

## **Diversity in Engineering Teaching – Views from Future Engineering Faculty**

**Authors:** Brook Sattler, Jessica Yellin, Yi-Min Huang, and Jennifer Turns

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Even though diversity issues have not always been addressed in engineering education, addressing diversity has emerged as an important issue in the engineering education community as the student population in colleges and universities has become increasingly more diverse. Despite these changes in student populations, attrition from engineering programs remains a significant issue across all groups. For underrepresented minority groups, recruitment and retention in the engineering programs is especially critical because significantly fewer engineering degrees were awarded to these students in the last decade. The current number of minorities and women in student populations represented in engineering programs are still well below parity with their distribution within the higher education population.

### **Implications of Findings**

Based on current findings, we have the following suggestions for engineering educators who want to consider diversity issues in their teaching, and faculty developers who provide resources for helping engineering educators consider diversity issues:

- Recognize that everyone brings to the table their own thoughts and opinions about diversity; many of these thoughts and opinions are rooted in their personal experience.
- Recognize that everyone will have different experiences with diversity and choose to address this issue in different ways.
- Any dialogue or reflection with colleagues, students, and other stakeholder groups is helpful.
- Broaden your own conceptions of diversity to include things like learning styles in addition to more traditionally recognized diversity issues (e.g., race, ethnicity and gender) by asking other people about their stories and experiences with diversity issues.
- Narratives are a powerful method of discussing and contextualizing learned experiences, and workshops in which faculty participants share their experiences with their peers through narratives has been shown to be very effective in getting faculty members to recognize issues.

### **Method and Background**

The context of this diversity research was situated within a larger qualitative study of future engineering faculty at a large, public research university on the West Coast. These future engineering educators created teaching portfolios during an 8 session workshop in which they had the opportunity to examine, reflect, and revise their beliefs and goals as teachers through a series of exercises, writing tasks, and group discussions. In the first of two workshop sessions

**Most participants had thought about diversity issues, had formed opinions or strategies for addressing diversity in engineering education, and were cognizant that diversity issues can be highly sensitive and chose their words carefully when discussing diversity issues.**

about diversity, graduate students and post-docs were asked to write a diversity statement after a facilitated discussion about diversity issues in engineering education. In the subsequent session, they shared these written statements and discussed them with other workshop participants in a peer review activity.

After the conclusion of this workshop, participants underwent semi-structured interviews for an hour about the processes that they used in constructing their teaching portfolios and the outcomes and impacts that creating a teaching portfolio had on them. In this study, we do not focus on the written diversity statements themselves, but focus the analysis on the exit interview data. In this portion of the interview transcripts, participants reflected about the processes they used to create their diversity statements and their thoughts about diversity issues as related to teaching engineering.

We purposefully selected four interviews from the larger dataset in order to characterize the various attitudes, beliefs, and conceptions of diversity held by participants. We first used a case study analysis to characterize each participant, then used thematic analysis to identify themes related to diversity. The core of this analysis was to characterize how these study participants thought about diversity as it relates to engineering education and where and how they formed their ideas.

### **What We Found**

All four participants represented below were in departments within the College of Engineering. Two participants were female and two were male. At the time of the interviews, two were post-doctoral associates and two were advanced PhD students. Two participants mentioned that they were members of, as one participant described it, “over-represented minority groups,” and two were Caucasian.

### **Findings I – Case Studies**

Participant YI104: Writing the diversity statement helped YI104 better understand his feelings about diversity. He classified diversity as a service responsibility and as ways to handle diverse groups of people in the classroom. YI104’s diversity views were greatly influenced by a childhood experience that caused YI104 to treat everyone the same regardless of any differences. He considered everybody to be American and therefore held to the same standard.

Participant JI102: JI102 had a negative experience during a university-wide workshop discussion about diversity where a panelist misunderstood what she was trying to say, then reacted harshly to JI102. The teaching portfolio workshop allowed her to discuss her previous experience and offered a sense of comfort, support, and encouragement. JI102 was ultimately pleased with her diversity statement and claimed that writing the diversity statement was challenging, interesting, and a really positive thing to do.

Participant YI110: YI110 focused heavily on the aspects of diversity related to different learning/teaching styles and on student needs at various levels of experience. He recognized that all students have different needs and identified distinct differences between undergraduate and graduate students. YI110 was passionate about working with and helping minority students. YI110’s experience as, in his own words, “an over-represented minority” influenced his perspective and made him more aware of opportunities and situations surrounding diversity. He stated that people shouldn’t even notice differences between people and that all people should have a sense of belonging within the engineering community rather than feeling excluded.

Participant YI105: The teaching portfolio workshop caused YI105 to think more about diversity and become very conscious of how her teaching statement and her diversity statement were complementary of one another. After writing her diversity statement, she edited her teaching philosophy statement so that the two documents were complementary to each other. When writing and talking about her diversity statement, YI105 was cautious of her words. When people did not use “politically correct” vocabulary during these other discussions, she felt surprised.

## Findings II – Themes

Three main themes that arose from this in-depth study included: 1) the use of narratives/story telling to describe participant views of diversity; 2) the self reporting of a critical incident (positive or negative) involving diversity; and 3) the use of politically correct terms when talking about diversity.

*The role of narratives.* When discussing writing the diversity statement, many participants used narratives to describe their diversity views. When describing their personal stories, the participants allowed the interviewer to see more closely the ways in which their diversity views were shaped. The use of narratives was most noticeable for those participants who discussed a critical incident that impacted their diversity views.

*The role of critical incidents.* Several participants discussed how a life incident impacted their views on diversity and how that incident in turn influenced how they responded to diversity issues in and out of the classroom. One participant’s experience occurred when he was a young child while another person had a life changing experience when participating in a diversity workshop. These critical incidents impacted these future engineering faculty members’ attitudes, beliefs, and conceptions of diversity.

*On being PC.* Negative experiences with diversity influence each person differently; therefore, each person has to deal with the situation in their own way. Participants frequently described being politically correct when discussing writing the diversity statement.

The data suggest that most participants had thought about diversity issues and had formed opinions or strategies for addressing diversity in engineering education. Some participants shared narratives in which they described critical incidents that shaped their attitudes, beliefs, and conceptions of diversity through these personal experiences. All participants were cognizant that diversity issues can be highly sensitive and chose their words carefully when discussing diversity issues.

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