



Let's get ethical: Incorporating "The Office" and engaging practices into an ethics module for capstone students

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Introduction:

Professional ethics is at the core of successful engineering practice, ensuring the integrity of the profession and the safety of the general public. To promote the formation of ethically aware engineers, the Accreditation Board for Engineering and Technology (ABET) requires institutions to graduate students with “an ability to recognize ethical and professional responsibilities in engineering situations, and make informed judgements...” [1]. Typically, ethics education is summarized into four main goals: 1) to make students aware of professional expectations, 2) to sensitize students to potential ethical issues that may arise, 3) to improve the students' ethical decision making, and 4) to motivate them to behave ethically [2].

The recent unscrupulous activity at high profile companies like Volkswagen [3] and Boeing [4] underscores the need to better prepare students for their professional practice. Unfortunately, effectively forming ethically-minded students is challenging due to credit hour limitations in the engineering curriculum, low student engagement, and a lack of perceived value in the content. Unlike the majority of the engineering curriculum, professional ethics is neither calculation- nor design-intensive. Covering this content through traditional lecturing and text-based reading assignments often fails to fully motivate this generation of tech-savvy students to learn to their full potential. Improvements to course design and content delivery can improve student engagement [5-9]. These strategies include developing interactive course activities [6], incorporating multimedia resources [7-9], and integrating practical experiences into the delivery of the course content [9]. Specifically, recent papers have suggested incorporating a multi-modal approach to teach ethics using popular media [10].

Bearing this in mind, a short ethics module was redesigned with the goal of improving student engagement and performance. The purpose of this paper is to describe the changes made to the module and evaluate their effectiveness. Specifically, the module was updated to include three main lectures: 1) engaging the students in the content, 2) delivering the content, 3) and successfully applying the content to contemporary situations.

Student and Course Background:

The University of Mount Union is a private, liberal arts institution located in Alliance, OH. The School of Engineering offers ABET-accredited undergraduate degree programs in mechanical and civil engineering in addition to new majors in computer, electrical, and biomedical engineering. Of the nearly 2,200 students enrolled at Mount Union, approximately 170 are majoring in one of the engineering disciplines. Mechanical engineering students are required to take a two-semester capstone sequence during their final academic year. Each week, students are required to meet for a lecture as a full cohort (105 min) and for progress meetings with their advisors as individual project teams (60 min). Specific project-related questions are addressed during the team progress meetings. The course lecture addresses a handful of topics related to engineering including

professional practice, designing for sustainability, entrepreneurship, and engineering ethics. The capstone sequence is used to evaluate all seven ABET student outcomes.

ABET Student Outcome 4 has been addressed in the capstone course through a short engineering ethics module at the start of the spring semester. Prior to the development of the module described in this paper, two full class periods were devoted to covering professional ethics and evaluating ABET performance indicators. During the first of these lectures, common terms were explained, the American Society of Mechanical Engineering (ASME) and National Society of Professional Engineering (NSPE) codes of ethics were reviewed, and engineering case studies were discussed. Students were then assigned a group project evaluating a case study developed from the NSPE board of ethical review rulings [11]. During the second lecture, the students presented their analysis of each case. At the conclusion of the module, the students were evaluated using an ASME Professional Practice Curriculum Engineering Ethics quiz [12]. Anecdotally, the author was disappointed in student participation during the class period, their willingness to seriously engage with the material, and their overall performance on the final quiz. A redesigned three-day ethics module was first implemented during the Spring 2018 semester and repeated the following year (Fig. 1).

Original Module			New Module		
Learning Goal	Delivery Method	Homework	Learning Goal	Delivery Method	Homework
DAY 1 Deliver Content and Apply	<ul style="list-style-type: none"> Lecture Covering: <ul style="list-style-type: none"> Definitions Codes of Ethics Discuss Case Study 	Group Case Study Project	DAY 1 Engage Students	<ul style="list-style-type: none"> Watch <i>The Office</i> Class Discussion 	Code of Ethics Assessment
DAY 2 Apply	<ul style="list-style-type: none"> Student Teams Present Case Study Projects 	Ethics Test	DAY 2 Deliver Content	<ul style="list-style-type: none"> Class Debate Lecture Covering: <ul style="list-style-type: none"> Definitions Ethical Frameworks Codes of Ethics 	Team Case Study Analysis
			DAY 3 Apply	<ul style="list-style-type: none"> Discuss Case Study Class Debate 	Ethics Test

Figure 1: Comparison of the original and new ethics modules.

