Accepted, Full Paper to be presented at American Society of Engineering Education Conference, Design in Engineering Education Division, 2021

Culturally Responsive Engineering Education: Creativity through "Empowered to Change" in the US and "Admonished to Preserve" in Japan

Xiao Ge[1], Daigo Misaki[2], Nanami Furue[3], Chunchen Xu[4]

1. Mechanical Engineering, Stanford University
2. Mechanical Engineering Systems, Kogakuin University
3. School of Management, Tokyo University of Science
4. Graduate School of Business, Stanford University

Abstract:

Creativity is an indispensable part of many engineering courses. However, with flourishment of global collaboration in various engineering classrooms and best educational practices being replicated across cultures, there are not many curriculum interventions that are originated from students' diverse cultural needs. When cultural differences are (unintentionally) ignored, students may get culturally biased grades and undergo psychologically difficult times. For instance, Japanese students coming to a U.S. university for a co-final presentation with their U.S. student partners may get ill-evaluated for a lack of articulation on how their ideas break through the status quo, which is considered desirable in Japan (preservation-orientation) but not so in the U.S. (change-orientation). This is problematic given that student evaluation is less based on traditional exams of fundamental science knowledge, but rather increasingly subjected to culturally-shaped subjective experience.

The paper is centered around the idea that engineers are motivated by the cultural values with which they identify. In the U.S., the motivation to promote change is widely held to underpin the generation of new ideas and value creation. In contrast, preservation is perceived demanding but taken very seriously in Japan, and change from this perspective can be seen as an unconstrained, irresponsible mission that requires less effort.

The paper empirically examines the cultural dimensions of creativity in engineering education, specifically how engineering students' motivations for creative problem-solving are different in the U.S. than in Japan. A cross-cultural survey study was run to test the hypotheses that Japanese (U.S.) engineers are more (less) motivated to create new ideas when they are asked to preserve rather than change something. We will share the encouraging preliminary results and discuss implications.

Engineers across different cultures have the capacity of both – create to change, and create to preserve. But different cultures emphasize different values. If engineering educators (and managers at organizations) of a certain sociocultural context celebrate their cultural values and restrict others, either consciously or not, this would put people with different values at disadvantage. With the salient power dynamics between educators (managers) and students (junior employees), this means alienation, misjudgment and disconnection. The paper underlies the importance for educators to learn about the different cultural forces behind different engineering behaviors. The research contributes to the cross-cultural literature of engineering education.