NATIONAL SCIENCE FOUNDATION
RESEARCH IN ENGINEERING EDUCATION
UNIVERSITY OF COLORADO, BOULDER

Survey Results

DECEMBER
2014

Survey Summary

- 2,674 usable responses
- Collected from four professional engineering organizations:
  - 1,218 ASCE members
  - 1,239 ASME members
  - 672 EWB members
  - 356 SWE members
- Collected early 2014

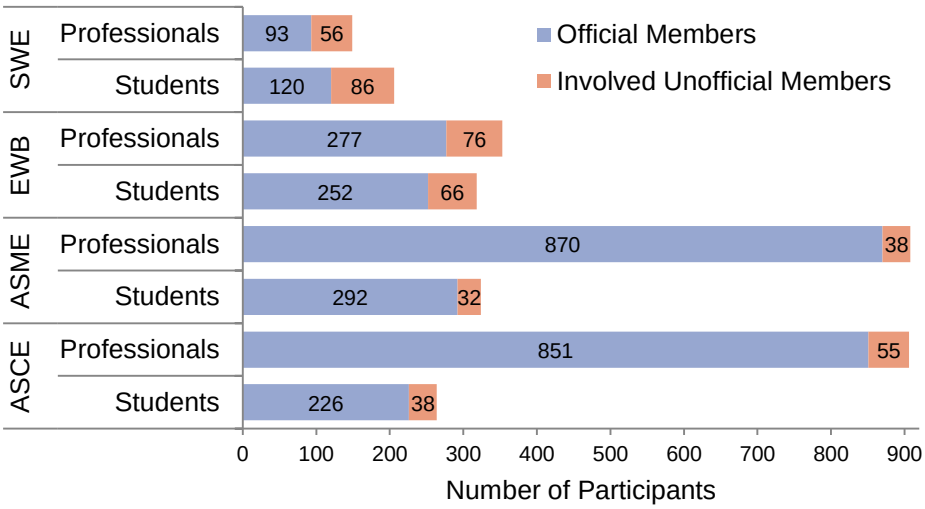
OVERALL DEMOGRAPHICS

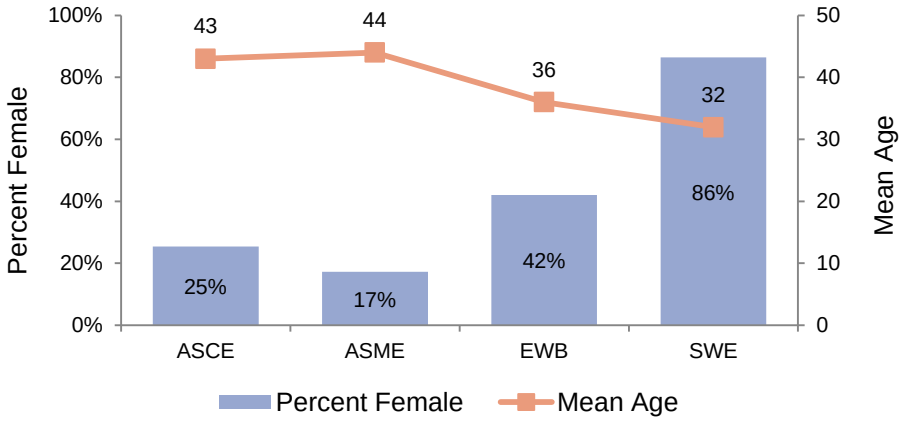
- Average age: 42
- Percent female: 25%
- Percent white: 82%
- Percent students: 29%
- Average number of years working: 17
- Undergraduates: 539
- Graduate students:194
- Practicing engineers: 1,472
- Academics: 184
- Retired engineers: 202

Thank you!

Thank you to those who assisted with data collection and who participated in our survey! This report summarizes the following results:

Who participated in the survey?





Who participated in the survey? (continued)

MEMBERSHIP

The majority of ASCE and ASME participants had been organization members for ten or more years ,while the majority of EWB and SWE participants had been organization members for three or less years.

ENGINEERING DISCIPLINE

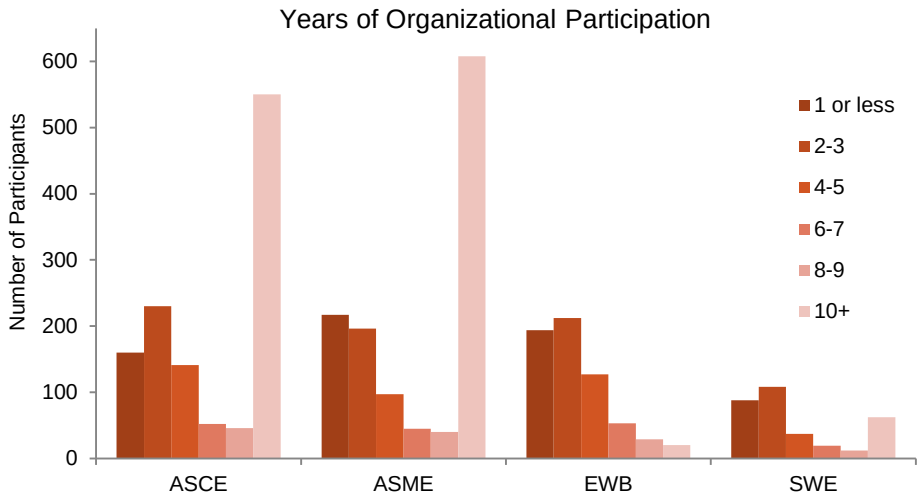
Due to the solicitation of ASCE and ASME, the majority of participants studied civil (40%) or mechanical (40%) engineering. The remaining 546 participants (20%) primarily studied environmental (24%), chemical (14%), or biological/biomedical (12%) engineering.