Course Components

Day 1: Engagement

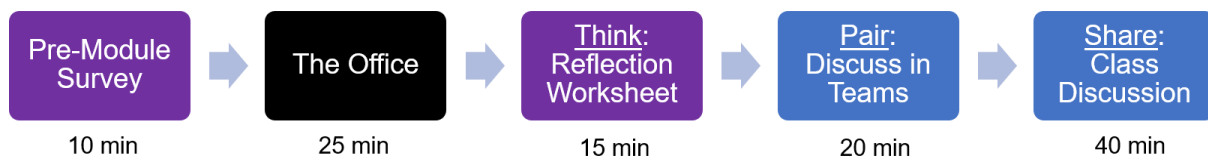


Figure 2: Activity Breakdown for the first day of the ethics module. Purple boxes denote individual student work time. The black box represents the use of popular media, and the blue boxes represent class activities.

The organization of the first day of the ethics module is shown in Figure 2. At the start of the ethics module, a survey was administered to evaluate student opinions about learning ethics in the capstone course (Fig. 3). A total of 32 senior-level, mechanical engineering students were enrolled in the capstone course over those two years. Student responses revealed that they were not excited for the module (2.6 ± 0.8) and did not think it would be interesting (2.8 ± 0.9). Many of the students did indicate that there would be some value associated with the module, since they were more likely to disagree with the statement, "I think the ethics module will be a waste of time" (2.8 ± 1.2). The students were also asked, "What previous experience have you had with the study or application of ethics?" One student (3%) had taken an entire course on ethics, 22 students (69%) indicated that an ethics case study was evaluated in a previous engineering course, and three students (9%) mentioned required ethics training during a past internship. The students were also given the option to provide comments about their ratings. These comments are provided below:

- *I don't think it's the most exciting, but it's good to learn about.*
- *Ethics isn't a fun topic in general.*
- *I think ethics is an important part of engineering and is necessary especially if we take on a lead role on a project. However, it's not one of my fascinations of the field.*
- *At this point, I am tired of studying, but I am very excited to learn about ethics and I am interested in the topic.*
- *Ethics to me are common sense. Just do not be an idiot and you will be fine.*
- *I think most of this is common sense/just being a decent person.*
- *I am not interested in the ethics part of engineering, but I know it is important.*
- *I think that ethics can be interesting if enough case studies/real world applications are involved.*
- *I am curious to see exactly what this module holds.*
- *From what I've seen, ethics is about making the choice w/the least amount of negative impact, but I hope that's not just it.*
- *Very tricky topic sometimes.*
- *I feel like ethics are important and since ABET thinks they are too, I think it's necessary to learn ethics in engineering.*
- *I'm in the middle. I think it's a must, but I'm not over the top excited for it.*

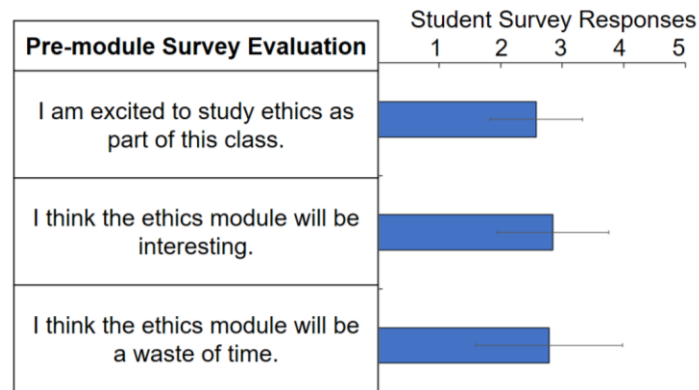


Figure 3: Pre-module student survey results. Student perceptions were scored as Strongly Disagree (1), Disagree (2), Undecided (3), Agree (4), and Strongly Agree (5).

