Women in Engineering: Past, Present & Future

Dedra A. Ecklund, P.E.

Civil Engineering Student Emily Brown; 1953
Credit North Carolina State University

Credit: Flate Focus

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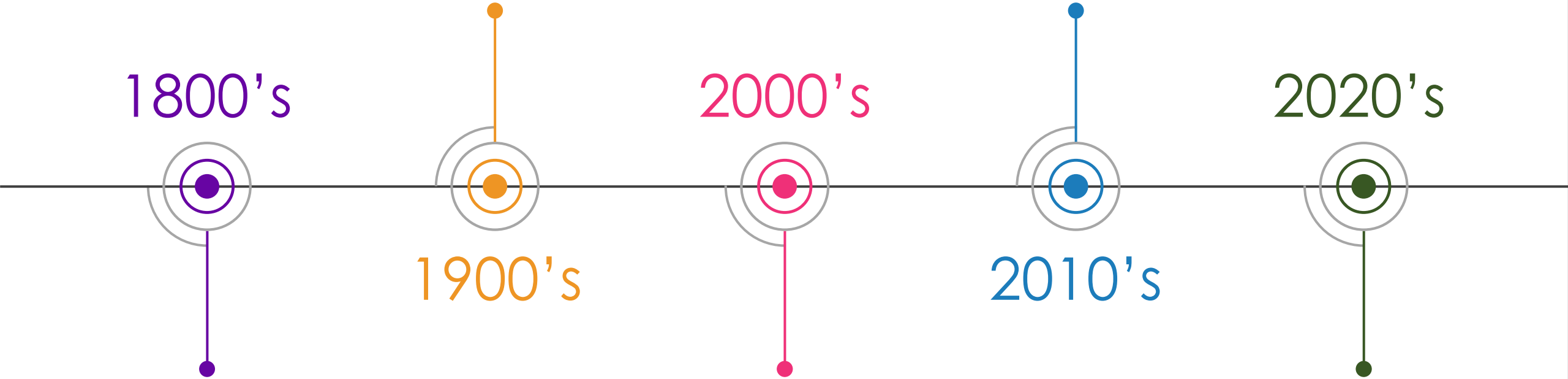
Women in Engineering



- Engineering Degrees Rare
- Could complete coursework without degree
- Limitations placed on women

- Defying gender norms
- World War II
- 1972 – 1% undergrad degrees

- 11% of all engineers
- 2006 - 3.5% Women in STEM

- 2014 – 7.9% Women in STEM

- 22% of all bachelor's degrees
- 13% of workforce
- 9.9% of construction industry
- 30% of women engineers still in field 20 years later

Contributions to Engineering Advancements

- Emily Roebling (1803-1903)
  - Field Engineer and Technical Leader of the Brooklyn Bridge
  - Took over from her husband due to illness
  - Brooklyn Bridge completed in 1883
- Elmina Wilson (1870-1918)
  - First Lady of Structural Engineering
  - First American female to complete a civil engineering degree
  - First female professor in engineering at Iowa State University
- Nora Stanton Blatch Barney(1883-1971)
  - First woman to graduate in engineering from Cornell
  - Sued the *ASCE* for denying full membership
  - Granddaughter of Elizabeth Cady Stanton
- Olive Dennis (1885-1957)
  - Major contributions and innovations to American railways
  - First female member of the *American Railway Engineering and Maintenance-of-Way Association*

Women's Roles in Underground Construction

- Engineer
- Owner's Representative
- Construction Management
- Project Management
- Construction Inspection
- Materials Testing
- Construction Foreman/Crew

Challenges Women Have Faced

- Societal Expectations
- Admissions in programs limited or forbidden
- Study time was limited in the library and class
- Second class status
- Title VII of the Civil Rights Act of 1964
- Admission of women at Texas A&M occurred in 1963

