Focus Groups – 4 focus groups with young people ages 12-15 and 16-19 in Raleigh, NC, and Phoenix, AZ, and one group with parents of young people ages 9-19 in Raleigh.

Youth Triads – 4 sets, with three children ages 9-11 in each group, 45 minutes to 1 hour each.

Online Survey – 12-minute questionnaire given to ~3,600 adults and teens with an over-sample of African Americans and Hispanics. Adult samples included an “informed” category.



Committee Recommendations

- **Reposition engineering**
- **Adopt and use the messages**
- **Conduct more tagline R&D**
- **Develop an online “toolkit”**
- **Meet to plan a large-scale
“campaign”**



Recommendation 1

To present an effective case for the importance of engineering and the value of an engineering education, the engineering community should engage in coordinated, consistent, effective communication to “reposition” engineering. Specifically, the engineering community should adopt and actively promote the positioning statement.



Proposed Repositioning Statement

No profession unleashes the spirit of innovation like engineering. From research to real-world applications, engineers constantly discover how to improve our lives by creating bold new solutions that connect science to life in unexpected, forward-thinking ways. Few professions turn so many ideas into so many realities. Few have such a direct and positive effect on people's everyday lives. We are counting on engineers and their imaginations to help us meet the needs of the 21st century.



The Big Shift: Repositioning Engineering

From
**Personal Benefits
and Needed Skills**



To
**How Engineers
Make a Difference
in the World**



Recommendation 2

The four messages that tested well in this project should be adopted by the engineering community in ongoing and new public outreach initiatives. The choice of a specific message should be based on the demographics of the target audience(s) and informed by the qualitative and quantitative data collected during this project.



Messages We Tested

- **ENGINEERS MAKE A WORLD OF DIFFERENCE**
 - From new farming equipment and safer drinking water to electric cars and faster microchips, engineers use their knowledge to improve people's lives in concrete, meaningful ways.
- **ENGINEERS ARE CREATIVE PROBLEM-SOLVERS**
 - Engineers have a vision for how something should work, and are dedicated to making it better, faster or more efficient
- **ENGINEERS HELP SHAPE THE FUTURE**
 - Engineers use the latest science, tools and technology to bring ideas to life in forward-thinking ways.
- **ENGINEERING IS ESSENTIAL TO OUR HEALTH, HAPPINESS AND SAFETY**
 - From the grandest skyscrapers to microscopic medical devices, it is impossible to imagine life without engineering
- **ENGINEERS CONNECT SCIENCE TO THE REAL WORLD**
 - Engineers collaborate with scientists and other specialists (such as animators, architects or chemists) to turn bold new ideas into reality.



Recommendation 3

More rigorous research should go forward to identify and test a small number of taglines for a nationwide engineering-awareness campaign.
The taglines should be consistent with the positioning statement and messages developed through this project and should take into account differences among target populations



Preliminary* Taglines

- **Turning ideas into reality**
- **Because dreams need doing**
- **Designed to work wonders**
- **Life takes engineering**
- **The power to do**
- **Bolder by design**
- **Behind the next big thing**

*Taglines were developed quickly without creative prototypes (such as posters, TV ads, or web pages) or input from focus groups.



Key Findings – Online Survey: Taglines

- **Turning ideas into reality was the most appealing among all survey respondents.**
- **Because dreams need doing was the second-favorite choice of adults and teens in the initial sample and the Hispanic over-sample. (Similar responses of girls and boys in all three populations to this tagline suggests this tagline may be relatively gender neutral.)**



Recommendation 4

To facilitate deployment of effective messages, an online public relations “tool kit” should be developed for the engineering community that includes information about research-based message-development initiatives and examples of how messages have and can be used effectively (e.g., in advertising, press releases, informational brochures, and materials for establishing institutional identity). The online site should also provide a forum for the sharing of information among organizations.



Recommendation 5

A representative cross section of the engineering community should convene to consider funding, logistics, and other aspects of a coordinated, multiyear communications campaign to improve the public understanding of engineering.