To address the prevalent opinion that studying ethics will not be interesting, the first day of the module was dedicated to engaging students with the content. To this end, an episode of the popular, Emmy award-winning TV show, *The Office*, was incorporated into the class to draw the students into the topic of professional ethics and motivate a full class discussion regarding their past experiences with ethics, current views on morality, and future expectations for their professional practice.

Following the survey and brief introduction to why ethics is covered in the capstone class, the entire “Business Ethics” episode of *The Office* (Season 5, Episode 3) was viewed by the class. In this episode Holly, the human resources representative (HR rep) at Dunder Mifflin (a paper company), must lead a corporate ethics training, but bemoans the fact that it will not be interesting because she has to read from a binder. Michael, the office’s somewhat incompetent manager, tries to make the training more interesting by challenging his employees to share times when they’ve acted unethically at work, even going as far as offering immunity from any consequences. One employee, Meredith, admits to engaging in a sexual relationship with a sales rep in exchange for discounts on office supplies for the company. The primary conflict in the episode between Holly and Michael was whether to report Meredith’s unethical behavior to corporate (Holly’s viewpoint) or pretend it didn’t happen so that she could keep her job (Michael’s viewpoint). In the end, Holly reports the behavior to corporate, but Meredith is not punished because the corporate HR rep considers her actions more of a moral “gray area”. Furthermore, the corporate rep looks the other way because the company is “getting a discount at a time when it really needs it”. To make matters worse, Holly is reprimanded since corporate simply wanted each branch to submit signed paperwork from each employee proving they had completed the training. Overall, this episode presents a rather pessimistic view of both the effectiveness and usefulness of ethics trainings.

Following the episode, the class engaged in a Think-Pair-Share activity. First, each student completed a worksheet of reflection questions (Tab. 1) independently. Then the students were asked to discuss their answers in groups of 3-4 students. Finally, the instructor led discussion with the whole class. Through these questions, the students reflected upon their expectations for the module (question 1), personal experience with misconduct and ethics trainings (question 2), thoughts about morality (question 3), and the ethical dilemma presented in the episode (question 4).

Table 1: Personal Reflection Work Sheet

<i>The Office "Business Ethics" Personal Reflection Questions.</i>	
1.	At the start of the episode Holly implies that her meeting won't be interesting because she'll have to read from a binder. <ol style="list-style-type: none">What are your expectations for our ethics module?What do you think we'll talk about?Are you excited? How would you rate your excitement on a scale of 1 (low) to 10 (high)
2.	Dunder Mifflin initiates the ethics seminar after misconduct from its corporate leaders. <ol style="list-style-type: none">Are you familiar with real-life examples of misconduct? What are they?Do you think the ethics training presented in the show will inspire a real change in the behavior of the employees? Why or Why not?Do you think our 3-week ethics module will make a difference to you or your peers? Why or Why not?
3.	At the end of the ethics seminar Michael says "She has given us a lot of wonderful things to think about. Right, what is wrong – Who's to say, really, in the end? I mean, because it is unknowable." <ol style="list-style-type: none">How does Michael's view of morality compare to your own views?Have you experienced these views elsewhere whether from individuals or groups of people? Elaborate.
4.	During the "Immunity" time, Meredith admits to sleeping with a supplier for a discount to help the company. Michael and Holly disagree on how to address the situation. <ol style="list-style-type: none">What is the dilemma?How does Michael want to address the problem? What is his motivation?How does Holly want to address the problem? What is her motivation?Ultimately, what action does the HR rep from corporate demand?This action seems to support Oscar's claim that they aren't discussing ethics, but "corporate anti-shoplifting rules." What are your opinions about corporate and professional codes of ethics?

To prepare the students for discussion on the second day of the ethics module, they were assigned to read both the ASME and the NSPE codes of ethics. The students were also required to complete a series of true/false questions about the NSPE code of ethics developed as a self assessment by the NSPE [13]. In accordance with NSPE's intended use of the self-assessment, this assignment was not intended to measure the students' knowledge of engineering ethics, but instead familiarize the students with the language in the code of ethics.

