# Chapter 83
# Addressing Cultural and Gender Project Bias:
## Engaged Learning for Diverse Student Cohorts

**Jennifer Loy**
*Griffith University, Australia*

**Rae Cooper**
*Griffith University, Australia*

## ABSTRACT

*Engaged student learning is based on creating significant learning experiences for every student. Attracting a more diverse student body into Engineering requires a re-evaluation of the conventional project topics that dominate the discipline. Recognising and addressing cultural and gender bias in the development of project work allows for the education of Engineering faculty on the development of a range of project work opportunities that support the learning for a more diverse cohort. The selection of set project work has the potential to negatively impact the learning experience of minority students. This chapter considers the elements influencing set project work and provides strategies for understanding cultural and gender bias, and for redesigning project work that provides for a more diverse cohort.*

## DRIVING DIVERSITY

It is most beneficial to consider all students as individuals and provide an education that caters to a full range of personalities, interests, backgrounds and social groups. In supporting diversity, there can be an underlying assumption that the driver is for an equality defined as "anonymity" within the cohort. Many of the strategies suggested in learning and teaching publications, for example on group work, advocate randomization as a way of ensuring that all students are treated equally (Race, 2006) and there is an emphasis on language that does not differentiate between students. However, this homogenization both assumes a balanced cohort profile as a starting point and that the minority should be always striving to

DOI: 10.4018/978-1-5225-6912-1.ch083

become the "same" as the majority. In practice, isolating minority students within a dominant majority will not provide them with equality, as their voice will count even less as individuals spread throughout a dominant group, than if they were grouped together. Similarly, providing all students with the same project work and assessment mechanisms does not provide equity if those tools bias a particular students" learning preferences over another and not support the development of diversity that the future of the profession needs to provide the balanced workforce. The argument that the outcome will be a spread of marks, with all having an equal chance, is superficial in that it does not take into account whether the dominant majority is repeatedly succeeding over minority groups. More fundamentally, it supports the notion that minorities with diverse learning preferences should adapt to suit the preferences of the dominant majority. This further sustains the existing paradigm.

According to scholarship on learning and teaching, Bloom's definition of deep learning is required in order for students to genuinely gain an understanding of any subject. This applies to engineering education as much as for any other discipline—arguably perhaps more so because of the need for engineers to understand the broader implications of their work for the development of viable, rigorous, systems outcomes for specific tasks. Leaders in educational research argue that for this to be achieved, students need to be actively engaged in their learning. Dee Fink (2013) describes this as the need to provide significant learning experiences for individuals; that is, activities that they can each personally relate to.

This is without doubt a challenge, and particularly for a discipline with an inherited body of knowledge and practice that has evolved very specifically for a dominant majority. Yet the drivers here are not only about improving learning and teaching, or even about supporting diversity for its own sake, they also relate to changing practice in the profession as a whole and the need to evolve the discipline to encompass more divergent thinking and practices as professional engineering challenges are become more complex and interdisciplinary. In addition, as engineering outcomes grow with the perpetual development of new technologies, the range of potential "end users" is increasing in diversity, requiring an understanding of the complexities of society in the global community. By addressing the aim to support diversity in the classroom, engineering academics are also opening the door to a rethink of the assumptions and practices that the academic discipline is dominated by and that may be in need of revision in response to the changing requirements of an evolving industrial, social and economic landscape.

## ENGAGED LEARNING

Educational theory contends that engaged students, those who feel empowered through their learning, are more likely to achieve deep learning outcomes than those who are not (Weimer, 2002). For engineering education, this can be more challenging than for some other disciplines because of the way it has traditionally been taught. Essentially, students tend to be taught the fundamentals in the early years of their degree, in preparation for the application work they engage in once those fundamentals are in place. Dee Fink (2013) argues that for authentic learning, students need to always be involved in learning experiences that have personal significance for them. This becomes a particular challenge in the context of engineering education. It is in direct opposition to the dominant learning pattern where students must understand the engineering science that provides the underpinning for the discipline prior to applying that knowledge in a particular scenario. However, engineering educators are increasingly working to provide practical learning experiences earlier in the degree where students can be involved in active learning and engage in Kolb's (2014) learning cycle. What there is less evidence of, are challenges to the