Possible Elements of a Campaign

- **Traditional and online advertising**
- **Corporate partnerships/sponsorships**
- **Pop-culture initiatives (e.g., contests, games, books, TV specials, documentary projects)**
- **Educational initiatives (e.g., curricula)**
- **Outreach to young people, parents, educators, guidance counselors, and the media**
- **Media training for ambassadors or spokespersons**

Price tag: \$12-\$25 mil./year over 2-3 years



Campaign-Related Questions

- **Who funds it?**
- **Who runs it?**
- **How will we know if it is working?**



Report Publication and Dissemination

- **Report due out late May**
- **Intensive dissemination to engineering community by NAE and project committee**
- **Outreach through professional meetings (e.g., ASEE in June)**
- **Media exposure through book reviews, articles, and editorials**



For Questions or More Information

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Key Findings – Audit

Existing messages and outreach tend to focus on:

- » **The value and nature of engineering and engineers**
- » **The academic skills needed to pursue engineering as a career, *especially math and science***
- » **Employment opportunities in engineering**
- » **Connection between engineering and quality of life**



Key Findings – Qualitative Research

- **No identifiable “public face” of engineering**
- **Many kids see engineers as “desk jockeys,” disconnected from people**
- **Children want well-paying jobs that are interesting and make a difference**
- **Engineers are seen as helping people, but not directly, the way doctors do**



Key Findings – Online Survey: Perceptions of Engineering

- **General Findings**
- **Teens vs. Adults**
- **Informed vs. “Not Informed” Adults**
- **Men vs. Women**
- **Boys vs. Girls**



General Findings

- **Both adults and teens said the most distinguishing characteristic of engineers is their high skill level in mathematics and science.**
- **Less than 15 percent of adults or teens described engineers as “boring” or “nerdy.”**
- **Technologies that have yet to be developed or are not in widespread commercial use were more appealing to adults and teens than technologies already in use.**



Teens vs. Adults

- **Teens in the initial sample were three times as likely as adults to consider engineering “boring” and twice as likely to consider engineers “nerdy.”**
- **Teens across the board responded more strongly than adults to entertainment technologies, such as iPods and video games.**



Informed* vs. Not Informed Adults

- **Informed adults in all three samples were significantly more likely than the not informed cohorts to associate math and science with engineering.**

* Individuals with some college education who said they either followed the news on an ongoing basis, including local, state, and national political developments, or were involved in their communities as volunteers.



Men vs. Women

- **Men in all three samples claimed greater knowledge of engineering than did women.**
- **African American women were more likely than African American men to believe engineers are well paid, hard working, and smart.**



Boys vs. Girls

- **In all of the teen groups, boys were nearly twice as likely as girls to rate engineering as a very good career choice.**
- **African American boys were significantly more likely than African American girls to consider salary extremely important to job choice.**
- **Hispanic girls were significantly more likely than Hispanic boys to think engineers were nerdy and boring.**



Boys vs. Girls (cont.)

- **African American girls were significantly more likely than African American boys to want a job that “makes a difference.”**
- **Hispanic girls were significantly less likely than Hispanic boys to believe engineering has a positive effect on people’s everyday lives.**



Key Findings – Online Survey: Messages

- **Engineers make a world of difference was the message with the highest “very appealing” rating among all adult and teen groups.**
- **Engineers connect science to the real world was the message with the lowest “very appealing” rating among all groups except teens in the initial sample.**
- **These preferences were confirmed when participants were asked to select the “least appealing” message.**



Why Increase Public Understanding of Engineering?

- **Improve technologically literacy for all Americans**
- **Encourage more students with diverse backgrounds to develop an interest in engineering and other STEM fields**
- **Sustain capacity for U.S. technological innovation**



What We Know: Part 1

- **Educational and public opinion research finds adults and teens have a limited understanding of engineering and engineers**
- **Compared with doctors, scientists, teachers, military officers and other professions, engineering is seen by the public as having relatively low prestige**



AAES/Harris Surveys

Top 10 Characteristics Associated with Engineers and Scientists

	Engineers	Scientists	Neither	Don't Know	Decline to Answer
	%	%	%	%	%
Creates economic growth					
2003	69	25	2	3	*
1998	51	25	-	5	1
Preserves national security					
2003	59	29	5	6	1
1998	36	22	-	9	2
Improves the quality of life					
2003	22	71	1	4	1
1998	16	72	-	3	1
Protects the environment					
2003	17	77	3	3	1
1998	13	78	-	3	*
Discovers the natural world					
2003	6	92	1	1	-
1998	4	92	-	2	*