Day 2: Content Delivery

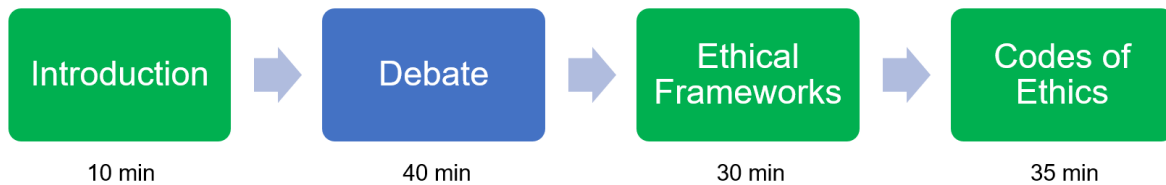


Figure 4: Activity break down for the second day of the ethics module. Green boxes denote faculty lecture and the blue box indicates a full class activity.

A classical “Introduction to Ethics” course will introduce, evaluate, and apply virtue ethics, deontology, and utilitarianism. Recent work has called into question the effectiveness and usefulness of such an approach to teaching professional ethics [10,14]. Additionally, this form of instruction fails to address another obstacle to ethics: the current generation’s increasing relativistic viewpoints on morality. Recent work by the Center for the Study of Religion and Society at the University of Notre Dame has shown that approximately 60% of emerging adults view morality as a personal choice where moral rights and wrongs are matters of individual opinions [15]. In order to fully understand the moral responsibilities imposed by codes of ethics, the students must first be introduced to the differing ways of considering morality (frameworks), including relativism. Then the reasons that relativism cannot, and should not, be applied when considering professional codes of ethics need to be explained. Therefore, the second day of the ethics module was devoted to the introduction and discussion of ethical frameworks (Fig. 4).

The first 10 minutes of the class prepared the students for discussion by providing simple definitions to common terms:

Ethics: The study of morals. Sometimes morals and ethics are used interchangeably.

Morals: Standards of behavior regarding what is and isn’t acceptable to do. Used to discern right and wrong.

Morality: A set of morals. The principles concerning right and wrong.

Ethical dilemma: A situation where one must make a decision between two morals, neither of which is unambiguously acceptable or preferable. Care is taken to distinguish between an ethical dilemma and just choosing to act unethically.

Before ethical frameworks were presented, the prevalence of relativistic morality was explored as a class. The class was asked to split into two groups based on the following question, “Is morality based on a person’s opinions?” In both years of the new module, students overwhelmingly joined the ‘yes’ group (>75%). Once the class was divided, the instructor carefully lead a debate, where each side tried to support their answer to the original question. To promote organization and politeness, only one person was allowed to speak at a time and speakers alternated between the two groups. It was observed that this style of debate enabled students to be engaged and even passionate (they don’t like to be wrong!). In both years, an argument was presented by the ‘yes’ team that was summarized as “Morals can’t be proven by science, so they must be based on opinions.” Following this revelation, the instructor inserted a new question into the debate: “Is the scientific method the only way to prove that something is true?” After a few more rounds of

debate, it became clear that the scientific method cannot prove that the scientific method is the only way to prove that something is true. Overall, the debate was helpful to consider some implications of moral relativism and illustrate the role of philosophy in a person's life. Since the students had little training in philosophy, it was surprising to some that they have to use philosophy (even if poorly developed) to support their own viewpoints!

