

# Chapter 14

## Integrating General Education Courses into Engineering Curriculum: Students' Perspective

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### ABSTRACT

*General Education Courses (GEC) are natural sources of “soft” skills in engineering curricula. Such skills are becoming increasingly important if the graduates are to operate successfully and be fully integrated in their workplaces. The importance of “soft” skills is fully recognized by engineering accreditation boards. The chapter reports on the engineering students’ reactions to the introduction of GEC at the University of Botswana (UB). The position of engineering students’ on the issue of GEC is not very clear. The questionnaire administered to final year students in all engineering programmes at UB gave a mixed response. On average, there were 25% neutral answers to the questions in the survey. The fact that on average one quarter of all graduating engineers did not have an opinion about GEC and their implementation was very disappointing and showed the general problem of students not being interested in that area of their study. The survey showed that students were not fully convinced that GEC were either important or relevant to their future career. The fundamental question on whether GEC were a necessary part of engineering programme brought almost an equal split between positive, negative, and neutral answers, with a slight advantage of positive answers (37%) over negative ones (33%). The students were equally split (36% positive and negative answers) on the question of whether*

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*GEC were relevant to their career paths. A small majority were of the opinion that GEC should not be retained. As it is critical that elements of general education are retained in the engineering curriculum, it is necessary to convince the students of the importance of those elements of the study. An effective advisory students' system is recommended starting with general discussions on engineering practice within departments led by senior members of staff. Also, an introductory course in engineering or any course directly dealing with engineering practice is recommended.*

## INTRODUCTION

Modern societies where knowledge and global economies are increasingly converging have seen a trend that undergraduate students should receive a broad education in a range of areas and not only in disciplinary courses for a given course of study (Harvard College, 2005). In engineering the subject specific courses are treated as core and offerings from other disciplines such as business, law, and the humanities are required as Complementary Studies (CS), electives, or General Education (GE). The primary motivation for these being “to broaden the knowledge of the graduates” (ECSA, 2004; University of Botswana, 2002); or as an extension of liberal education, which “is a process of learning and teaching that postulates the value of “disinterested” learning—knowledge for self-development—aside from any specific informational or use value the learning may also supply” (Harvard College, 2005).

The accreditation requirements for engineering programmes impose two sets of skills; “hard” engineering skills and also “professional” skills, which are often referred to as “soft” skills. Those skills include communication, teamwork, professional and ethical responsibility, life-long learning ((Shuman, Besterfield-Sacre, & McGourty, 2005).

General Education Courses (GEC) are natural sources of certain “soft” skills in contrast to “hard” engineering skills which are taught through compulsory coursework (Shuman, Besterfield-Sacre, & McGourty, 2005; Dowling, 2006; Rubens, 2007). GEC appear, in one form or the other, in all engineering curricula in continental Europe (Bankel, 2005), UK (Levy, 2000), North America

(Mathur & Venter, 2000; Fisher & Mahajan, 2003; Ryan-Bacon & Delisle, 2000), and also in new engineering educational systems (Johari, et al., 2002; King, 2008). “Soft” skills are indeed necessary to prepare students to function efficiently in workplaces. It is recommended that they can be introduced into the engineering curricula in the form of business-oriented project work and significant work experience in engineering settings (Spinks, Silburn, & Birchall, 2006).

The traditional assumption is that a graduate from a rich blend of academic mix would be ready for the integrated world of work beyond the lecture hall. Advertisements for fresh graduates often seem to confirm this expectation or demand of a multi-skilled employee by emphasising the advantaged position of candidates who understand the business imperatives of work settings in addition, of course, to the core engineering skills expected of any engineering graduate.

However, the status and recognition of “soft” skills in engineering fraternity has not always been appropriate. Even students themselves are not usually appreciative of the importance of non-technical topics in their curricula. Sadly, the same attitude is shared by some teaching staff. In that respect there is a need for cultural change so both students and lecturers would recognize the importance of “soft” elements in academic curriculum (Florman, 1997).

Since 1990 the University of Botswana (UB) has been offering four degree programmes in engineering (all leading to a B.Eng. degree) in: Construction Engineering & Management, Civil Engineering, Electrical/Electronic Engineering and Mechanical Engineering and also Bachelor

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