

# Engineering Students Define Diversity:



Lorraine N. Fleming, Ph.D.  
Sislena Ledbetter, Ph.D.  
Janice McCain, Ph.D.  
Dawn G. Williams, Ph.D.

*Howard University*

# Scholarship on Learning Addressing Diversity

"...to conduct research on the engineering student learning experience in order to provide a comprehensive account —*across diverse student populations and environments*— of how people become engineers."

# Wm. A. Wulf, Former NAE President said:

(NAE Annual Meeting, October 4, 1998)

"...Our profession is diminished and impoverished by a lack of diversity."

"... Every time we approach an engineering problem with a pale, male design team, we may not find the best solution. ... we may not even understand the full dimension of the problem"

# Related Studies

- Foor, C., Walden, S. and Trytten, D. (2007). "I Wish That I Belonged More in this Whole Engineering Group:' Achieving Individual Diversity".
- Haden, C. (2007). "Evaluating Support for Underrepresented Students in Engineering Degree Programs."
- May, G.S. and D.E. Chubin, (2003) "A retrospective on undergraduate engineering success for underrepresented minority students."
- Purdy, C. & Wasburn, M. (2005). "Diversity in Engineering Education--What Are the Perceived Issues?"

# Objective

- To share insights into the role that diversity plays on the educational pathways of undergraduate engineering students.
- No predisposed definition of diversity was expressed or implied while conducting the research.

# METHODOLOGY

- *Sample:* Cohort 1, 94 Sophomores
- *Instrument:* Structured Interviews
- *Analysis:* Qualitative with a Grounded Theory Approach (Structuralism)

# Research Questions

- How does this generation of undergraduate engineering students **define diversity**?
- How do students **classify diversity** within their **academic settings**?
- How do students perceive that their **race and gender** impacts their goal of becoming an engineer?

# Participants are part of **Generation Next\*** (18-25 year olds)

Progressive approach to some of the  
major social issues of the day

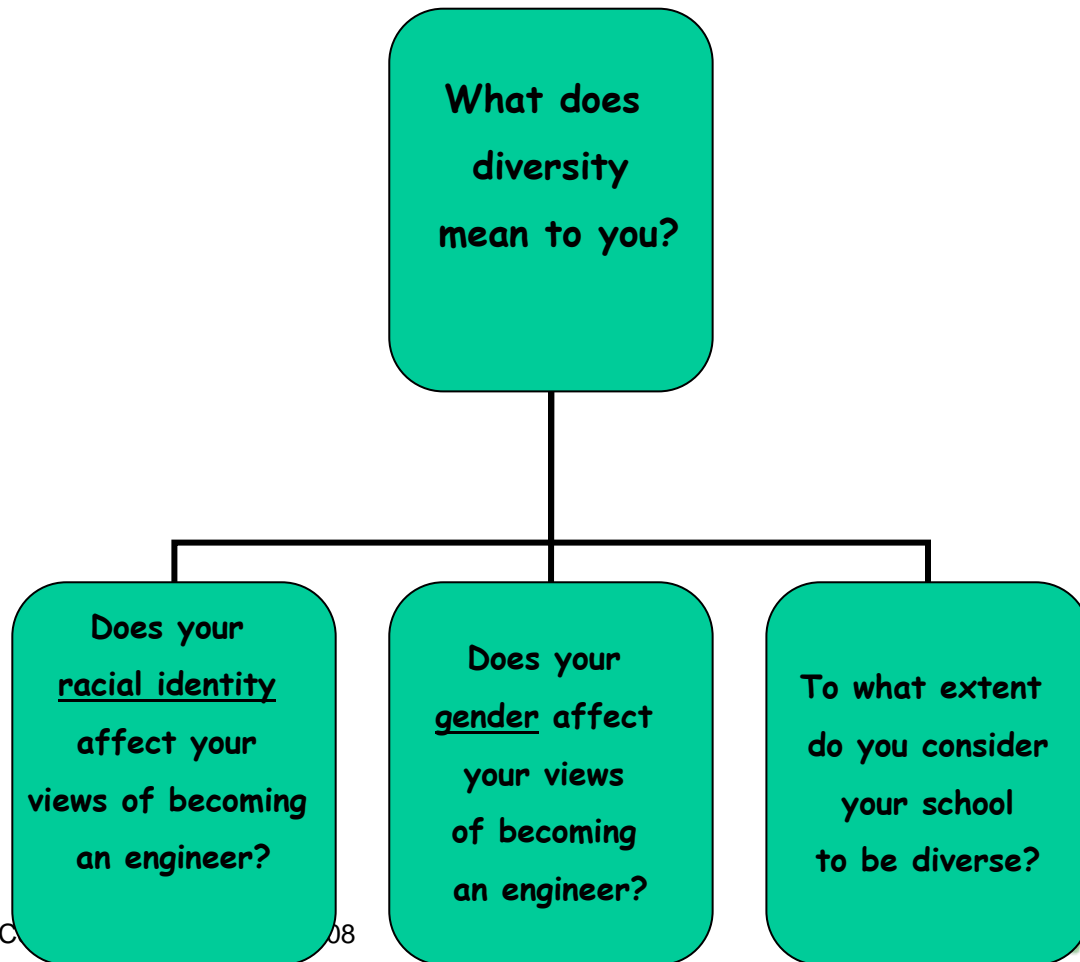
- More tolerant of racial issues (e.g., affirmative action, interracial dating)
- Less likely to have old fashioned views on the role of women, family and marriage

