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Reflections on Teaching Ethics Unethically [evidence-based practice, DEI]

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Experience Report: Reflections on Teaching Ethics Unethically [evidence-based practice, DEI]

Abstract

Engineering ethics education is essential for future graduates, yet it is often seen as a secondary 'complementary' study, it is pushed to be more 'engineering-like' through focusing on quantitative methods, it is reduced to 'rules and codes', and assessment of engineering ethics remains a mysterious process that people are willing to ignore problems within. In this paper, I provide an autoethnographical case study of my experience in my first year of teaching engineering ethics, where I engaged as an observer with another instructor's content. I provide an overview of the course, and present four main findings from a work-in-progress analysis of my weekly reflections. Overall, this research emphasizes the importance of teacher reflections to continuously observe the power and forces that are driving decisions within the academic institution, especially within ethics education.

Introduction

Ethics is essential to engineering, and worldwide is acknowledged as a skill and competency required by graduating engineers (Paul et al., 2015). However, regardless of this importance, ethical reasoning falls under a different knowledge paradigm than most other engineering subjects. Whereas mathematics and thermodynamics can *feel* like there is one right answer, ethical challenges are complex with different personal and cultural perspectives (Handford et al., 2019), often with variety of trade-offs that make it difficult to consider one 'right' answer.

Although a valued skill through most accreditation documentation, in practice—in teaching, in student perception, and even in regulation—ethics tends to be devalued in engineering classrooms (Seniuk Cicek et al., 2025), pushed to the side as a "complementary" or "soft" skill. Additionally, engineering educators are rarely given pedagogical guidance on how to teach engineering ethical reasoning skills, and therefore they often emphasize the more objective and quantitative approaches for teaching ethics; i.e. they tend to "engineer-ize ethics" (Newberry, 2004, p. 350). Most approaches to teaching engineering ethics reduce it to rules and codes, case studies, and other micro ethical analyses of calculation errors and safety factors (Bauschpies et al., 2018).

As a new faculty member who was hired to teach our engineering ethics course, I have observed and reflected on the current systems, cultures, and processes. In this paper, I reflect on the ways in which students are adeptly aware that they are getting an ethics education that does not provide them with any ethical reasoning skills. Especially for students who exist outside the dominant heteropatriarchal and colonial norms, particularly those with neurodiversity, struggle to engage in this style of ethics teaching. In essence, ethics is often taught in engineering by perpetuating normative values and cultures of engineering, which I argue to be unethical.

Positionality

I am a white, queer settler in Canada. My undergraduate education was in manufacturing engineering, and for both my MSc and PhD I conducted engineering education research, focusing on leadership and social justice respectively. I strongly believe in advocating for

engineering education to move away from technocentric approaches and to integrate more social elements, community-based solutions, and engagement in discussions on the politics of engineering.

I recently began my role as an assistant professor; however I have critically been engaged in scholarship, research, teaching, and pedagogical communities about engineering education for 10 years. This gives me unique insight into theoretical foundations and best practices, although my experience in the classroom as the primary instructor remains limited in comparison. My first assignment as an assistant professor was to co-teach an engineering ethics course, and my reflections during that experience are the primary focus of this paper.

Background Literature: Engineering Ethics Education

Ethics is core to the engineering profession and engineering identity, with significant regulation and accreditation processes ensuring education of ethics. However, learning engineering ethics requires practice and cannot easily be reduced, measured, and assessed within course learning outcomes. Here, I summarize a few key pieces of challenges that come with engineering ethics education, much of which is informed by a Chapter in the Handbook for Engineering Ethics Education (Seniuk Cicek et al., 2025) and from my thesis (Paul, 2024).

Ethics is typically seen as a less important or 'complementary' topic relative to 'core' technical content (Monteiro et al., 2017). To make ethics seem more relevant, it is often taught through 'objective' technical framings, emphasizing quantitative approaches such as decision trees and risk factors (Harris et al., 1997). Engineering is generally approached through an objective and positivistic lens; however, this belief in the applicability of rational problem-solving to ethical problems gives engineers a false sense of power and authority. 'Normative holism' (Downey, 2012) has been applied to conceptualize how the dominant engineering narrative of believing that all technological progress creates benefit to humanity causes engineers to consider that any 'engineering' they do must be for 'good.' It also becomes difficult to question ethics education and accreditation assessment, as they exist under the guise of being an analytical, systematic, and objective process that appears robust (Woolston, 2008).

