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Compliance or Catalyst: Faculty Perspectives on the Role of Accreditation in Engineering Ethics Education [Full Research Paper]

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Despite the significant link between curricula and accreditation, there is limited research on engineering educators' perspectives on accreditation related to ethics and societal impacts. This full research paper addresses the following research questions: (1) What are faculty members' perspectives on the role of accreditation in engineering ethics education? (2) How, if at all, does accreditation influence their teaching practices? This research was designed to understand the influence that accreditation, as an external force, has on ethics education via the educators tasked with teaching it. This study employed an exploratory qualitative approach and drew on semi-structured interviews that probed participants' ethics teaching practices and perspectives, including the influences and motivations related to their instruction. Interviews were completed with 20 engineering ethics educators who represented a range of engineering disciplines across 17 institutions in the United States. Inductive analysis of the transcripts indicated a bifurcated response to accreditation in the context of ethics and societal impacts education. On one hand, accreditation drove the integration of ethics in the curriculum and signaled its importance in engineering. On the other hand, accreditation was perceived to reduce ethics education to a matter of compliance, create an outsize pressure on those tasked with teaching ethics, and impinge academic freedom. The findings pointed to the varying and sometimes conflicting perspectives on accreditation. An understanding of how accreditation can either spur or stifle educators' engagement in ethics instruction has implications for faculty motivation. The findings also highlight the need to think beyond accreditation in justifying and supporting the inclusion of ethics and societal impacts in engineering education.

Introduction and Background

Accreditation is an oft-cited reason for including ethics in engineering education in the United States. In this research, ethics is conceptualized as inclusive of microethics, the responsibilities of individual engineers, and macroethics, the broader impacts of the engineering profession on society [1]. Beginning in 2000, student outcomes related to both domains were included in accreditation in the United States as an understanding of ethical and professional responsibilities and impacts of engineering solutions in environmental and societal contexts were integrated into engineering programs accredited by ABET [2]. Accreditation plays a role in standardizing the preparation of engineering graduates, but the attainment of student outcomes is left to the individual engineering programs. This is particularly true for ethics, which unlike mathematics, basic science, and engineering science, do not have a specific requirement for credit hours and are often viewed as part of the "broad education component" or "culminating major engineering design experience" [3]. Engineering faculty members thus influence undergraduate education broadly, and ethics education specifically, by designing curriculum and shaping their own courses. Despite the significant role that accreditation plays in setting the standards and priorities for engineering education, it is unclear how faculty members internalize this external force. The present study explored the interplay between accreditation and ethics education from the perspective of engineering faculty members.

Accreditation

Accreditation in the United States dates back to 1932 when the Engineers' Council for Professional Development (ECPD), the predecessor to ABET, was founded [2]. Since the

beginning, accreditation and professional societies have been tightly coupled as member societies help set standards and provide expert volunteers as Program Evaluators. ABET underwent significant transformation at the turn of the millennium in adopting Engineering Criteria 2000 (EC2000). The shift to outcomes-based assessment was intended to increase flexibility and innovation. The change also included a focus on professional skills, reflecting a decades-long growing recognition in the importance of equipping engineering graduates with a broader skill set for the evolving workforce [4]. Engineering graduates were thus expected to demonstrate an "understanding of ethical and professional responsibilities" and "to understand the impact of engineering solutions." A study of engineering programs between 1995 and 2005 indicated that the majority of engineering programs added ethics courses and/or content in response to EC2000 [5]. ABET underwent another change two decades later in revising Criterion 3 Student Outcomes. Programs must now document their students' attainment of "an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors" (outcome 2) and "an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts" (outcome 4). The revised outcome 4 thus bridged microethics and macroethics. ABET has grown in its global reach and now accredits programs in 40 countries in addition to the United States. As a result, ABET affects engineering students in 4361 programs around the world [6], which magnifies the important relationship between accreditation and engineering education.

