Mini Workshop - Exploration of the Ethical Development of Engineering Undergraduates

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Abstract - This workshop will be conducted by members of the Exploring Ethical Decision-making in Engineering (E3) Team. The workshop will be an interactive exploration of the meaning of “ethical development” for engineering students. We will introduce participants to a variety of teaching strategies and co-curricular activities that may enhance a students’ ethical development as identified through the Survey of Engineering Ethical Development (SEED) project. The SEED project was a multi-year national holistic assessment of ethics education in engineering that included measurements of a students’ ethical knowledge, ethical reasoning, and ethical behavior. The investigation included 19 diverse partner institutions and over 4000 engineering undergraduates. In addition to the presentation of research results and analysis, the audience will be asked to share personal experiences and discuss strategies for adapting identified best practices in different institutional settings. Finally, breakout groups will identify challenges and opportunities for improving ethical decision-making on a national scale.

Index Terms – Assessment, Ethics in Engineering, Ethical Development

INTRODUCTION

Engineering programs and colleges rely on a variety of curricular and extracurricular experiences to promote their students’ personal and intellectual development. However, educators and campus leaders are not certain which experiences have the most positive impact on students’ development, in this specific case, a student’s ethical development. In other words, how do colleges get the best value for allocating campus resources towards the development of students? In response, the Exploring Ethical Decision-Making in Engineering (E3) Team addressed the need for improved understanding of ethics education by conducting the Survey of Engineering Ethical Development (SEED).

The E3 Team represents a group of engineering educators and educational researchers from four institutions (California Polytechnic in San Luis Obispo, Carnegie Mellon University in Pittsburgh, Lawrence Technological University in Southfield, MI, and the University of Michigan – Ann Arbor) who have worked collaboratively for more than a decade to understand the underlying causes of academic dishonesty in engineering undergraduate populations and the relationship between academic dishonesty and unethical behavior in the professions. The team was especially motivated by decades of others’ work showing that engineering students were among those most likely to report frequently cheating. The E3 Team has conducted four major investigations, including the SEED project, as detailed on the team website. (http://www.engin.umich.edu/research/e3/index.html).

The SEED Project is a multi-methods research project funded with a grant from the National Science Foundation. The project included identifying 18 diverse participant institutions from across the United States, which makes this the first nationwide assessment of engineering ethical development. Visits were made to all partner institutions to conduct interviews and focus groups with students, faculty, and administrators. Participants discussed how ethics is incorporated into the students’ experiences at their institution, how students identify and approach ethical dilemmas, and how their institutional culture affects students’ ethical development, discussions focused on both antisocial (e.g. cheating) and pro-social (e.g. volunteering) behaviors that could influence ethical development.

Campus visits were used to develop the SEED instrument. The validated and tested instrument measures student characteristics and formal curricular and co-curricular experiences as well as three components of ethical development: knowledge of ethics, ethical reasoning, and ethical behavior. A total of 3,914 undergraduate engineering
students at 18 sites completed the SEED instrument in the spring of 2010. As of February of 2011, we have completed preliminary analysis of both the qualitative interview/focus group data and the quantitative SEED instrument data. All measures of ethical development varied across institutions and within institutions by class year because of differences in a students’ exposure to ethics instruction. As such, the survey is able to measure ethical development and differentiate between approaches. In addition, some approaches to ethics instruction (e.g. presentation by a professor in an introductory engineering course) were common across many of our partner sites, while other innovative approaches (role playing in case studies) were more institution specific.

Findings suggest that the number and type of co-curricular (i.e. out of class) experiences have an important influence on ethical development. Involving students in the right experience can facilitate ethical growth and institutions can provide students more opportunities to participate in community service programs and professional organizations.

There is also an inverse relationship between ethical reasoning and satisfaction – students who have higher levels of ethical reasoning are less likely to be satisfied with their ethics instruction. One possible explanation is that students who have higher levels of ethical reasoning are more likely to apply more nuanced approaches to ethical dilemmas. These students may be dissatisfied with ethics instruction that focuses on memorizing codes and rules rather than addressing complex areas of ethical dilemmas. Therefore, programs need to establish a curriculum that spreads ethics education across the duration of the degree program and focuses on decision-making and character development at appropriate developmental levels.

Finally, the institutional culture made a difference on how students behaved and how they articulated concepts of leadership and ethics. In other words, institutions should have clear behavioral expectations from the upper administration down through the faculty/staff and to the student body. In other words, everyone needs to be on the same page when it comes to codes of conduct. It does not work if the administration preaches ethical behavior and then faculty ignore or inadvertently promote cheating by classroom policies and procedures.

In conclusion, our overarching goal is to identify and disseminate best practices for engineering education. The outcomes of this project includes a better understanding of the impact of formal curricular and co-curricular experiences on students’ ethical development and assistance for faculty and administrators wishing to improve ethical development for their students by adapting successful approaches.

ABET requires that students should “understand” their ethical and professional responsibilities. However, true ethical development requires that students identify ethical issues, generate alternative ethical solutions in a professional context, and follow through with ethical intentions. The goal of the workshop will be for participants to realize how ethical development can be emphasized and promoted in institutions of higher learning through the interactive discussion of research results on the ethical development of engineering undergraduates.

A tentative agenda includes:

- Overview of workshop objectives and the SEED project (10 minutes)
- Interactive activity on audience perceptions on what strategies will promote ethical development (10 minutes) – this activity will identify approaches currently being utilized by participants.
- Presentation of SEED results (20 minutes) – this presentation will reinforce some of the participant identified strategies and challenge others.
- Interactivity on how to incorporate results into existing curricula (30 minutes)
- Discussion on challenges and opportunities for improving ethical decision-making on a national level (20 minutes)

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