Applying Phenomenography to Understand Practicing Engineers’ Lived Experiences About Ethics in Engineering and its Implications for Ethics Education

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Can we better align engineering ethics education with engineering practice?
1. What are the qualitatively different ways engineers experience ethical issues in their engineering practice in the health products industry?

2. What patterns of individual and environmental factors contribute to or limit an engineer’s experience of ethical engineering practice?

3. How are current frameworks of ethics education aligned with a comprehensive and situated understanding of ethical engineering practice?
1. What are the qualitatively different ways engineers experience ethical issues in their engineering practice in the health products industry?
We used phenomenography as our research methodology

- Goal: To understand the variation in how people experience a phenomenon
- Outcomes
  - Categories of description
  - Relationships between categories
We interviewed 42 engineers in the health products industry

• Six companies: medical devices, orthopedic devices, pharmaceuticals

• Used a screening survey to select for variation across nine key attributes
Number of people

Race/Ethnicity

Decline
Hispanic
Multi
Black
Asian
White

Number of people
Years in Engineering

Number of people

0-9
10-19
20-29
30-39
40+

0  5  10  15  20  25
The interview protocol asked about experiences related to ethics

• “Can you describe an experience you have had with ethics in engineering?”
• “Can you describe an experience you had, within engineering practice, that did not involve ethics?”
• “What would you say ethical engineering practice is?”
• “What ethical considerations are important to think about when practicing engineering?”
Ethical engineering practice is ...

Complying with rules and your supervisor
Producing accurate, complete documentation
Treating competitors fairly
Balancing the needs of the patient and the employer
Using judgment to balance risks
Talking with others through disagreements, beyond legal requirements
In summary …

• Professional engineers have a range of experiences of ethical engineering practice

• Our category scheme, with dimensions of variation, will help align instruction in engineering ethics with the requirements of actual engineering practice

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