Following the newfound appreciation for philosophy, the lecture describing ethical frameworks began. To simplify the topics into 30 minutes, the lecture focused on how engineers should interpret the code of ethics. How each student develops morality for their personal life was avoided. In *The Office*, Michael says, "Right? What is wrong? Who's to say really, in the end? I mean, because it is unknowable." This quote helped introduce moral skepticism, the idea that moral truths cannot be known. If moral skepticism is valid, then the code of ethics is nonsense. Next, moral relativism was addressed from personal (subjectivism) and cultural (conventionalism) frameworks. The flaw of moral relativism in professional ethics is that it allows for each person's or culture's morals to be just as valid as others. After some discussion, the students were quick to point out that codes of ethics would be meaningless and not enforceable if everyone viewed them with a relative framework. Moral objectivism was next presented as a system where moral principles exist and are binding for all rational beings. For an objectivist, ethical dilemmas occur when two or more of these principles are at odds. Finally, absolutism is introduced from both a duty-based (deontological) and consequentialism (utilitarianism) point of view. Under the simplified language for the module, absolutism differed from objectivism by requiring the existence of only one correct course of action for every situation. In other words, it is not possible for ethical dilemmas to occur; instead, the right answer must be discerned.

Following the introduction to ethical frameworks, the NSPE fundamental canons were finally reviewed in class. A short discussion was led to determine the most appropriate framework for the canons' application. Once the class agreed that codes of ethics were most similar to moral objectivism, the discussion pivoted to how best to apply these codes. Next, the terms "stakeholders" and "conflicts of interest" were discussed. Finally, an ethics decision matrix [16] was presented as viable method to compare possible courses of action when presented with an ethical dilemma.

Once again, homework was assigned to prepare the students for the next day of the module. This time, the students worked in teams to evaluate different case studies developed by the Markkula Center for Applied Ethics at Santa Clara University [17]. The student teams were required to answer the following questions regarding their scenarios:

1. What is the ethical dilemma?
2. List at least three stakeholders in this situation. What are possible consequences for each stakeholder?
3. How should the engineer proceed? Fill out the ethics decision matrix to help determine the appropriate response.

Day 3: Application



Figure 5: Activity break down for the 3rd day of the ethics module. The green box denotes faculty lecture and the blue boxes indicate full class activities.

Traditionally, teaching professional ethics in engineering involves discussing case studies [18-20]. This same approach was adapted for the third day of the ethics module (Fig. 5). First, each student team briefly (3 min) presented an evaluation of their homework case study. The analyses tended to be simplistic and not well reasoned (i.e. quitting your job, appealing to higher management, or just going along with the action). Therefore, these presentations provided a baseline analysis to build on during the day's discussion. Additionally, two best practices were suggested: 1) first work toward positive change before taking drastic efforts, and 2) brainstorm solutions that can creatively satisfy all professional commitments.

After the presentations, the students were introduced to the case study that would be discussed in class: the Volkswagen (VW) diesel emissions cheating scandal [3]. In this case study, engineers at VW wrote thousands of lines into engine software that could identify when a vehicle was being tested for emissions. The coding would cause the engine to use more fuel, which reduced harmful emissions to levels acceptable enough to pass emissions tests. When the car was normally on the road, emissions were much higher than acceptable levels. A synopsis of the scandal, timeline of important events, and follow-up regarding the consequences from the scandal were presented to students through a series of Youtube videos. This strategy was used to improve student engagement, since Powerpoint-intensive lectures can negatively affect a student's motivation to learn [21], and other studies have recommended integrating online media to improve student engagement [9].

Any engineering case study could be used for day 3 of the module. The VW emissions scandal was selected because it raised some additional and interesting questions to discuss. Because of the political discourse associated with climate change, some of the students will be sympathetic toward VW, claiming a personal apathy toward pollution. This provided an excellent opportunity to reinforce that while practicing as an engineer, the code of ethics takes priority over one's personal views. By reviewing the codes of ethics, the decisions of VW's engineers and managers clearly break at least the following canons:

- NSPE Canon 3/ASME Canon 7: Issue public statements only in an objective and truthful manner.
- NSPE Canon 5: Avoid deceptive acts.
- ASME Canon 8: Engineers shall consider environmental impact in the performance of their professional duties.

Another discussion point involved comparing the consequences for VW compared to other car manufacturers. In light of the VW scandal, many other manufacturers were also accused of cheating during emissions tests. This raised the following questions for discussion: “Was VW’s decision to create cheat software still wrong if it was necessary to compete in the market with other ‘cheaters’?” and “Is an action wrong if everyone else is doing it?” Once again, the students were encouraged during discussion to prioritize the engineering codes of ethics rather than their own.