AAES/Harris Surveys

Top 10 Characteristics Associated with Engineers and Scientists

	Engineers	Scientists	Neither	Don't Know	Decline to Answer
	%	%	%	%	%
Would make a strong leader					
2003	56	32	6	5	*
1998	47	28	-	8	3
Cares about the community					
2003	37	51	5	6	1
1998	24	46	-	9	2
Sensitive to societal concerns					
2003	28	61	5	5	*
1998	47	57	-	8	3
Inclusive of women and minorities					
2003	26	54	10	9	1
1998	16	37	-	14	3
Saves lives					
2003	14	82	1	2	*
1998	6	65	-	3	1



“Very Great Prestige” (Harris, 2006)

Firefighter	63	Architect	27
Doctor	58	Athlete	23
Nurse	55	Lawyer	21
Scientist	54	Accountant	17
Teacher	52	Journalist	16
Military Officer	51	Union Leader	12
Police Officer	43	Actor	12
Priest/Minister	40	Business Exec.	11
Farmer	36	Stock Broker	11
Engineer	34	Accountant	10
Member of Congress	28	Real Estate Agent	6



What We Know: Part 2

- **Women, African Americans, Hispanics, Native Americans are vastly underrepresented in engineering**
- **The United States' S&E-based innovation system is facing increasing challenges from other nations**



Selected Data for Women, African Americans, Hispanics, and Native Americans in Engineering

	Women	African Americans	Hispanics	Native Americans
Percent of U.S. population	50.7	12.8	14.1	1.0
Percent of engineering bachelor degrees earned	20.5	5.3	7.4	0.6
Percent employed as engineers	11.0	3.1	4.9	0.3

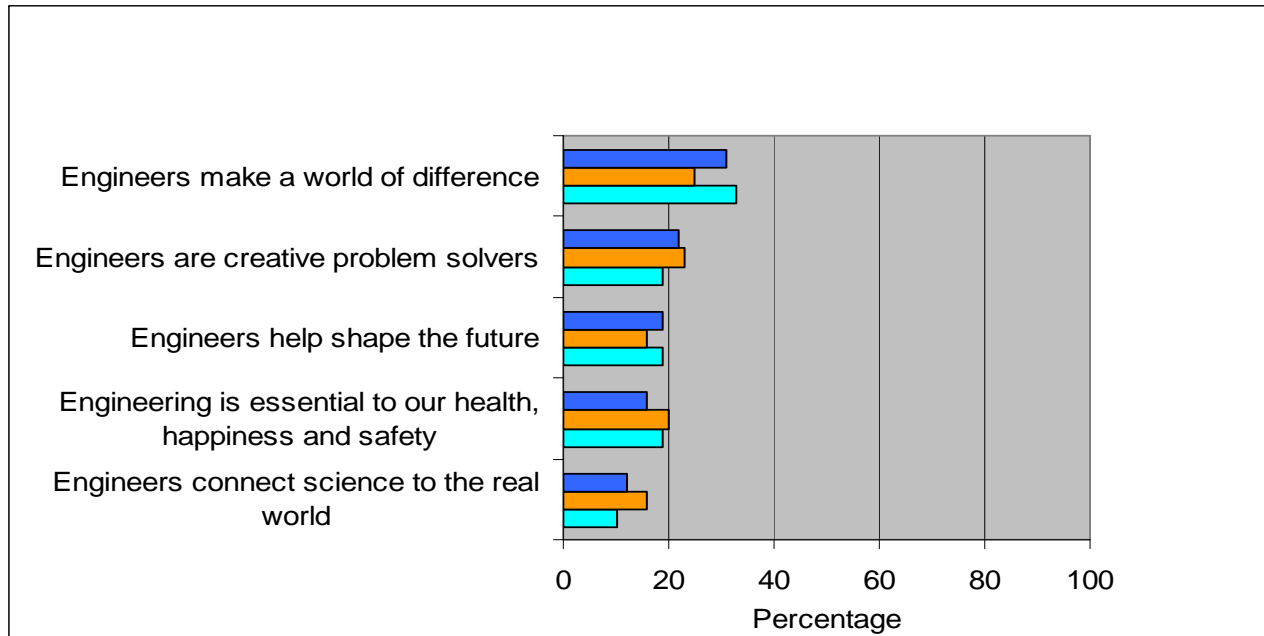


What We Know: Part 3

- **Lots of time and effort is being spent communicating with the public about engineering. A 2002 survey by the National Academy of Engineering determined such expenditures were a minimum of \$400k annually. Yet, there is little evidence of impact.**