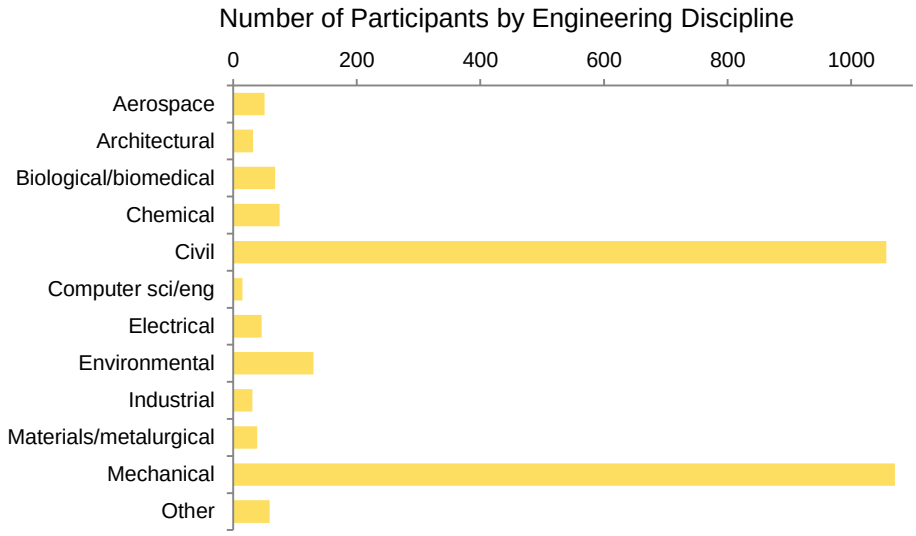
RACE/ETHNICITY

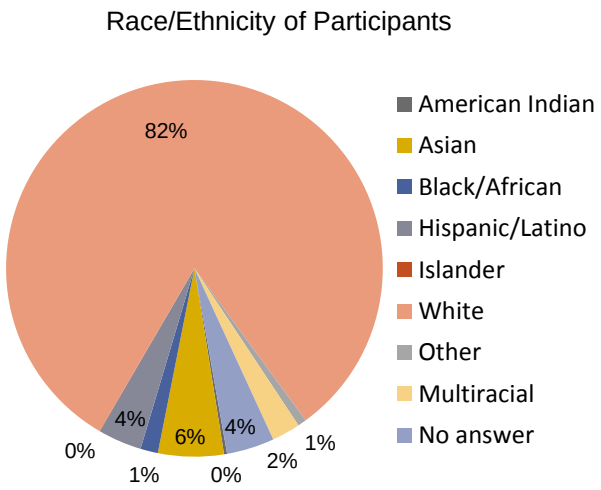
The majority of survey participants were white, and 14% were a racial or ethnic minority.

OTHER ORGANIZATIONS

Seventy-nine percent of the participants were involved in only one of the four organizations included in the survey. Several were involved in multiple organizations as listed in the table. Forty-six percent of participants expressed participation in another professional engineering organization not listed on the survey.







Number of Participants Involved in Multiple Organizations	
ASCE & ASME	92
ASCE & EWB	346
ASCE & SWE	149
ASME & EWB	135
ASME & SWE	141
EWB & SWE	145
All four orgs.	24
Other org.	1,226

What did the survey ask?

FOR MORE INFORMATION

See a full list of publications from this project and survey items at: http://www.amyjavernickwill.com/gender-diversity-identity-ewb-usa

DEMOGRAPHIC INFORMATION

Included age, gender, race/ethnicity, engineering discipline, organizational participation, GPA, family members within engineering, engineering service participation

MOTIVATIONS TO STUDY ENGINEERING

Assessed 20 different factors influencing decisions to study engineering, which grouped into seven categories: community development, family, financial, intrinsic behavioral, intrinsic psychological, mentors, and social good

PERSONALITY TRAITS

Measured scales of agreeableness, conscientiousness, emotional stability, extraversion, and openness to experience

