Diversity and Inclusion in Chemical Engineering Education

Cheryl Bodnar, Arthur Felse, and Phil Wankat

Engineers are being called upon to solve many of society's ever-increasing challenges. In many technical fields the low-hanging fruits have been plucked and creative solutions are required to solve the problems at hand. Creative thought can be at its best only when individuals with diverse life experiences participate in the process. All individuals irrespective of differences in gender, race, ethnicity, sexual orientation, socio-economic background, age, etc., bring invaluable contributions to the engineering profession. It is crucial that we address the social and historical barriers that have prevented or marginalized underrepresented minorities in engineering education, so their life experiences become available as practicing engineers to develop creative solutions to intractable problems.

Engineering education and the engineering profession are sorely lagging behind in diversity. Although diversity has been recognized as an issue to improve upon, we haven't moved the needle very far in the past 20 years. Most faculty members recognize the need for diversity in engineering education, but few see it as a pressing or critical issue. Diversity and inclusion are not often considered to be "'mission critical"; it is not an issue that keeps us awake at night. Therefore, broad-ranging conversations and debates on the benefits, challenges, and best practices for diversity and inclusion in engineering education are immediately needed.

Several groups and individuals are working hard to improve diversity in engineering education. Professional organizations such as ASEE and AIChE, and many engineering colleges, have started commendable initiatives to improve diversity. But work to improve diversity has been done by a select group of individuals involved in diversity matters. To make diversity a crucial element of engineering education, it is important to integrate diversity into everyday functions, rather than treating it as an issue that will be handled by a separate unit within the university, *i.e.*, diversity initiatives should be decentralized with a central support structure.

The front line for diversity occurs in each engineering course every day. Diversity is enhanced if the classroom environment itself is inclusive where everyone feels comfortable and believes they are respected and listened to. Unfortunately, we all have preconceptions (implicit biases) that impact how we see things and can make a class less inviting for some students than for others. The papers in this special issue will provide you with proven methods to make your courses more inclusive every day.

The scientific/engineering norm is to leave emotion out of papers. However, leaving a major and/or a school because one does not fit in hurts and costs money and time. Feeling isolated or that one does not belong hurts. There is a human dimension and a moral dimension that are often missing in engineering discussions of diversity.

When your daughter, who can strike out every boy in Little League, is not allowed to play; or your son, who wants to become a male nurse, is afraid of the ridicule attached to the position; or you are passed over for a well-deserved promotion because you are too young or too old; you will understand the human price of discrimination—it hurts and causes emotional distress. The same distress happens when students are given the message in class after class that they are not qualified and are not wanted in engineering. Deliberately sending these discriminatory messages is unacceptable. Unfortunately, because of our implicit biases, we may be sending these same hurtful messages daily without realizing it.

The time to start working to create an inclusive engineering education culture is now. The working group is you and everyone else in your department—faculty, staff, and students. It is only through working together and learning from one another that we may ever truly change the culture and make engineering education equitable and inclusive. ❏