Chapter 4
Empowering Women in STEM: Embedding STEM in K–12 Education

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ABSTRACT

This chapter covers a project that was part of an I3 (Ideas, Innovation, Invention) challenge within a global engineering, junior course at University of Mount Union. The course exposes engineering students to global societal challenges and their solutions. Of importance in this project is the need to boost numbers in the STEM (Science, Technology, Engineering, and Mathematics) and the need to increase diversity. With this in mind, the team developed and tested five different activities that involved different areas of STEM that were both fun and didactic in nature. Each activity had an associated module to allow for assessment of understanding. An orange buoyancy module, a strength of paper module, a soil erosion module, a simple circuit module, and a simple electric motor module were developed. They were tested on K-5 students at Washington Elementary School, Alliance, OH and on K-5 students at Ollas Arriba Elementary School, Panama City, Panama.

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INTRODUCTION

The project conducted by the University of Mount Union engineering students in EGE 320 International Engineering Field Experience focused on diversifying engineering, specifically the empowerment of women to allow for a greater accessibility and availability of STEM-related careers. To meet the constantly evolving global economy and workforce demands within and between other nations, STEM is needed to further develop modern technology to prevent a country from falling behind in a technology-driven society. The idea behind this research was to develop methods and approaches that introduce students to STEM at a young age. Engagement and exposure to STEM at a younger age as well as maintaining a student's interest is critical in whether a student goes into STEM fields and careers or drops out completely.

Careers in this field are priority because too few college students are pursuing degrees in these fields. It is argued that with the creation of STEM-related programs, innovation and the establishment of more jobs will follow, and consequently, make a country more competitive in the global economy. An important objective of this project involved the creation and implementation of gender-neutral engineering-related activities used in a classroom setting. These activities were designed to be enjoyable and engaging for many students with the expectation of exposing each student to the world of STEM-related fields. Since a general interest in STEM related fields will largely contribute to a better economy and society for all, it was favorable that this project was feasible and easily implemented into primary and secondary levels of education throughout the world.

In order to assess the empowerment of diversity within engineering, kits were created by the team that were implemented within classrooms. The kit that was designed featured five different lessons taught students ideas from electrical engineering, structural engineering, environmental engineering, mechanical engineering, fluid mechanics, and physics. It featured products that were easily accessible, inexpensive, safe, and user friendly. The kit explained to the adult the background behind the lesson, the procedure the students should follow, and the concept that should be explained to the students following the completion of the experiment. These short, engaging, STEM based activities were a fun way to engage kids of various ages. Throughout this chapter, the five modules used will be explained more in depth along with the results found, and background research done to get to the conclusions.