The class ended with one final debate based on situation that had actually occurred at Mount Union. The students were presented with the following scenario, adapted from work first presented by Watkins [18]:

As a graduating mechanical engineering senior from Mount Union, you have already accepted a job at Company 1. However, you receive an offer to interview for a more desirable position at Company 2. Should you go on the interview?

The rules and organization of the debate were the same as day two of the module. Surprisingly, almost all the students (>90%) agreed that it is okay to go to the interview. After discussing their reasons for 10-15 minutes, the scenario is expanded:

*You’ve decided to go on the interview and have been offered the second position!
Do you back out on your first commitment for the second commitment?*

This scenario was selected because the correct course of action is ambiguous. Overwhelmingly, the students prioritized personal benefit with little regard for consequences to other stakeholders. This oversight provided an excellent reminder to review the code of ethics and consider other stakeholders before concluding the right course of action. Finally, they discussed the following extension to the scenario:

Let’s say that you are a junior applying for internships at local companies. Many of the senior class members have backed out of jobs with those companies. Will their actions affect your ability to get hired at these companies?

When the scenario is flipped, the students seem more open to declining the original interview. This illustrates two points: 1) the students need more practice considering consequences from the viewpoints of other stakeholders, and 2) it is difficult to choose options that result in less personal benefit.

Day 4: Mini-Test

Following the three-day ethics module, a short, mini-test was used to evaluate specific ABET performance indicators associated with professional ethics (Fig. 6). The students’ responses were evaluated on a 5-point scale: 1- Very Poor, 2 – Poor, 3 – Fair, 4 – Strong, and 5 – Very strong. A score of 4 or higher was required to meet the performance indicator. Overall, 75% of the students were able to successfully provide strong or very strong responses to 4 of the 5 questions (Fig. 6).

The students had the most difficulty articulating the difference between a technical and ethical problem, with only 65% of the students meeting the performance indicator.