Engineering Ethics Education

Momentum around engineering ethics education has grown over the past several decades, in part due to accreditation along with broader environmental, political and technological changes [7]. Accreditation remains an oft-cited reason for including ethics in engineering education in the United States. For example, a systematic review of 26 engineering ethics interventions in the United States found 65% pointed to ABET accreditation as a rationale [8]. Despite the growing emphasis on ethics, there is limited consensus on teaching practices and learning objectives [8] while the quality and consistency of ethics instruction are still in question [9]. This in part can be attributed to the flexibility and autonomy that engineering programs have in designing curricula. Engineering programs have developed various approaches in terms of where ethics are taught, how ethics are taught, and the extent to which ethics are taught. Interviews with program representations in civil, electrical, and mechanical engineering at public universities in the United States indicated engineering faculty members were unsure of the most effective approach for teaching ethics and the amount of content that was sufficient for the ABET criterion [5]. Given the key role of engineering educators in designing curriculum and their individual courses, it is insightful to consider influences on their teaching.

Influences on Engineering Educators' Teaching Practices

Educators' teaching-related decisions are informed by a range of personal and professional experiences and beliefs. Knowledge and experience inside the classroom [10] and personal interest and student feedback [11] are examples of salient influences on educators' instructional practices. In the context of engineering ethics, a study of 19 faculty members found intrapersonal, interpersonal, academic, and professional factors shaped their engagement in

ethics education [12]. That study focused on internal influences, not external influences such as accreditation.

Motivation provides a lens through which to examine decisions. One such theory of motivation is expectancy-value, which illuminates the connection between an individual's beliefs, values, and choices [13] - [14]. Expectancy-value theory brings together multiple factors, including cultural considerations and an individual's previous experience, perceptions of cultural considerations, interpretations of experience, goals, and affective memories. The theory also posits there are two constructs that directly influence choices: (1) expectation of success, which is the belief in your likeliness to succeed in a task and is related to competence and (2) task values, which is your desire to engage in a task. Task values includes four components: attainment value (alignment with sense of self), intrinsic value (interest or enjoyment), utility value (usefulness), and cost value (expense) [15] - [16]. Expectancy-value theory has demonstrated utility in understanding faculty motivation related to teaching capstone design [17] and engaging in the research-practice cycle [18]. The latter study found expectancy of success, cost value, and utility were salient motivation factors for faculty members to transform engineering education via the research-practice cycle.

Research Questions

The present study addressed the following two research questions:
(1) What are faculty members' perspectives on the role of accreditation in engineering ethics education?
(2) How, if at all, does accreditation influence their teaching decisions related to ethics?

Project Context

This study is part of a larger project that explored ethics and societal impacts education from the perspectives of faculty members, engineering students, and engineering alumni. The aim of the larger project was to identify potential exemplars of engineering ethics education. As part of the larger project, 38 interviews were conducted with educators throughout the United States [19]. The interviewees were drawn from the preceding quantitative phase of the project in which over 1400 educators completed an online survey [20] - [21]. The interview participants were purposefully selected as instructors of potential exemplars in a range of institutional, disciplinary, curricular, and pedagogical settings. The interviews were designed to understand their practices and perspectives related to engineering ethics education, including influences on their instruction. The interviews were not designed to explicitly focus on accreditation; however, accreditation organically emerged in the majority of the conversations. Since the interviews were semi-structured, not every participant discussed accreditation. The present study examines the 20 interviews in which accreditation was mentioned.

Methods

Participants

All the participants taught ethics and/or societal impacts to engineering students, in a variety of courses including Introduction to Engineering, Senior Capstone Design, elective ethics courses, and required engineering courses. More information on the participants is displayed in Table 1. The participants represented various disciplines: chemical engineering (n=4), civil/environmental engineering (n=3), electrical engineering (n=3), general engineering (n=3), industrial engineering

(n=1), mechanical engineering (n=3), nuclear engineering (n=1), and two were in non-engineering departments and taught ethics to students in multiple engineering programs. The rank of the participants included assistant professor (n=8), professor (n=10), and emeritus professor (n=2). Participants were not asked to identify their race/ethnicity during the interview. The participants were assigned a pseudonym using a random name generator to maintain confidentiality.