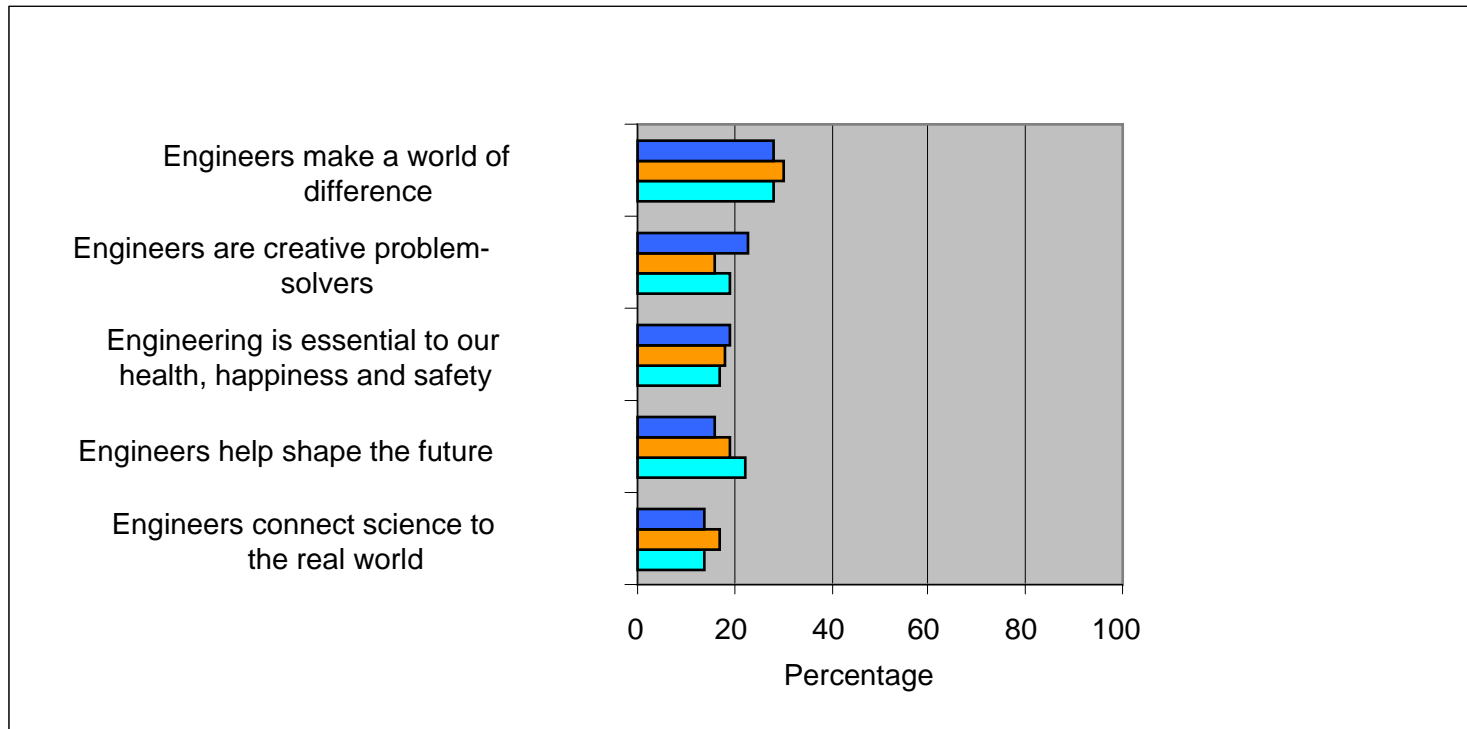
"Most Appealing" Message *Adults*



Note: Top bar = Initial sample. Middle bar = African American over-sample. Lower bar = Hispanic over-sample.



"Most Appealing" Message *Teens*



Note: : Top bar = Initial sample. Middle bar = African American over-sample.
Lower bar = Hispanic over-sample.



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