In teaching engineering ethics, reducing it to "rules and codes" is a common approach, and although ethical codes are easier to teach and assess, they "may unintentionally omit ethical principles that have not been codified" (Rottmann & Reeve, 2020, p. 148). These reductionist approaches emphasize micro ethics, where cases are analyzed based on simple failures and mistakes such as calculation errors or safety factors (Perlman & Varma, 2002). Although important, emphasis on micro ethics, objective, calculative, and deterministic views imply this is the most important and that ethics can be mechanized into parts and mathematical equations (Bauschpies et al., 2018).

Additionally, ethical codes create a boundary between those inside the community who see ethics as code and those outside the community, who often interpret ethics as social justice (Mitcham & Englehardt, 2019). Those who are professional engineers and bound by the code are seen as ethical, even though the behaviours, skills, and mindsets required to enact the codes are unclear and shrouded in secrecy (Colby & Sullivan, 2008). Slaton (2012) explains: "codes of ethics that historically have urged engineers to practice only within the limits of their own

competence have rarely defined those limits clearly," which makes engineering standards and codes "virtually impossible for non-experts to apply" (p. 100).

What follows is that engineering ethics education has become a tool for promoting neoliberalism, where we prioritize competencies that promote the narrative of progress, commodification, and contributing to the economy, rather than educating for competencies that would support engineers in ethically serving society (Handford et al., 2019; Leyva, 2009; Riley, 2012). The globalization of engineering education competencies is (through institutions such as the Washington Accord) is simply domination of Western values rather than any consideration of global engineering bringing in different cultural perspectives and ethical frameworks (Anwar & Richards, 2013; Gray et al., 2009; Haug, 2003).

In the next section, I provide the context of the ethics course I co-taught, including an overview of the course content and assignments. Following this section, I take a qualitative analysis look back on my reflections throughout the term, and provide some findings on a more critical perspective of this ethics course.

Context: Ethics Course

It is important to first situate into the Canadian engineering regulatory system. As a regulated profession across Canada, the title of 'engineer' is a protected word to those who have a Professional Engineering (P.Eng.) designation. Each province sets their own regulatory requirements for obtaining a P.Eng., however typically it requires four main components:

- Approved 4-year undergraduate engineering degree.
- Four years of engineering industry experience.
- Passing an ethics exam near the end of the Member-in-Training period (typically an 80-100 multiple choice exam)
- Submission of competency assessment. In the province of Alberta, this includes demonstrating competence across 22 engineering competencies through a 1-page essay on each.

At the University of Calgary, there is one course which covers ethics and professionalism, with a strong emphasis on the requirements and regulations towards becoming a P.Eng. Students across all disciplines (chemical, mechanical, electrical, software, civil, geomatics, biomedical, sustainable systems) take the same course, titled "ENGG 513 The Role and Responsibilities of the Professional Engineer in Society". I was hired into the Sustainable Systems Engineering program specifically to teach this course, and taught it for the first time in January 2024 with a co-instructor from the Electrical and Software Engineering Department (who had previously taught the course two times). Due to an administrative scheduling error and last-minute changes, I had limited agency on the context, structure, or design of the course, and instead followed the lead of my co-instructor with their previous course structure. I also did not have any input into the lecture content, as these were all pre-recorded slides with audio. Although unfortunate, this provided me with an opportunity to observe the course format, learn from student assignments, experience assessment grading processes (including TA training), and reflect on the project management of a large-enrolment course. Now currently teaching the January 2025 semester, I am incredible grateful for the learning during this first experience.

In about 2016, the course modality changed to an online asynchronous format, where there was no scheduled course time, and students engaged with the material at their own pace. Students are required to have third-year standing or above to take the course. Given the high percentage of students at University of Calgary who participate in a 12- or 16-month internship work experience (more than 80% of students), many students complete their ENGG 513 course while working full-time on internship (between their third and fourth year of study). This allows for an excellent opportunity for them to reflect on engineering ethics and professionalism while working in industry.