Table 1: Participant information

Pseudonym	**Gender**	**Course(s) Taught that Included Ethics/Societal Impacts**
Beth	Woman	Intro to engineering
Brody	Man	Intro to engineering
Deb	Woman	Intro to computer engineering
Kim	Woman	Senior design (chemical engineering)
Bill	Man	Senior design (electrical engineering)
Elizabeth	Woman	Senior design (environmental engineering)
Aaron	Man	Senior design (chemical engineering)
Dan	Man	Radioactive materials
Alexis	Woman	Design and entrepreneurship; Computers and society
Britney	Woman	Materials
Graham	Man	Principles of chemical and biological engineering; Intro to computing
Terrance	Man	Engineers Without Borders
Stewart	Man	Required professionalism (all engineering disciplines)
Franklin	Man	Required ethics and professionalism (all engineering disciplines)
Mack	Man	Required ethics and professionalism (civil, environmental, electrical engineering)
Dixon	Man	Ethics elective (industrial engineering)
Leo	Man	Ethics elective (electrical and computer engineering)
Lindsey	Woman	Ethics elective; Thermodynamics
Bart	Man	Ethics elective (all engineering disciplines)
Lawrence	Man	Ethics elective (all engineering disciplines)

The 20 participants represented 17 institutions (11 public and 6 private) that varied in terms of size, location, and Carnegie classification. The institutions included Baccalaureate Colleges: Arts & Sciences Focus (n=1), Master's Colleges & Universities: Small Programs (n=1), Master's Colleges & Universities: Medium Programs (n=1), Master's Colleges & Universities: Larger Program (n=3), Doctoral/Professional Universities (n=1), Doctoral Universities: High Research Activity (n=1), and Doctoral Universities: Very High Research Activity (n=9). The institutions were geographically dispersed, including the Northeast (n=4), Midwest (n=4), South (n=4), West (n=4), and Mid-Atlantic (n=1).

Data Collection

The semi-structured interviews were conducted virtually and recorded with the participants' consent. The interviews were conducted between Fall 2016 and Fall 2017. Thus, the changes to

the ABET criteria were under consideration during this period and were approved in October 2017. The revised criteria went into effect during the 2019-2020 cycle. The broad aim of the interviews was to understand the participants' practices and perspectives related to ethics, including the influences that shaped their teaching. Examples of interview questions relevant to the present study include:

- Describe what has influenced your current efforts to educate engineering and computing students about ethical and societal issues.
- What challenges, if any, have you encountered in teaching engineering and computing students about ethics and societal impacts?
- To what extent do you feel that your efforts to educate engineering and/or computing students about ethics and societal impact issues are integrated within a cohesive curricular plan?
- In what ways do you perceive that your priorities for educating engineering and computing students about ethical and societal issues are similar to and differ from colleagues in your department?
- How would you describe the culture at your institution in regard to educating engineering and computing students about ethics and societal impacts?

The study was approved by the Institutional Review Board for human subjects research (Protocol #15-0326). After the interview, each participant was emailed a summary of the discussion and asked to verify its accuracy. This member checking process was employed to support the validity of the qualitative findings [22].

Data Analysis

The analytical process was exploratory and began with reading all the transcripts from the larger project to identify the interviews in which accreditation or ABET was mentioned. The sub-set of 20 transcripts were reviewed again to locate the segments that related to accreditation and to familiarize with the data and the context in which accreditation was discussed. The interview segments were then analyzed inductively to identify emergent views on accreditation in the context of ethics education. This process followed multiple cycles of coding [23]. Values coding [23] was used first to identify values, attitudes, and beliefs related to accreditation. This phase involved multiple coding to support the reliability of the codes [24]. The first author conducted the initial analysis to develop a codebook with the values codes. The second author reviewed a sub-set of the segments with the codebook. The authors then discussed their interpretations to clarify the meaning and application of the codes. For example, driver and compliance were distinguished by the positive and negative connotation, respectively. Next, focused coding [25] was used to systematically review the data and develop themes from the values codes. The themes, presented in the Findings, were the salient concepts in the interviews that elucidated the answers to the research questions.