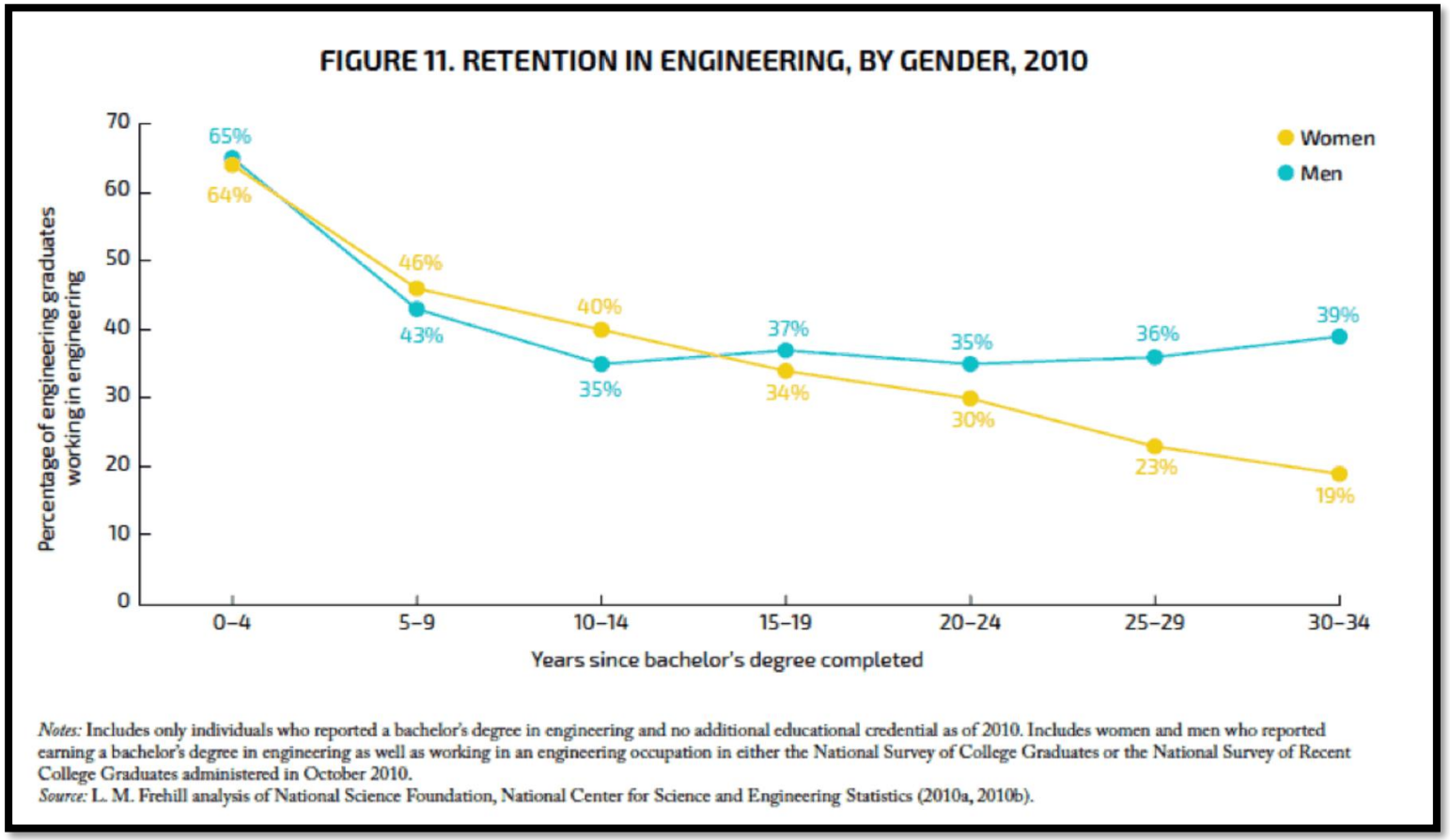
General Electric Training Program
Credit: Society of Women Engineers

Reasons People Think Women Quit

- Caregiving of Children or Parents
- Lack of Confidence
  - No difference from those who stayed and those who left
- Don’t want to work
- Pay Disparity

Retention of Women in the Industry

- Why do women quit?
  - Toxic Work Culture
    - 69% of survey participants
  - Feeling Undervalued
    - 52% of survey participants
  - Being Bullied
    - 48% of survey participants



Source: Corbett, C., & Hill, C. (2015). Solving the Equation: The Variables for Women's Success in Engineering and Computing. Washington, DC: American Association of University Women.

Retention of Women in the Industry

- What Contributes to these Factors?
  - Implicit Biases
    - Assertiveness may be perceived as being too aggressive
    - “Old-boys” club workplaces
  - Gender Stereotyped Assignments
    - Given administrative tasks
    - Lack of technical opportunities
  - Different Expectations
    - Want to contribute positively within society and solve problems
    - Driven by social responsibility
  - Lack of Female Role Models
    - Advancement in technical positions and leadership roles is minimal
    - Pool of candidates is shrinking

Retention of Women in the Industry

- What can be done?
  - Mentoring Programs
    - Formal or informal programs
    - Society of Women Engineers
    - AWWA Women in Water
  - Targeted Recruitment
    - Representation matters
    - Community outreach
  - Inclusive Networking Opportunities
    - Think outside the box
    - Be mindful of child-care needs and female interests
  - Flexible Work Schedules
    - Hybrid environments
    - Opportunity to work from home
  - Allyship
    - When you are at the table bring someone else
    - Say their name - Be the person that will promote a female engineer's skills and abilities