\*Source: How Young People View Their Lives, Futures and Politics, A PORTRAIT OF "GENERATION NEXT", The Pew Research Center for The People & The Press report, January 2007.



# Interview Questions

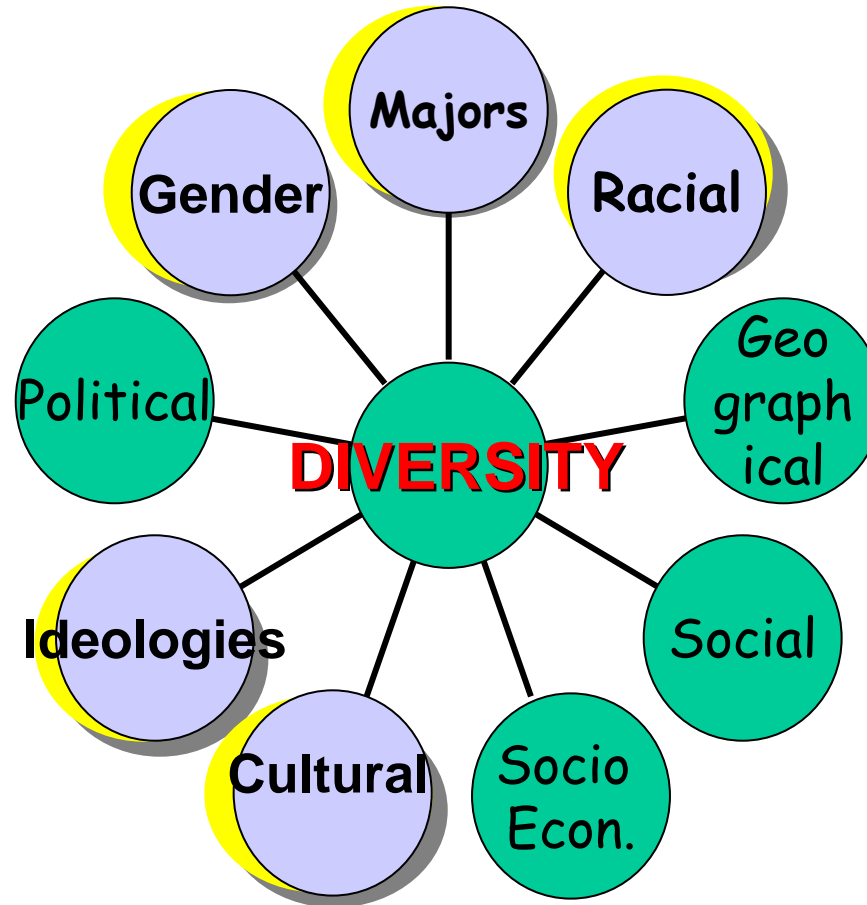
*Data extracted from structured interviews,  
4 campuses, cohort 1.*



# Interview Question

*What does diversity  
mean to you?*

# Emergent Themes of Diversity



## Technical Public Institute

Students framed diversity in the context of their institution-type and race.