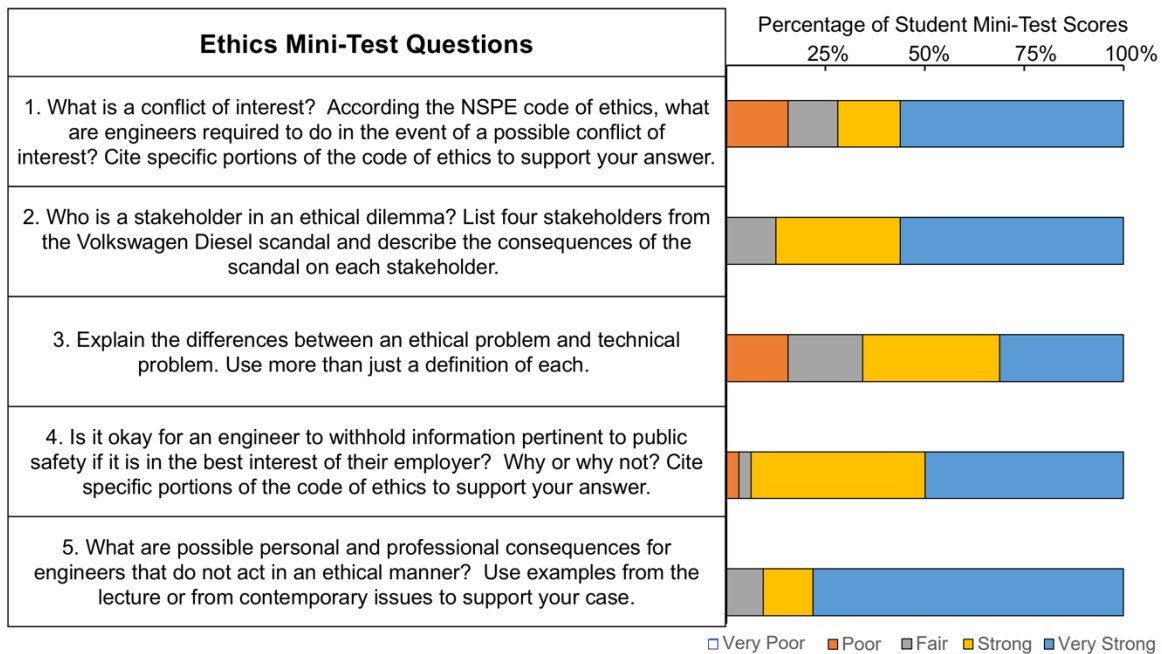


Figure 6: Student performance on the ethics mini-test

In addition to test questions, a survey evaluating the module was administered to track student perceptions (Fig. 7). Overall, the students reinforced their original lack of excitement at the start of the module (2.8 ± 1.1), although the 2019 cohort was more positive. The students also indicated that viewing *The Office* was helpful in engaging them in the lecture (4.2 ± 0.75). Even though the students had evaluated ethics case studies earlier in their curriculum, they still indicated that the module improved their understanding of both professional ethics (4.3 ± 0.72) and codes of ethics (4.4 ± 0.71). Greater variance was observed for evaluations of whether the lecture portions of the module were engaging (3.8 ± 1.0) and whether the entire module was more engaging than they expected (3.7 ± 1.15).

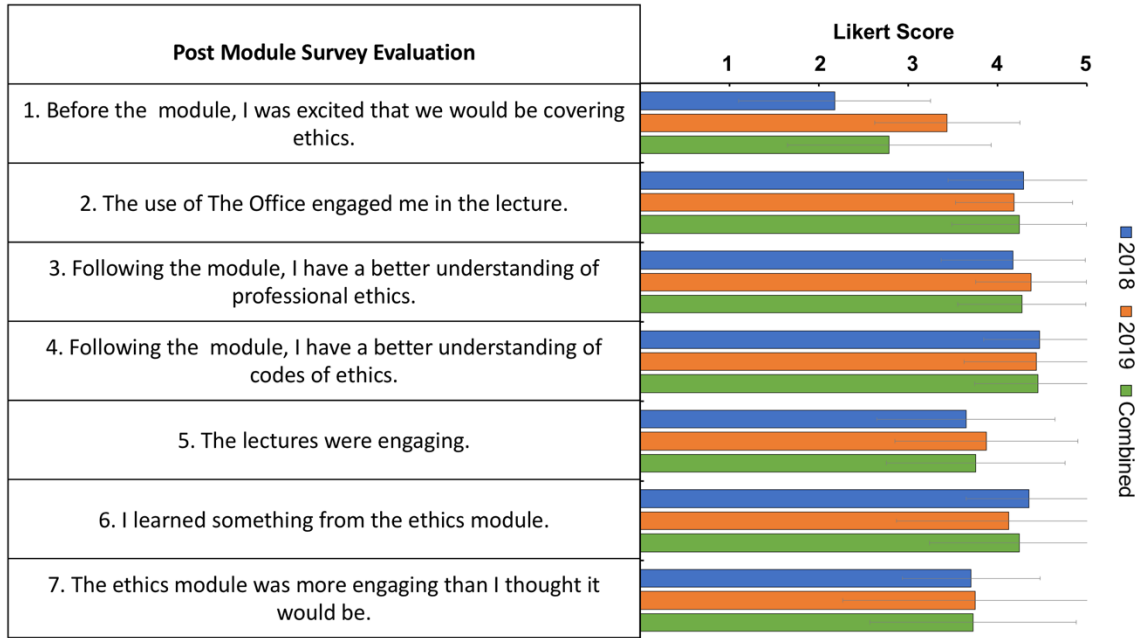


Figure 7: Ethics module survey evaluation from 2018 and 2019 cohorts. Questions were scored as Strongly Disagree (1), Disagree (2), Undecided (3), Agree (4), and Strongly Agree (5).

Each student was also asked an open-ended question: “Which parts of the ethics module should be continued next year?” The most common response was the classroom debates (Fig. 8; 16 responses, 50%). Many students also specifically mentioned that watching *The Office* should be continued (14 responses, 44%). Reviewing real case studies was the third most common response (7 responses, 22%). The lecture in general and the full class discussions were also mentioned.