Benefits of Workforce Diversity

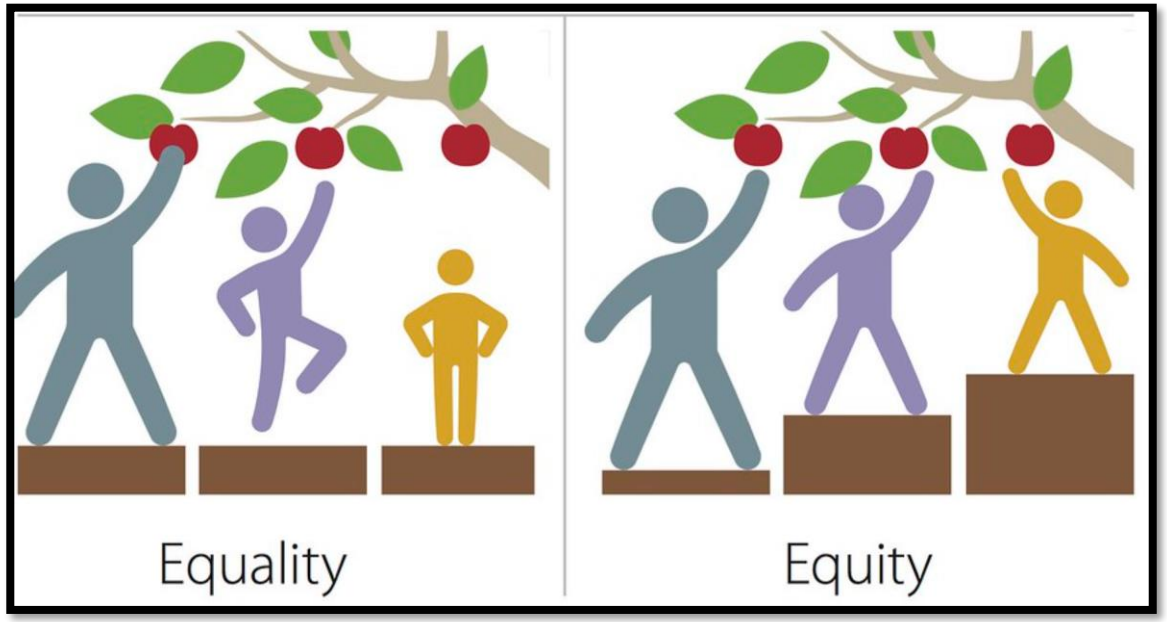
- Different Perspectives = Better Outcomes
  - Companies with women on the board, performance increases by 54%
  - Global Economy enriched by 120 trillion (World Bank Study; May 2018)
  - Gender diverse teams have higher profits (Center for Creative Leadership)
- Reflective of diversity in colleges and universities
- Fill the pipeline with next generation

Next Generation

- Self-limiting pipelines doesn't offer challenges of different perspectives
- Create welcoming environments
- Participate in STEM programs
- Mentorship or retention programs

What Can You Do?

- Be an Ally
  - Representation matters
  - Think Equity vs Equality
- Be a Mentor
  - Active Listening
  - Don’t always have to “fix” it
- Lead By Example
  - Create and Be the Change
- Leverage Resources
  - Bring women to the table where decisions are made
- Create an Environment of Respect and Authenticity



Credit: County of San Mateo

Inspiring the Future

CHRISTINE KIRBY, PE, ENV SP
"Women need to be offered the same opportunities for training and advancement that are offered to men. We need to be represented in senior leadership, and young engineers need mentors who they can identify with and relate to. This has been a key factor in career success for me, and I can't overstate the importance of representation and diversity in leadership."

LISA LATTU, PE, AICP
"I grew up going to oil field job sites and microbiology labs with my parents and worked one college semester for an off-shore directional drilling service company. It never occurred to me that women didn't or couldn't do those sorts of jobs."

Inspiring the Future

MELISSA MACK, PE, PMP

"I became an engineer because, being from a developing country, I saw a great need to help improve the lives of those in developing and other communities when it came to have good, clean, easily accessible drinking water; good sanitation; and better living situations. I've always been interested in how things work but wanted to use that talent to make the lives of others better. Being a woman in engineering, I've learned to not focus on my sex but on my abilities, how I can help others, and standing up for what I believe is right. When people know that you genuinely care and are accomplishing things, they tend to notice ability versus appearance."

MACKRENA RAMOS, PE

"It is very different being a female engineer today versus 20 years ago when I first started my career. It's no longer a surprise to see another woman in a technical meeting, at a construction site visit or as a decision-maker. We are integrated into all levels of management both internally and on the client side. I see the next generation building on those accomplishments, mentoring more female engineers, and breaking any remaining barriers."

DEDRA ECKLUND, PE

"Studying engineering stemmed from male role models who encouraged my love of math and science. I also benefited from STEM programs that were organized, funded, and staffed with male engineers. I did not have a female role model in the field until my junior year of college. There is still a glass ceiling for women to break through in the field, but I recognize we have succeeded in many areas already."

Questions?

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