Limitations

The findings are limited to the perspectives of the individuals who chose to participate in an interview. The aim was not to generalize across all engineering educators but to illuminate views on accreditation, their influence on teaching practices, and the context in which those decisions were made. Additionally, the interviews were not designed to explicitly prompt participants to

discuss accreditation. No assumptions can be made about the participants in the larger project who did not discuss accreditation and were therefore not included in the present analysis.

Findings

The findings for research questions 1 and 2 are presented together to show the thematic perception of accreditation and its influence, if at all, on educators' teaching decisions related to ethics. The findings indicated a bifurcated perspective on ethics. On the positive side, accreditation was perceived to help drive the inclusion of ethics in the engineering curriculum and validate the importance of ethics in engineering. On the other hand, accreditation was perceived to reduce ethics education to a matter of compliance, create an outsize burden on the educators tasked with the ethics outcome, and impinge academic freedom.

Accreditation helps drive the inclusion of ethics in the engineering curriculum

This theme captured the perception that accreditation was a driver for including ethics in the engineering curriculum and was shared by five participants. The ABET student outcomes motivated the integration of ethics in courses in which the topic might not otherwise be explicit. In describing her motivation to teach ethics in her Introduction to Engineering course, Beth noted "Well ABET certainly has a part. It is a part of it [Introduction to Engineering] because it's one of the courses that it's a little bit easier to include that content." Senior Design was another place in the curriculum that was described as an appropriate setting to integrate ethics and societal impacts. For example, Elizabeth's response to her motivation in teaching ethics was that "the primary reason it's part of the curriculum in senior design is ABET." Introduction to Engineering and Senior Design are courses often identified for ethics content, but accreditation could also drive the integration of standalone ethics courses in the curriculum. Bart, who designed and taught a course dedicated to societal and ethical issues in engineering, noted that it developed around the momentum of EC2000 and the department strategizing how to achieve the ethics outcome.

> There's a couple motivations: one is, you know, in early 2000s that ABET 2000 criteria came out that…there was a lot of effort nationwide in schools to implement ethics education either in courses like this one or embedded in other courses. And so, our department was facing how to do that.

Within this theme was also the perception that accreditation provided a starting point and afforded the opportunity to integrate ethics across the curriculum. For example, Graham, who was the chair of his department, explained that the department sought to teach ethics in various courses.

> We're accredited by ABET like most engineering programs. And so, they have an ethics requirement and we sort of use that as a starting point, right, we don't, our goal is not to do the minimum that ABET requires but our goal is to use that as a starting point for teaching ethics throughout the curriculum. The pushes that I feel to make sure that we teach ethics robustly come from the accreditors, they come from the College of Engineering Dean, they come from our advisory committee, and alumni that hire our students.

By formalizing the inclusion of ethics in engineering education, accreditation served as a catalyst for its integration in the curriculum. This perception influenced educators' choices and practices by providing motivation for teaching ethics in their existing courses or developing new courses.

Accreditation reflects and validates the importance of ethics in engineering

The second theme related to positive perceptions of accreditation was that it reflects and validates the importance of ethics. The ABET student outcomes are designed to prepare engineering graduates for entering the profession, thus pointing to the interconnection between ethical and professional responsibilities; global, societal, and environmental contexts; and engineering practice. From this perspective, accreditation was not the reason to teach ESI, but rather, confirmation that it should be taught. As an example, Kim, who taught Senior Design and was department head, noted,

> chemical engineering is unique among the ABET accredited programs. Because… the program criteria that specifically says that you have to educate the students on the safety of the potential safety hazards associated with the processes that they'll be working with and designing… chemical engineering is very, very serious about the safety education side of things.