*"...it's not very diverse...because... it is an engineering school, ... so in that aspect it's not diverse... most of the students are kind of the same person in a sense...because we're all pursuing the same degree." (F)*

*"...every school I've ever been to, it's been around 90% white... we have a few transfer...and foreign students... but... diversity at this school...there isn't a whole lot." (M)*

## Urban Private University

Students framed diversity broadly and in the context of culture and ideology.

*"... [I] think diversity means people coming from different cultures...it's a difference." (M)*

*"...Diversity is having, ... the presence of multiple people that have multiple experiences, ... and ...people with different outlooks, not necessarily culturally, but in general. (M)*

## Suburban Private University

*Students framed diversity in the context of  
race and gender.*

*Some found it difficult to discuss.*

*"ah, diversity means ah, it means, ah,  
it's hard to define diversity without  
diversity (chuckle)." (F)*

*"...having a wide variety of different...  
races...genders... schools." (F)*

## Large Public University

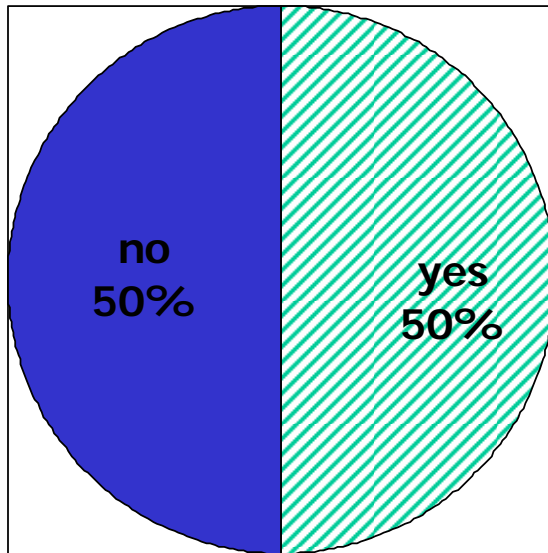
Students described diversity  
as trite and over exposed.

*"...social diversity...is pounded into our head at every stage of your development ...diversity is one of those 'buzz words'. I don't think it's as important as everyone tries to make it." (M)*

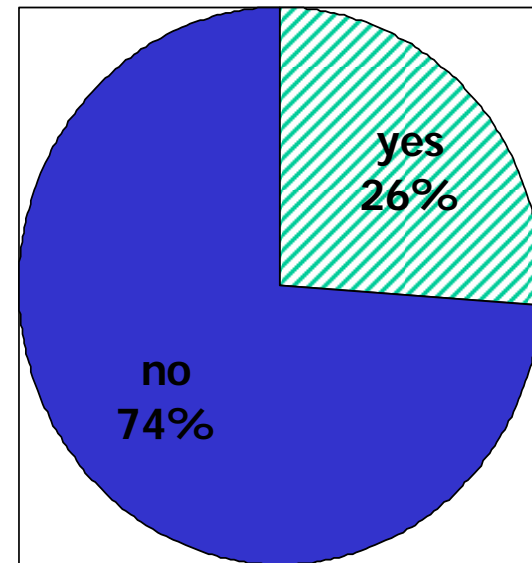
*"Diversity. Ahm I think that's the fourth time I've heard it this year (laughing)...So I guess diversity is just a bunch of different personalities all in one together." (M)*

# Does your gender affect your views of becoming an engineer?

Females



Males



Those women, who said that gender does impact their views of becoming an engineer, cited that they were impacted negatively by the *"lack of role models."*



# Female Student's View

Does your gender affect your views of becoming an engineer?

