Chapter 93
Widening the Industrial Competence Base:
Integrating Ethics into Engineering Education

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ABSTRACT

Amidst the macroeconomic, social, and industrial trends altering the industrial operating environment, calls have been made to shift attention from specialized but narrow technical content of engineering education to a broader competence base that better accommodates societal demands. This chapter focuses on the micro-level ethical conduct that materializes in face-to-face interaction in engineering teams. The chapter serves three aims: first, it defines the key concepts employed in the discussion. Second, it offers an account of the worth and impacts of investments in emotive skills in the engineering world. Finally, it describes a pedagogic experiment in incorporating ethics into engineering degree studies at Aalto University, Finland. The ultimate objective is to propose a teaching practice that would turn the currently marginal attempts to include ethical topics in engineers' syllabi into a mainstream mindset and philosophy that dictates decisions and drives conduct in future engineering communities.

INTRODUCTION

In the contemporary society, ethics has slowly morphed into a substance matter of its own right, bridging the gap between engineering education and industrial reality. Social legitimization no longer serves as a mere marketing argument but as a requirement pervading the operations of all engineering sectors and promoting profitability, access to resources and chances of survival (Surroca et al., 2013). Besides societal trends causing a push toward engineers' wider social understanding and responsibility, industrial crises such as those of Enron and WorldCom (Welch & Ordonez, 2014) have drawn public and legislative attention to corporate governance and ethics issues. This has created a significantly more constrained regulatory operating environment than ever before, forcing organizations to acquire a social license needed to operate in their community (Huang, 2010). As an

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incentive, the supposed positive link of socially responsible operations with the bottom line has strengthened the business case for ethics (Smith et al., 2009).

Further, incidents of worker dishonesty, theft, and fraud have exploded research on employee behavioral ethics (Welsh & Ordonez, 2014). Due to these trends, calls have been made to shift focus from specialized but narrow technical content of engineering education to a broader competence base, one that would perhaps prepare engineers as full-fledged working-life professionals. This should not be regarded as a mechanical response to external demands, rather as a natural evolution of the engineering profession to accommodate societal changes (Didier & Derouet, 2013).

Such accommodation materializes on two levels. On the micro-level, individual engineers are expected to demonstrate morality, autonomy, responsibility, empathy, critical thinking and self-regulation in their decisions and conduct. On the macro-level, engineering as a profession is to collectively build a society that meets the requirements of the economy, ecology, and ethics (Korhonen-Yrjänheikki, 2011; Bolanakis et al., 2010). Instead of representing merely themselves or their own organizations, post-modern engineers are beginning to perceive their role as global problem-solving citizens (Lappalainen, 2011; Didier et Derouet, 2013).

With increasing consensus, these traditionally humanistic concerns are gaining ground among engineering educators and yet the institutional atmosphere in some technical universities still conceives these themes as second class. The shift in education foci is further hindered by many engineering students being indifferent to and ignorant of non-engineering topics. Other practical barriers include lack of expertise in social topics among teaching faculty, together with non-existent related pedagogy (Boni & Berjano, 2009).

To respond to these calls and to fill the related pedagogical gaps, this chapter focuses on the micro-level ethical conduct that materializes in face-to-face interaction in engineering teams and between individual engineers. Such an approach necessitates discussion about self-regulation, empathy, and social skills, popularized as emotional intelligence (EI). The aims of the chapter are three-fold. First, to invite those who are uninformed about emotive competences into our discussion, I begin with a definition of each key concept employed in the discussion. Second, as motivation, the chapter continues with an account of the worth and impacts of investments in socio-emotive skills in the engineering world. The final section describes a pedagogic experiment in integrating ethics into an engineering degree course at Aalto University, Finland. The ultimate objective of this chapter is to propose a teaching practice that would turn the currently marginal attempts to include social and ethical topics in engineers' syllabi into a mainstream mindset and philosophy that dictates decisions and drives conduct in future engineering communities.

Societal Mega-Trends Pressing for Ethical Thinking and Action

As an unwanted by-product of the human capacity for accelerating productivity, postmodern individuals growingly gather goods and material to bolster their feeling of prosperity. The induced ecological problems related to air, water, and soil degradation challenge industries to redesign their manufacturing processes in pursuit of production technologies that consume less energy. In addition to environmental concerns, today's way of life and reckless use of natural resources for hastened manufacturing elicit questionable social and intellectual tendencies in consumers, thereby inducing mental and societal problems (Filipkowski, 2011). Resultatively, the discussion about ethics is colored by concepts ranging wide from sustainability, ecological footprint, greenness, water footprint, diversity management and human equality to so-