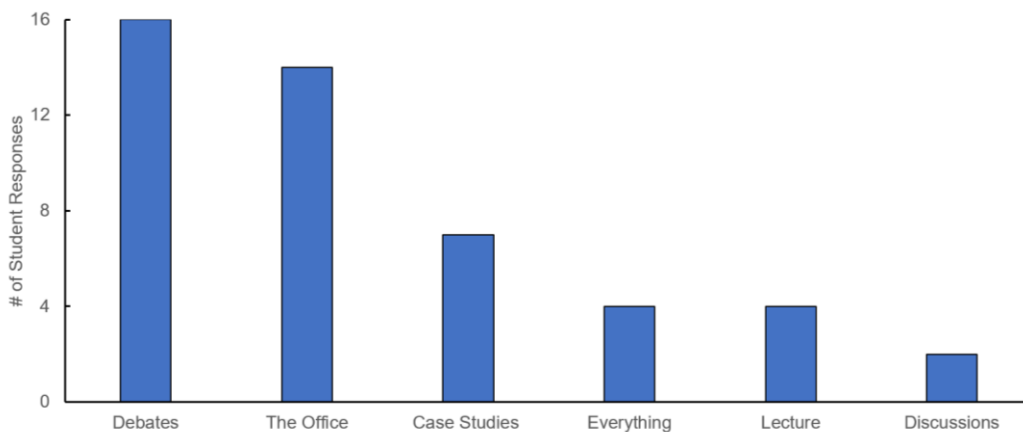


Figure 8: Open-ended student responses to “Which parts of the ethics module should be continued next year?”

Discussion

Teaching non-technical content presents challenges to student engagement, especially when this content is taught to seniors during their final semester. Prior experience teaching an ethics module

as part of a mechanical engineering capstone course motivated the design of the new module presented in this paper. From an instructor standpoint, the new module was more enjoyable to teach and produced meaningful interactions with the students both inside and outside the classroom. The students also seemed to benefit from the new module both in their learning and engagement. Even though students were not interested in learning ethics (Fig.3), the students self-reported a better understanding of professional ethics (Fig. 7) and performed well on the post-module mini-test (Fig. 6).

Overwhelmingly, the students found watching *The Office* to be an effective way to improve engagement with professional ethics content (Fig. 7, 8). This evaluation agrees with other papers promoting a multi-modal approach to teaching ethics using popular media [10] and student preference for a greater incorporation of popular media resources as learning tools [7-9]. A literature search revealed other examples of popular media use, including incorporation of *The Office* clips to teach professional ethics to business students [22]. The research presents a much different approach, using clips from different episodes of *The Office* to illustrate violations of workplace norms. At other institutions, instructors have incorporated different sitcoms such as *Parks and Recreation* to teach public ethics [23].

The broad changes to the module structure and content delivery presented in this paper represent an attempt to improve student engagement and motivation. Significant simplification of complex ethical frameworks was required to fit the material into a single lecture period. Ideally, every engineering student would graduate with a solid foundation in philosophy, reason, and ethics. Unfortunately, students at Mount Union are not required to take a philosophy course. Therefore, one of the main goals for the module was to at least provide a simple foundation on which students could base their understanding of codes of ethics. Anecdotally, this component of the module was beneficial to the students, but the evaluation methods did not attempt to track student understanding of the ethical frameworks. In future iterations, questions addressing ethical frameworks should be added to the mini-test and post-module survey.

Training in ethics and philosophy does not guarantee that an engineer will act ethically, as nearly 80% of engineering ethics violations tend to be committed willfully [24]. Some argue that ethics cannot actually be taught. Others contend that because engineering ethics involves *components* that can be taught (knowledge of codes and ethics, the ability to identify ethical issues, the ability to make moral decisions, and the will to take action) [2], ethics can in fact be effectively taught. Of course, to impart these ethical components to students, instructors must first have a captive audience willing to engage with the material.

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