"... there are societies, like Society for Women Engineers...that does help change our perspective on being an engineer

...it's 'cause I'm female, because I'm a minority and I'm not used to being like that because I'm a white middle class individual

... it's hard to become an engineer, it's real intimidating to be ahm, working for... predominantly all males...it's kind of a challenge to me,

...I can do this, I can pioneer this and be a female engineer, be just as good as a male engineer" TPI



TPI

# Male Students' View

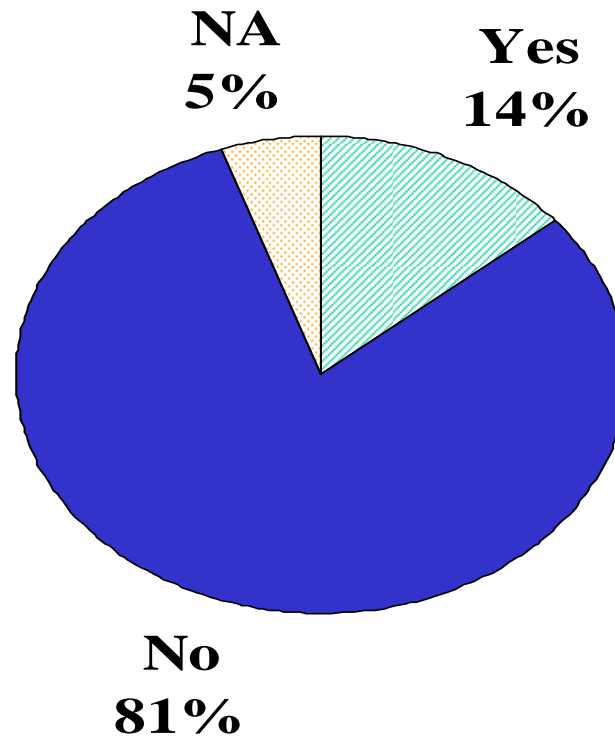
Does your **gender** affect your views of becoming an engineer?

"...if the females... have an advantage, just because [of] things like affirmative action ... where they give certain advantages to some minorities, I wonder if it is a disadvantage being the majority?" LPU-M



*"It's more natural for males to be engineers."*  
SPU-M

# Does your racial identity affect your views of becoming an engineer?



# Multiple Students' View

Does your racial identity affect your views of becoming an engineer?

"I really don't think so. I don't think that is a big deal. I don't think about it very much."

LPU-M

"The only thing it affects is who's gonna employ me...but it doesn't affect how I feel about being capable...if you know what I'm saying, because I'm black...." UPU-M

# Multiple Students' View (cont'd)

Does your racial identity affect your views of becoming an engineer?

"No, maybe if I was like another race.

...people still tell me I look white...my being Spanish has in ..no way shape or form [affected] anything...,

...so I don't celebrate Cinco de Mayo or anything...."

-TPI-M

# Observations

- To most engineering students, diversity means difference (school, gender, race, geographical, major field, politics, religion).
- Diversity can be an uncomfortable topic for students to discuss.
- Students recognize the impact of diversity on their careers.
- Students outlined an impending generational paradigm shift in diversity.
- Finally, when studying issues with such paucity as diversity, researchers must consider employing both qualitative and quantitative methods. The absence of either method, while interesting, would have been less robust.

# Implications for Engineering Education

Back to Wm. A. Wulf's statement

*"At the same time, by failing to attract a diverse engineering work force, we diminish what engineering can contribute to society, and society pays an opportunity cost...."*

# Acknowledgement

*This material is based on work supported by the National Science Foundation under Grant No. ESI-0227558, which funds the Center for the Advancement of Engineering Education (CAEE). Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.*



*CAEE is a collaboration of five partner universities: Colorado School of Mines, Howard University, Stanford University, University of Minnesota, and University of Washington.*