Activity #1: Draw an Engineer at Work
Diversity in Engineering
Professional Development

Mill Swan A Head Start

April 6, 2016
Agenda

• Purpose
• Background
• Definitions
• Recommendations and Applications
Purpose

To discuss the need for and ways to increase diversity

in the S.T.E.M. curriculum at the Pre-K level
BACKGROUND
Problems in S.T.E.M.

- Great accomplishments in the 20th century
  - The first man on the moon
  - Polio vaccine
  - Internet
  - Institutions like MIT, Caltech, WPI, and Berkeley

- The U.S. is falling behind other nations
  - 17 out of 19 countries in Problem Solving
  - 21 out of 23 countries in Math
  - 30 of the 40 most advanced countries graduating science majors

*National Center for Education Statistics, 2012; Pew Research, 2015*
S.T.E.M. Problems

- Millions of S.T.E.M. jobs are available
  - Not filled because of lack of qualified STEM workers

- The Engineering workforce
  - 87% Whites and Asians compared to 12% African Americans and Latinos
  - 24% are women

Bennett, 2012; Change the Equation

How do we solve the STEM Dilemma?
Solving the STEM Dilemma

• Pipeline interventions or Bridge programs

Elementary school → Middle school → High school → College → Work Force

• High quality curriculum

• Early education (pre-K)

• Diversity
Why Diversity?

Consider the diverse composition of your classrooms

• Does it match K-12 classrooms? College?
• Does it match the diversity of STEM occupations?
Why Diversity?

1. Diversity is critical to excellence
2. Lack of diversity represents a loss of talent
3. Enhancing diversity is key to long-term economic growth and global competitiveness
DEFINITIONS
Gender

- *Sex*- the genetic determination of being male or female
- *Gender*- the socially defined roles expected of male and female human beings
Nationality

• The status of belonging to a particular nation by origin, birth, or naturalization

• E.g. American, Jamaican, Italian, Brazilian, Polish, etc.
Ethnicity

- denotes a group of people who perceive themselves and are perceived by others as sharing cultural traits
- Includes language, religion, family customs, and diet

Chinese

Jews

Latinos
Race

- denotes a group of people who perceive themselves and/or are perceived by others as possessing distinctive physical traits
- Often based on skin color and other characteristics.
- E.g., White, Black, Yellow, or Red
Racial Identity

• one’s sense of group identity or affiliation and association with others who possess the same racial heritage.
Cultural Proficiency

Learning and teaching about different groups in ways that acknowledge and honor all people and the groups they represent.
Stereotypes

• A set of beliefs about the personal attributes of a group of people

• May be positive or negative

• Examples?
Activity #2: Case Study
Richie Parker
Summary

• Identifies as:
  • Car enthusiast
  • Engineer
  • Employee
  • Son

• He also happens
  • To be **male (gender)**
  • To have **no arms** due to a condition known as Bilateral Amelia in which limbs aren't formed (**ability**)
  • To be **African American (race and Nationality)**
Activity #2: Case Study

• How does this change your perception of
  • What an engineer at the job looks like?
  • What diversity means?
  • What are the different types of diversity we should include?
Diversity

- Age
- Gender
- Race
- Culture
- Nationality
- Socioeconomic
- Cognitive abilities
- Physical abilities
RECOMMENDATIONS & PRACTICAL APPLICATIONS
Discussion

• What are the practices you currently use to be culturally responsive?

• How can we make the curriculum more inclusive?
Activity #3: Group Activity

• Compare your drawings of the engineers at work

• Discuss the following. Was there...
  • Gender diversity?
  • Racial and ethnic diversity?
  • Age diversity?
  • Occupational diversity?
  • Ability diversity?
  • Stereotypes?

• Share
Stereotypical Images
Diversity in Engineering
Recommendation #1

Be aware of our personal biases
Application #1

Be deliberate in one’s choices: Books

Be inclusive of gender, race, disability, and different engineering occupations
Application #1a

Be deliberate in one’s choices: Posters
Application #1

Julia Beecherl Endowed Professor
Founder / Director of Nanotechnology
Center of Excellence

Emily Warren Roebling one of the
engineers of the Brooklyn Bridge

President’s Council of Advisors on Science
and Technology (PCAST) in President Barack
Obama’s administration.

Mae C. Jemison

Sundar Pichai is a computer engineer and the
current CEO of Google Inc.

Share Videos of Role Models
Be deliberate in one’s choices: Guest Speakers

• Parents
• Community Workers
• Experts in the field

Be inclusive of gender, race, disability, socioeconomic status, and different engineering occupations
Recommendation #2

• Be aware of our beliefs
Expectancy Beliefs

Do teacher’s expectations actually influence student performance?
Pygmalion in the Classroom

- Rosenthal & Jacobsen (1968) Study
- Teachers informed that some students were “bloomers” based on IQ test
- “Bloomers” actually scored an average of 30 points higher on standardized tests
High vs. Low Expectations

• Identifying problems

• Waiting for answers

• Role play
Application #2

• Foster respect in classroom
• Hold all students to high standards
• Make learning challenging
• Encourage creativity
• Engage all learners
Recommendation #3

• Learn about our own culture and about others
Celebrating Diverse Cultures

1. Attend cultural events in your community
2. Develop relationships and understand the dynamics of cultural interactions
3. Make connections between classroom and real world
   • Include books, language, diet of different cultures
   • Choose examples that are relevant to students (TV, online, film, current events)
   • Have Show and Tell
   • Involve families and communities

*Head Start Cultural and Linguistic Responsiveness*
Respecting Diverse Cultures

1. How do my children and parents self-identify?
2. What are their nationalities?
   - Mexican vs. Puerto Rican
   - Jamaican vs Trinidadian
   - Polish vs Ukrainian
   - Korean vs Japanese
3. What do they prefer to be called?
   - Black vs African American
   - Latino vs Hispanic American
   - White vs Caucasian vs European American
   - Asian vs Asian American
Incorporating Diverse Cultures
Summary

1. Be aware of personal biases
   • Use inclusive pedagogical content (books, posters, activities)

2. Be aware of one’s beliefs
   • Foster respect in classroom
   • Engage and challenge all learners

3. Learn about our own culture and about other cultures
   • Attend cultural events in your community
   • Develop relationships and understand the dynamics of cultural interactions
   • Involve families and communities