The reflections analysed for this paper are from the January 2024, where just under 500 students were registered in the course. My co-instructor posted 18 content slides with audio overlay that are from the "Canadian Professional Engineering and Geoscience: Practice and Ethics" textbook (Andrews et al., 2019). This textbook and the content slides emphasize professional licensing and regulation, professional practice, professional ethics, environmental practice and ethics, and obtaining and maintaining your professional practice. Specifically, there are five rules of ethical conduct as set out by APEGA (the Association of Professional Engineers and Geoscientists of Alberta), as taken from their guidelines for ethical practice (APEGA, 2022):

1. Professional engineers and geoscientists shall, in their areas of practice, hold paramount the health, safety and welfare of the public and have regard for the environment.
2. Professional engineers and geoscientists shall undertake only work that they are competent to perform by virtue of their training and experience.
3. Professional engineers and geoscientists shall conduct themselves with integrity, honesty, fairness, and objectivity in their professional activities.
4. Professional engineers and geoscientists shall comply with applicable statutes, regulations, and bylaws in their professional practices.
5. Professional engineers and geoscientists shall uphold and enhance the honour, dignity, and reputation of their professions and, thus, the ability of the professions to serve the public interest. (APEGA, 2022)

The primary assignment method was through video submissions, where 72% of a student's grade was spread across six 3-minute video recordings of themselves. Students were given guidance on these videos that it must feature their face, they were not allowed to look at notes or a script, and their video must be done in one-take (i.e. no editing). The first five videos follow the five rules of conduct, and each included three parts:

1. Recite the rule.
2. Explain the rule in your own words.
3. Create an example to illustrate the rule from your own branch of engineering.

The sixth video asked students to engage with two different media sources from a list of six options provided and reflect on how these relate to engineering ethics. These media sources included two videos of indigenous perspectives on ethical space (Crowshoe & Ermine, 2016; Kimmerer, 2014), two podcast options, one on the ethics of the iron ring ceremony (Bradley, 2023) and another discussing ethics in engineering vs. medicine (Crane, 2022), and two news articles, one on bias in large language models (Piers, 2024) and another on the ethics of big oil

(Shingler, 2023). Overall, the video format was beneficial approach to student assignments within the asynchronous course format as it allowed students to engage in a more meaningful way than through only written assignments.

The final 28% of their grade was a group project that required students in groups of 2 or 3 to write a 15-page report that summarized the requirements for becoming a professional engineer in Alberta, complete a mock competency assessment for two competencies for each student, and answer five reflection questions.

Critical Context: Unethical Ethics Course?

The critiques and critical reflections in this section are my own perspective and opinion, based on reflections which I completed on a semi-weekly basis throughout the term. Although my experience with ENGG 513 at my institution is being used as a case study, it's important to emphasize that these findings are a reflection of the larger state of engineering ethics education. In this paper I focus on many of my negative reflections, however it is also important to acknowledge there is a significant amount of work being done to improve how we teach engineering ethics, and I am continuously inspired and learn from many of these scholars.

Each week, I reflected on these three prompting questions:

- WHAT: Description of the week.
    - What happened? What did I cover? Describe the experience.
- SO WHAT: Making meaning
    - How do you feel, why? What challenged you? What was a rewarding experience? What worries to you have?
- NOW WHAT: Taking action
    - What will you do next? What adjustments or changes do you want to make?

This work-in-progress presents a preliminary qualitative analysis of some of the main themes observed through my own personal reflections.

Bridging Across Paradigms

My co-instructor and I came from extremely different paradigms and beliefs around teaching and learning. Through this experience of teaching together, we had to consciously acknowledge this, and I often reflected positively on how well we were able to work together given our extreme differences. After the first assignment, we were discussing extensions over email and he indicated to me that he was against giving extensions. I replied, "I am against NOT giving students extensions, and both teaching philosophies are valid." The goal of this statement was to ensure, especially as a junior female faculty member, that my voice and perspectives were being heard. My colleague is about 25 years my senior, and deconstructing this hierarchical role meant that we had to bridge across significantly different paradigms. I reflected in my journal a little later in the semester, "I do feel like our emails have still been relatively kind to each other, and it does feel rewarding to be able to engage with a colleague who we obviously see things in very different ways, but we are still able to work together collegially." Given that the course content and assignments were all pre-determined before I was brought onboard, we did not have the opportunity to exploring bridging across these paradigms during course design and development, which may have led to further challenging conversations.

