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# Ethics and the Development of Professional Identities of Engineering Students

Engineering students develop their identities as professionals through practical experiences and formal education. In this project, I addressed two questions about this development, focusing on the development of the student's understanding of professional and ethical responsibility:

- How do undergraduates in engineering develop their self identities as nascent professionals, particularly their understandings of engineers' ethical obligations?
- How can instruction in engineering ethics affect the development of a student's professional identity?

Previous studies have shown that in a course on engineering ethics, students achieve cognitive goals in knowledge and reasoning, but these studies do not indicate whether ethics courses also strengthen moral commitment: through reasoning and deliberation, an individual can determine the right action, but may lack the courage to take that action. Theoretical work in moral psychology, based on a study of moral exemplars, suggests that people act on their moral judgments with certainty when moral goals are aligned with self identity. It is logical, therefore, to pursue an investigation of moral courage through a study of identity development.

At the University of Illinois at Urbana-Champaign, undergraduates may take a full three-credit elective course on engineering ethics, ECE 216 (since renumbered 316). The course emphasizes ethical issues in engineering for individuals and organizations, rather than social policies. At the beginning of the fall 2003 and spring 2004 semesters, all students in the course completed an initial essay that responded to the following questions:

- What are the characteristics of the ideal professional engineer? What are the engineer's most important professional responsibilities? Give specific examples. Explain your reasoning.
- What people and experiences have shaped your understanding of these characteristics and responsibilities? How have they done so? Describe specific incidents or actions you have taken. Possible sources could include relatives, friends, employment, courses, student organizations, etc.
- To what extent do you feel that you have these characteristics and are prepared for these responsibilities? Why or why not? How would you know that you are a professional engineer? Give specific criteria.

At the end of each semester, for the final reflection paper, students described how their answers to these questions had changed as a result of taking ECE 216. Out of a total of 77 students enrolled in the course in the two semesters, 59 consented to participate in the study, including 9 of 10 women. To analyze the initial essays and final reflections, I classified the students' responses into a small number of categories and looked for related words within each category.

According to the initial essays, students learn about the characteristics and responsibilities of engineers from co-workers and relatives who are engineers, not from engineering courses. According to the final reflections, during ECE 216, students became more confident in their ability to identify and reason about moral problems. Students learned about specific ethical obligations of engineers beyond honesty; for example, engineers should avoid conflicts of interests and maintain confidentiality of proprietary information. Most significant, some students developed a deeper, richer understanding of professional responsibilities beyond completing assigned tasks conscientiously. Because they realized that engineers are morally responsible for social consequences of technical decisions, these students articulated a capacious notion of professional responsibility that encompasses stewardship for society and the environment.

Although engineering courses generally do not influence the development of students' professional identities, this project suggests that a course on engineering ethics could affect students profoundly. In addition, this project raises two topics for further research. First, students' responses were influenced by the particular content, pedagogy, and instructors in the offerings of ECE 216 in 2003–04. The study could be repeated with other populations of students in other engineering ethics courses. In particular, further research could identify specific course activities that most significantly influence students' thinking about the characteristics and responsibilities of engineers. Second, students expressed greater self-confidence in moral reasoning, but these self-reports might not be accurate. Thus, we have followed on this project with interviews of selected individuals—both students who took ECE 216 and students who did not. These interviews reveal how students think about their professional identities and whether, in a difficult situation, that identity will give them the courage to choose the action that they have determined is right.

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