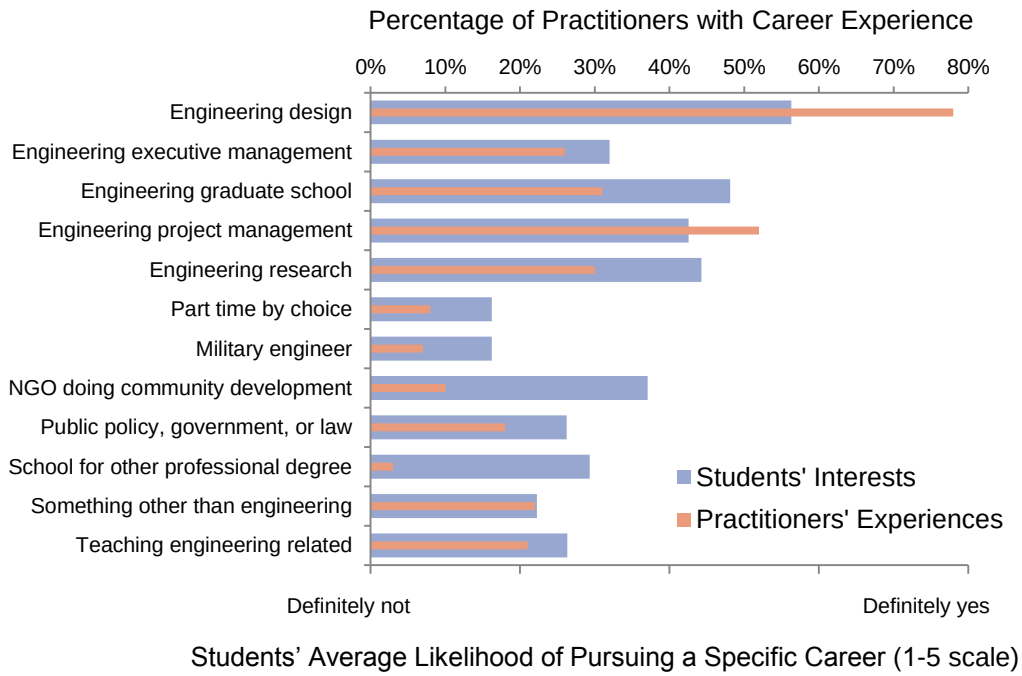
PERCEIVED TECHNICAL & PROFESSIONAL SKILLS

Used ABET's learning outcomes to measure perceptions of technical (e.g., designing experiments, solving problems, using skills, etc.) and professional skills (e.g., teamwork, communication, ethics, etc.)

CAREER INTERESTS & EXPERIENECES

Asked about students' interests and practitioners' experiences in a list of twelve different career roles both within and outside of engineering (see below for more details and results)

Career interests & experiences



CAREER INTERESTS

Students were asked about the likelihood of working in specific career roles in the next five years on a one to five scale. Engineering design, graduate school, and research were the three highest responses.

CAREER EXPERIENECES

Practicing engineers were asked if they have had experience in the list of career roles. Most (78%) had experience in engineering design followed by engineering project management (52%).

INTEREST IN CHANGING CAREERS

Nine hundred eighty-three (52%) of practicing engineers expressed an interest in changing their current career role. Among the 983, the most common roles of interest were engineering executive management (19%) and working for an NGO doing community development (15%). Working part time by choice, teaching in an engineering related subject, and working in public policy, government, or law were over 10%.

What differences were found within each organization?

For each organization, comparisons were made between the organization's members and the other survey participants not involved with that specific organization using linear and logistic regression models (e.g., the ASCE column presents results that compare ASCE members with those that are not ASCE members).

Results for each organization are summarized in the table below using the following notation:

- **Equivalent:** no statistically significant differences between members and non-members
- **Higher:** organization members had a higher percent, mean or score than non-members
- **Lower:** organization members had a lower percent, mean or score than non-members
- ***** statistically significant difference at the 95% confidence level
- ****** statistically significant difference at the 99% confidence level
- ******* statistically significant difference at the 99.9% confidence level

Results from comparing organization members to non-members for each organization				
Survey Scale	**ASCE**	**ASME**	**EWB**	**SWE**
Percent female	Equivalent	Lower***	Higher***	Higher***
Percent minority	Equivalent	Lower**	Equivalent	Higher**
Mean age	Equivalent	Higher by 4 years***	Lower by 8 years***	Lower by 12 years***
Mean undergraduate GPA on 4.0 scale[a]	Lower by 0.08**	Higher by 0.05*	Equivalent	Equivalent
Percent with engineering service participation (including EWB)	Higher***	Lower***	Higher***	Higher***
Motivations to study engineering[b]	Lower intrinsic behavioral*** intrinsic psychological*** and financial motivations; higher community development*** and family* motivations	Higher intrinsic behavioral*** and psychological*** motivations; lower community development*** motivations	Higher community development*** and social good*** motivations[†]	Equivalent
Personality traits[c]	Lower openness to experience*	Equivalent	Higher openness to experience*** and agreeableness**	Equivalent
Perceived technical skills[d]	Equivalent	Higher***	Equivalent	Equivalent
Perceived professional skills[d]	Equivalent	Equivalent	Higher***	Equivalent

Footnotes indicate control variables:

a: age
b: age, gender, GPA, minority status
c: age, gender, organizational participation level
d: age, gender, GPA

†Differences in intrinsic motivations were eliminated when controlling for engineering discipline
Note: Percent with an immediate family member within engineering were equivalent for all four organizations' comparisons.

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