Kim viewed ethics through the lens of safety, which is woven in the culture of chemical engineering and reflected in the program-specific criteria. For Elizabeth, who taught Senior Design in environmental engineering, the inclusion of ethics in accreditation student outcomes reduced resistance that might be faced in teaching it. When asked if she encountered any challenges, Elizabeth responded "not at all, I mean for one thing it's part of ABET requirements. So, it's pretty well respected that we do need to address the issue of ethics explicitly."

Accreditation reduces ethics education to compliance

The theme that accreditation reduced ethics to an issue of compliance emerged in seven of the interviews. It is important to note the context in which this theme appeared as each of the participants was describing the perspectives of their colleagues, departments, or universities, not that they personally taught ethics as a matter of compliance. For example, when asked about the culture at his institution related to engineering ethics education, Leo responded "at [institution], minimal compliance is the rule." Ethics were integrated into the engineering curriculum to be compliant but only to the extent to which it would satisfy the accreditation mandate. Similarly, Dan expressed "by ABET standards we are required to do engineering ethics… we are nominally ticking that box." Although he integrated ethical, societal, political, and environmental issues in his elective course on radioactive materials, the nuclear engineering program narrowly taught ethics as safety and intellectual integrity in required courses to meet the accreditation requirements. This perspective was also framed as programs having an approach of teaching ethics for "bean counting" (Bart) and to "check that box" (Lawrence). Lawrence expanded this comment in noting,

> they [the college of engineering] make a case that they're doing something that, for better or worse, has often accepted the section of the professionalization class as ethics, especially given some compliance model in place.

This theme pointed to programs integrating ethics for the purpose of accreditation and isolating the part of the curriculum in which it is taught to demonstrate compliance. For Deb, this ethos developed in her department after the approval of EC2000.

> ABET insisted on seeing some ethics taught in our curriculum, they weren't specific how it was done. There could be a separate course or it could be taught through existing courses. And I was on the curriculum committee at that time…So basically how can we get past this requirement, this ABET requirement, and not do anything.

As a result of this ethos, Deb continued to explain that "mostly people were trying to make it look like they were doing something when they were doing very minimal." This perspective is different from accreditation helping drive the inclusion of ethics because in that theme, accreditation provided a starting point to motivate the thoughtful integration of ethics in the curriculum. Whereas here, ethics was taught for the sake of appeasing the program evaluators and only to the minimal extent that was necessary to do so.

Accreditation creates an outsize pressure on educators teaching ethics

Given the weight of accreditation, there is responsibility among all faculty members in demonstrating their students' attainment of the outcomes. The interviews revealed that this responsibility can be magnified in cases, such as ethics, where the outcome is commonly isolated in a single course. Two educators expressed feeling pressure from their department since they were tasked with teaching the course in which ethics were included, and thus the demonstration of ethics-related outcomes was on their shoulders. As an example, when her department was revising the curriculum in response to EC2000, Deb noted that her course was selected as the required course in the electrical and computer engineering degree in which ethics would be taught. She explained this pressure in stating:

> The directive from the department was basically none. It was save our department 'til we get ABET accredited. And so, I felt a fairly big responsibility because if there had been complaints of us not doing it, I would have been shot. The whole department would have been angry, I guess.

Similarly, Aaron taught Senior Design, which is the course in his department that is designated for explicit ethics integration. He noted this responsibility was reflected in meeting accreditation standards and helping students pass the Fundamentals of Engineering exam, which also includes ethics.

> The magnitude of it feels a bit bigger in design overall, like the whole thing kind of weighs on me and this one [ethics] is the one that I feel the least confident in and just like hope the most. And I don't think I'm doing a bad job, but definitely most room for improvement.

Both Deb and Aaron expressed a lack of preparation and confidence, which contributed to the pressure they felt in teaching ethics in fundamental engineering courses. Other interviewees expressed that feeling unqualified to teach ethics was common among many engineering faculty members. Bill, who taught Senior Design and was department head in electrical engineering, was asked about challenges he encountered in teaching ethics and noted resistance from his

colleagues since “many faculty don’t feel qualified to teach ethics and it’s not a high priority for them.” He continued to explain they

> are not really trained in the social sciences or liberal arts for the most part so they lack the kind of nuanced understanding of how to bring ethics into the classroom, I don’t have it myself but have been forced by circumstance to read more in this area.

