



Transforming Culture in
Engineering Education

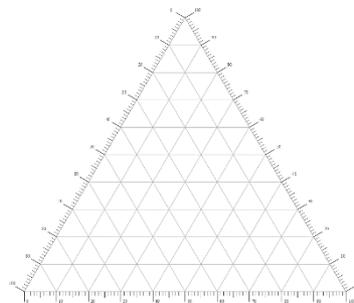
NAE Forum on Proposed Revisions to ABET-EAC General Criteria on Student Outcomes and Curriculum

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Critique the Alignment of Proposed Criteria 3 and 5 Relative To:

1. Efforts to foster inclusiveness in engineering profession—Engineer of 2020
2. Entry level needs of the practice today—IBM, IDEO
3. Future expectations for BSEs—Forbes Insights and ASEE CMC Attributes of a Global Engineer
4. Forces: Technical, collaborative problem solving, intercultural sensitivity



1. Efforts to Foster Inclusiveness

Aspiration #6 of 10 - Engineer of 2020

“We aspire to an engineering profession that will effectively recruit, nurture, and welcome underrepresented groups to its ranks.”



Alignment with Aspiration to Welcome Underrepresented Groups? None

- Criteria 3 and 5 do not address any part of this aspiration.
- Engineering college cultures are rarely inclusive, often uncivil for those who are not straight, white, men.
- Biases--gender, race, social class, ethnicity, and national origin--permeates every node in the system: standardized tests; admissions practices; pedagogy; and student and faculty academic/ social culture.

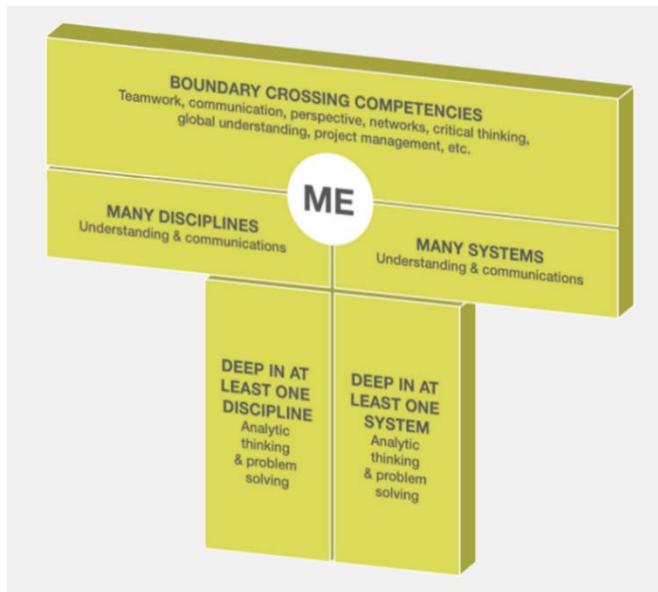
Inclusion and Diversity: Much Effort, Mixed Results, Widespread Challenges

1. Medtronic: “NEED minority engineers in clinics.”
2. Chairs: “women are the best students—they leave.”
3. “Your students are a liability in my company.”
4. “In labs, the boys rip the tools out of my hands...”
5. “The prof won’t meet with girls—I bring a boy along.”
6. “There was a professor who called all the black women students by the name of the woman janitor. I will send no money until he is gone.”
7. “That faculty roast is full of firing offenses!”

2. Entry Level Needs Today: IBM and IDEO-“T-Shaped” Skills

T-Shaped Skills

Jim Spohrer, Global
University Programs IBM



Tim Brown, CEO IDEO

Vertical

- Depth of skill-ability to contribute to creative processes

Horizontal

- Disposition for collaboration across disciplines
- Empathy, active listening, EQ
- Enthusiasm for, and ability to build on other's ideas

Alignment with Entry Level Need for “T-Shaped” Engineers? Weak

- Criteria 3 and 5 have a primary technical focus.
- Criterion 4, “an ability to communicate effectively with a wide range of audiences” does not fully capture the importance of this competency.
- No mention of KSAs or disposition related to effective collaborative problem solving.
- “...able to participate in diverse, multicultural workplaces” is a low expectation and does not appear in the criteria themselves—just the preamble.

3. Future Needs Expressed by Industry: Global, Strategic, Inclusive, Diverse

Forbes Insight 2011, Global Diversity and Inclusion

- “Diverse and inclusive workforce is crucial for companies that want to attract and retain top talent.”

ASEE CMC Attributes of a Global Engineer

- 20 attributes; 5 groups:
- Technical
- Professional
- Personal
- Interpersonal
- Cross-cultural

Alignment with Future Industry Needs

Global Cultural Competence? Weak

- The focus of future needs is global intercultural competency.
- The criteria have one only reference to global contexts.
- They do not envision preparing students for contributing to innovation and business performance in an inclusive, diverse, global, technical ecosystem.

Observations on Content

- Criteria 3 and 5 reflect a significant emphasis on technical outcomes over increasingly critical interpersonal and collaboration outcomes.
- Neither today's employer needs for "T-shaped" knowledge, skills, abilities nor future needs for engineers who can contribute in a complex, global environment are addressed well.

Observations on Impact

- The proposed criteria do not articulate outcomes that will propel engineering programs to work toward preparing students for the needs of existing-- or future employers. They appear to reflect 20- to 30- year old business environments.
- These criteria do not help ABET perform or contribute to its reputation as a far-sighted global leader in engineering education.
- The proposed criteria do not make sufficient forward progress to warrant adoption.



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