

## **Engineering Students Define Diversity: An Uncommon Thread**

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Diversity has taken on many meanings, depending on the context in which it is used and the person using it. Today's engineering students have come to embody diversity as an extension of their home, academic and social environments. The result is a group of students that often show indifference to diversity (however defined) and the impact it will have on their professional careers.

### **Implications of Findings**

In their own words, students outlined an impending generational paradigm shift in thinking about diversity. They shared profound, thought-provoking data for leaders in engineering to consider as they search for ways to attract and retain more women and minorities in the field. Insights gained from this research can address the needs of a cross-section of engineering student populations with careful attention paid to gender, race, culture, and ideological similarities and differences. While diversity has become increasingly complex, creative efforts to engage and support the academy from the student body to professors and the administration should be pursued.

Broadening the pool of engineers is essential to the integrity, validity, and survival of the engineering field. Many studies have investigated reasons for the lack of representation of women and minorities in STEM degree programs and these studies demonstrate that the playing field in engineering is still not level.

### **Methods and Background**

Researchers must consider employing both qualitative and quantitative methods when studying a complex issue such as diversity. In the present study, there were often inconsistencies in what students reported on quantitative closed-ended questions and what they reported in their qualitative follow-up discussion during the structured interview sessions. The absence of either method in this analysis, while interesting, would have made the findings less robust.

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This study used grounded theory, an inductive, analytical approach, to develop the concepts that ultimately informed the research. Findings from structured interview data from 94 (out of 160) sophomore students participating in a longitudinal study called the Academic Pathways Study were analyzed. The four participating schools (referred to by pseudonyms) include: Technical Public Institution (TPI), a public mid-western university specializing in teaching engineering and

technology; Urban Private University (UPU), a private, mid-Atlantic Historically Black University; Large Public University (LPU), a large public university in the Northwest US; and Suburban Private University (SPU), a medium-sized private university on the West Coast.

Including students from diverse backgrounds was a key element of the research plan, and special attention was paid to understanding how underrepresented students navigate their initial years in engineering education. This was accomplished by employing over-sampling strategies for gender and underrepresented minorities in order to gain information about a broader range of students.

No preconceived definition of diversity was expressed or implied while gathering the data or in conducting the research analysis. Diversity as discussed in this paper reflects a non-scripted, but inductively constructed term based on the responses of the students.

### **What We Found**

The major findings of this study are divided into three primary categories: defining diversity, gender roles and identity, and racial identity. Students defined diversity in many ways. Among the familiar themes were diversity of gender, race, culture, and ideology. The less familiar themes included diversity of major, geography, socio-economic status, and political affiliation.

Some students at SPU found it easy to define diversity and shared very thoughtful expressions about what diversity meant to them. For example, Peter defined diversity by saying "*...I think diversity means people coming from different cultures...it's a difference.*" Rhonda used a series of analogies to define diversity and explained "*...diversity, know some people have the expression that you have more strings to your harp...I think that's what diversity is...if you love math that's great, but you also do other things, say music...diversity in culture...you learn that it's not just your culture that's supreme to everything else....*"

Other students found it more challenging to define diversity, while some students found defining diversity monotonous and redundant. For example, Bob, a student at LPU, stated "*...social diversity...is pounded into our head at every stage of your development...*" Rick said "*diversity is one of those 'buzz words.' I don't think it's as important as everyone tries to make it.*" Seemingly, to students such as these, diversity has become more of a catch all phrase.

Interestingly, there were some inconsistencies in what students reported quantitatively in the closed ended questions and what they went on to describe qualitatively through the open-ended questions. For instance, one student at LPU rated his school as fairly diverse but went on to describe the conflicting nature of diversity or achieving diversity at his institution.

When students were asked to what extent their gender affects their views of becoming an engineer, two statistically significant relationships were found. First, female and male students had differing opinions about the impact that gender has on their becoming an engineer and second, that a lack of role models was significantly associated with being female. Almost two thirds (63%) of students said that their gender did not affect their views of becoming an engineer.

However, both females and males voice many different opinions about the impact of gender on their educations. For example, Martin, from LPU stated "*...if the females...have an advantage, just because things like affirmative action, you know where they give certain advantages to some minorities, I wonder if it is a disadvantage being the majority?*" Some women see themselves as

ambassadors to the field and are aware of the gender imbalance. Tina from TPI explained "*...I think that females are such a low percentage of...engineers...it encourages me to be one of those people to get the word out to have more females...in the field of engineering.*" Some individuals shared thoughts reflective of a foregone past. For example, Henry, from SPU exclaimed "*...It's more natural for males to be engineers.*"

Students were also asked to share views about how they believed their racial identity affected their views of becoming an engineer. Eighty-one percent answered "no," that race had no impact on their engineering aspirations. Joel, a white student from LPU articulates "*I really don't think so. I don't think that is a big deal. I don't think about it very much.*" Nathan, an African-American student from UPU, found it more of a concern—"the only thing it affects is who is going to employ me...but it doesn't affect how I feel about being capable...if you know what I'm saying, because I'm black..."

These findings together demonstrate a changing attitude toward diversity among college age students. As the multicultural landscape continues to broaden, racial identity is a term that must be operationalized, and not generalized, for discussion among engineering academicians to incorporate in the teaching and learning process.

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