In leading the department and Senior Design, Bill self-taught in the area of ethics to take on these responsibilities as the interdisciplinary nature of ethics is beyond the technical expertise of most engineering faculty members. From Bill’s perspective, the limited engagement in ethics education stemmed from a lack of qualification and priority. Bart similarly expressed that his colleagues were reticent to teach ethics themselves, but not because they do not value it. He commented,

> one thing I think is good about my department is that I think all of our faculty take seriously ethical and professional responsibility of our students and having them learn something about it. And while most of my colleagues wouldn't want to teach the course I teach not because they don't care about material, but because they probably wouldn't feel comfortable and they weren't qualified to teach it.

Accreditation impinges academic freedom

The final theme that emerged in the data was that accreditation constricts academic freedom. The two interviewees who discussed this perspective were relating the perception of their colleagues. Bill, a department chair in electrical engineering, noted one of the challenges he faced in teaching ethics was within the department: “faculty are antagonistic toward ABET because they think it impinges upon their academic freedom and so it’s really hard to get people to do ethics just because ABET requires it.” In Bill’s experience, these faculty members perceived a conflict between the mandate of accreditation and the autonomy they valued. Lindsey reported a similar view amongst her colleagues when her program was going through accreditation.

> ABET came back to us for our second round of review and said ‘to do it in standard form and don’t rewrite the criteria’… once that happened a lot of the faculty were like ‘this isn’t fun anymore, now we’re just complying with what they want’ and they started to see it as a burden and as an imposition and I think that’s when it got undermined.

The data suggested that ABET, especially when perceived as a matter of compliance as noted in the previous theme, was viewed to be in tension with the freedom and independence that academics value. In turn, this undermined faculty members’ engagement in teaching ethics.

Discussion

This study explored educators’ perspectives on accreditation in the context of engineering ethics and its potential impact on their teaching decisions. The findings indicated varying responses to the role of accreditation. On one hand, accreditation helped drive ethics in the curriculum, which catalyzed ethics being explicitly taught in existing courses and in new standalone courses. Accreditation also signaled the importance of ethics in engineering, which validated educators’ ethics instruction. On the other hand, accreditation was perceived to reduce ethics education to a

matter of compliance thus contributing to an approach of doing the minimum necessary. Accreditation also created pressure for those tasked with teaching ethics, especially if ethics were compartmentalized in the curriculum and colleagues in the department were reticent to teach it themselves. Lastly, the data indicated a perception among some engineering educators that accreditation impinges academic freedom. The findings lead to three implications for engineering ethics education, which are detailed in the following sub-sections.

Faculty Motivation

Re-examining the findings through the lens of faculty motivation illuminated the interrelationship between the values and beliefs expressed in the interviews and choices related to ethics education. Expectancy-value theory helps make sense of the findings and their implications for engineering educators' involvement in ethics instruction. Expectancy-value theory posits that an individual's choice to engage in a task is influenced by the value they assign to the task and their expectation for success [13] - [14]. For the participants who valued the role of ethics in engineering, accreditation was perceived as an additional motivation for teaching ethics. The ABET student outcomes catalyzed the integration of ethics in the curriculum and reinforced the necessity of its inclusion. Conversely, participants described their colleagues who did not value ethics education beyond being compliant with accreditation and thus were resistant to teach it themselves. The engineering faculty members who perceived a conflict between the academic freedom they valued and the accreditation mandate similarly shared a reticence to teach ethics. Expectation of success also emerged in the data in terms of a perceived lack of qualifications to teach ethics. One of the reasons accreditation created a sense of pressure was because the ethics outcome was often the responsibility of a single faculty member in the department. Participants expressed that their colleagues did not feel qualified or competent to teach ethics, which motivated their decision not to engage. Expectancy-value theory thus provides a bridge between the research questions (1: perceptions of accreditation and 2: influences on teaching) to demonstrate the importance of motivation in understanding faculty members' engagement in ethics education.