No one knows how to measure ethics

Throughout my first year, I heard multiple faculty members and even external evaluators emphasize that ethics is hard to measure and understand. This aligns with significant amount of literature which describes how ethics is dismissed within engineering education due to an assumption that as engineers it's okay to be below required levels of ethics, given that it's too difficult to teach and assess (Seniuk Cicek et al., 2025).

From my observations of the current course, this belief was observed. In my reflections early in the semester, I stated, "the course structure and set-up completely avoids and intentionally dismisses student perspectives." I had been reflecting on the grading schemes and the difficulty I was having supporting TAs to grade the assignments consistently. Our grading rubrics were not clear and our training program for the TAs was not clear, however all this was dismissed under the guise that no one knows how to measure ethics, so it was acceptable that our assessments weren't robust. The result is that students' knowledge and contribution to the course (through their assignment submissions) is dismissed and unvalued. This approach goes against Freire's perspective that students contribute equally to the learning environment (Freire, 1970/2018), and therefore, in my opinion, leads to unethical teaching of ethics.

Assessing ethics is more important than learning ethics

Teaching asynchronous ethics was particularly challenging because I had no set times with the almost 500 students. Most of my time was spent training TAs on grading, grading student assignments, and responding the grade appeals from students. This emphasis on grades throughout the semester began to wear on me and I could feel myself changing. I reflected, "I just feel so frustrated at the system at making me not care about the students' learning." I realized that not only was I hyper-focusing on the assessment and grade (instead of students' learning), but the students also had been so deeply normalized into avoiding their learning in order to achieve the grade. This problem is not unique to this course, however in addition to the two previous themes, it felt accentuated from my vantage point.

To change this cycle, we must ask ourselves different questions: What should students learn (rather than what *works*) (Biesta, 2007)? How can we support students in critical consciousness (Freire, 1970/2018) and awareness of the power dynamics in engineering decision-making processes? Bauschpies et al. (2018) offer advice that instead of approaching engineering ethics through the lens of ensuring just actions, instead we should aim to support students in "listening for signals of injustice".

Teaching unethically to maintain my energy for the long game

Early in the semester I made a conscious choice to go along with the provided course format and structure, even when I knew it was not following any principles of accessibility or universal design for learning (Ross, 2019). Throughout the course I received significant student feedback on the ways in which the marking was confusing and inconsistent to students, even leading to situations where students described the harm and anxiety it was causing them. The tension within me was that although I agreed with these students' comments, I knew I had consciously made a decision to not change the assignment to be more inclusive and accessible. For example, the requirement of not being allowed to read notes for three minutes not only inaccessible, but most

official student accommodation provisions are focused on timed assessments, leaving students without an avenue to request support.

However, in my reflections I reminded myself that it was not just about these 500 students, because “I can’t take it too personally and I have to look at the bigger picture”. At the time of this paper writing, I have already taught 500 students in September 2024, and I am currently teaching another 500 in January 2025, following immediately after by another 500 in May 2025 (I teach the course three times per year). So, it was important that I “remember that I’m not sacrificing my mental health” and instead that I was focused on observing the course format, and actively learning from student submissions and feedback. My first teaching experience was an incredible learning experience, and I can feel both disappointed that I didn’t do more to support student learning, while also being proud of my decisions to prioritize the ability to keep my energy for long term changes.

Summary and Next Steps

This first work in progress paper provides a reflection on my experience of teaching an engineering ethics course and the tensions with my social justice paradigms and understandings of engineering ethics. Going forward, as I begin to gain more independence in my role, I will continue to reflect. Reflection is an essential tool for continuous improvement in teaching (Walder, 2014), and it feels as though sometimes it is my only lifeline that is preventing me from getting sucked into the academic institutionalized heteropatriarchal and colonial system. As I move forward, this work will focus on the ways in which I have positively adapted and improved my teaching of engineering ethics, with focus on the wealth of knowledge I have gained from many members of the community worldwide.

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