Framework of Competencies for Internationalizing Engineering Curriculum

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ABSTRACT

The globalization of corporate activities requires corporations to function through their international network of subsidiaries and has major implications for engineering education. Hence, it is imperative that engineering students have a global view of engineering practice because engineering solutions have impact across geographical borders. The cultural, geographic, social, and economic realities of the global economy require that modern engineers be competent in foreign language and culture in order to succeed in the global business environment. Equipping engineering students with social and cultural competencies would provide students, who may potentially work on international assignments, with the ability to collaborate with foreign nationals and successfully function in a global engineering environment. This paper examines the impact of globalization on engineering and technology education and discusses the competencies required to ensure that engineering and technology students are adequately prepared to make them more effective in foreign environments.

Keywords: Engineering, Global Competence, Globalization, Internationalization, Technology Education

INTRODUCTION

Global corporate activities are of particular importance to the creation of competitive advantage for firms (Duderstadt, 2008). An increasing number of US manufacturing jobs, including high-end and highly-skilled jobs, are outsourced...
to countries with substantially lower labor costs in order to achieve cost savings and competitiveness. Moreover, the impact of globalization and increased cross-border mobility of engineers and technologists has profoundly affected engineering and technology education. However, there is a growing concern that the U.S. engineers, technologists, scientists, and researchers are not prepared for professional practice in the global workplace. The rapidly global economic environment makes it imperative that engineering and technology educators must ensure that their graduates are prepared to be productive global citizens and professionals by incorporating international experiences in the undergraduate curriculum.

The current global economy requires that the preparation of students for engineering and technology practice include a global perspective. Thus, there is a need to broaden engineering and technology education so that future engineers and technologists will be prepared to work in the global workplace. In 1996, the Accreditation Board of Engineering and Technology (ABET) adopted Engineering Criteria 2000 (EC2000) for accrediting undergraduate engineering programs. EC2000 specifies 11 student learning outcomes that emphasize the development of students’ mathematical, scientific, and technical knowledge, as well as other professional skills, such as problem-solving, effective communication, professionalism and ethics, global competency, and teamwork (ABET, 2012). Graduates of engineering programs are expected to demonstrate the following objectives:

1. An ability to apply knowledge of mathematics, science, and engineering;
2. An ability to design and conduct experiments, as well as to analyze and interpret data;
3. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
4. An ability to function on multidisciplinary teams;
5. An ability to identify, formulate, and solve engineering problems;
6. An understanding of professional and ethical responsibility;
7. An ability to communicate effectively;
8. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;
9. A recognition of the need for, and an ability to engage in life-long learning;
10. A knowledge of contemporary issues;
11. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Ainane, Pertmer, and Schmidt (2002) observed that the more radical advance of EC2000 is the inclusion of non-technical criteria. Specifically, outcomes (d), (f), (g), (h), (i), and (j) emphasize teamwork, professionalism and ethics, effec-
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