Academic Culture and Motivation

The emergent negative perceptions of accreditation, that it reduced ethics to compliance and impinged academic freedom, were the views that the participants perceived of and from their colleagues. The role of colleagues was also apparent in the theme relating the outsize pressure on educators tasked with the ethics ABET outcome, since the majority of engineering faculty were perceived as feeling unqualified or uninterested in teaching ethics. These findings point to the interplay between ethics education and the environment in which teaching decisions are made. This is important because of the social component of motivation. In their study of faculty motivation to engage in the research-practice cycle, Matusovich and colleagues [18] found "personal motivation [is] shared by perceptions of collective value or other people's beliefs" (p. 323). As a result, decisions to engage can be stifled if personal values are at odds with collective values. The collective values of a department or institution contribute to defining its academic culture [26]. The ethos of minimal compliance that emerged in the interviews aligns with the findings from an examination of ABET self-study documents in which "some programs appear to be satisfying the requirements of ABET Criterion 3.f with very limited applicable curriculum content" [5] (p. 383). As a result, this perception may be pervasive in cultures beyond those represented in the present study.

Rationale for Ethics Education

Another implication of the findings is the importance of thinking beyond accreditation in motivating and justifying ethics education. Referring back to a systematic review of engineering ethics education interventions in the United States, 65% cited ABET as the rationale [8]. Similarly, a study of electrical, civil, and mechanical engineering programs at public universities in the United States found "the overwhelming reason cited by program representatives for making professionalism and ethics content changes in their curriculum was ABET's EC2000" [5] (p. 384). Accreditation is a significant driver for including ethics in the engineering curriculum. However, the findings in the present study found accreditation can be associated with compliance and pressure, so it may be valuable to reframe the inclusion of ethics in engineering education. Furthermore, antagonism towards accreditation in general can affect faculty members' perception of ethics education if ABET is used to justify it. For example, a dissertation on engineering faculty views regarding accreditation found the majority of the responses were negative, such as ABET stifling creativity, detracting from quality teaching, and creating a burdensome workload [27]. There are broader societal, professional, and moral imperatives for teaching future engineers about their responsibilities and impacts that extend beyond meeting program evaluation.

Future Work

This exploratory study revealed directions for future inquiry. Although the interviews were designed to explore influences on participants' ethics-related teaching practices and perspectives, they did not explicitly probe accreditation as an influence. Future research could be guided by that focus and include a larger sample to understand if the exploratory findings presented here are salient and transferrable. The findings indicated the interplay between academic culture and ethics education in understanding faculty members' motivation to teach ethics. Future research could follow this thread to explore the factors that constitute culture in relation to ethics education and potential differences that may exist based on departmental and institutional characteristics.

Conclusion

Accreditation is a significant lever of change in engineering education as it establishes standards that programs must meet to attain and maintain the recognition of being accredited. Past research has examined the impact of accreditation on student learning [28], including evidence that ABET EC2000 catalyzed curricular change and supported quality assurance [29]. The present study explored accreditation from the perspective of engineering educators to understand its potential impact on teaching ethics. Semi-structured interviews with 20 faculty members who teach ethical and/or societal issues to engineering students indicated varying views on accreditation. On one hand, accreditation helped drive the integration of ethics in the curriculum and signaled its importance in engineering, thus catalyzing and reinforcing decisions to include ethics in course content. On the other hand, accreditation was perceived to reduce ethics education to a matter of compliance, create an outsize pressure on those tasked with teaching ethics, and impinge academic freedom, which contributed to a perceived resistance among engineering colleagues to teach ethics. The findings pointed to the influence of beliefs and values on teaching decisions within the framing of faculty motivation. The data also indicated the importance of academic

culture and rationale for ethics in understanding how to support ethics education and those tasked with leading it.

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