

61a Teaching Generic Skills through Engineering Competition Design

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In an elective course, junior level engineering students developed and delivered a hands-on engineering competition to Junior- high school students. The program was successful in achieving a number of objectives. Firstly, our students were able to influence school students before they make relevant subject choices enabling the Engineering profession to gain greater exposure and perhaps attract better students. Furthermore, through developing and trying to teach these high school students, our juniors were better able to grasp the technical material and were able to acquire good generic communication skills. Finally, as the design competitions were geared directly to the school curriculum, teachers were given ideas and support directly relevant to the board of education goals.

COURSE OUTCOMES

At the end of this elective, students were able to: • Investigate, identify, design, develop, implement, and evaluate experiential activities for non-engineers which reflect engineering practice; • Develop skills in the management and use of personal and material resources and processes; • Effectively communicate engineering principles and practices to others; • Present their work in written, graphical, and oral forms.

COURSE OUTLINE

Students worked alone or with a partner to develop an educational unit for Year 9 High School Students which involved them in some aspect of engineering science or technology and which, at the same time, raised an awareness of, and an interest in, engineering. The college students were expected to decide on the format of delivery as well as the subject and content under academic supervision and in consultation with cooperating science teachers in schools. The units were designed with due regard to the teaching and learning process and to the Year 9 curriculum proscribed by the Board of Education. Activities undertaken as part of the units reflected, wherever possible, aspects of professional engineering practice.

The elective consisted of an initial 2-hour Workshop in which we worked as a group to develop ideas and assist in how to develop a proposal. The written proposal was submitted to the cooperating Science Teacher for feedback prior to confirmation of acceptance by the academic advisor. Having the Science teachers involved was beneficial to both the college students and the participating high school students.

The activities in the unit were motivating and authentic. Motivation comes from choosing activities and goals that are meaningful and which people care about. Authenticity comes from involving students in “real” work directed towards “real” products or goals. Finding parallels in school activities with professional engineering practice is an obvious way to build in authenticity.

The units had to be flexible in process and goals to allow for variations in student abilities and motivation, and in the resources that schools were willing to provide. Plans were made for potential problems that might occur.

Self-direction in the students was encouraged. They were guided through activities by answering questions, setting challenges and providing feedback, thereby helping them to achieve the goals of the activity.

Once the proposal had been approved, the students had to liaise with the Science teacher to arrange a time to deliver the unit at the allocated school (potentially their alma mater). Assessment was based on the content, presentation and a final report.

The presentation will describe typical competitions developed as well as an analysis of the learning outcomes of the high school students.