Faculty Perspectives about Incorporating Academic Integrity into Engineering Courses

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Abstract

This study examined how a professional development workshop affected faculty members' perspectives about incorporating academic integrity into their engineering courses. Embedded in the context of a new initiative at a large Mid-Atlantic University that aims to enhance engineering students' understanding of academic integrity and professional ethics, the workshop featured three aspects: 1) enhancing faculty members' self-efficacy in teaching academic integrity and professional ethics; 2) facilitating their development of instructional strategies for teaching integrity and ethics; and 3) supporting their classroom implementation of instructional plans. Seven faculty participants were interviewed after they implemented the new instructional plans in the semester following the workshop. Three major themes emerged from inductive analysis of interview transcripts. First, all participants reported that the workshop helped them become more aware of the importance of incorporating academic integrity into their teaching and were more reflective on how to effectively discuss this critical issue with their students. Second, after the workshop, participants made several changes in their courses and applied a variety of strategies to incorporate academic integrity into four aspects of their teaching: course syllabus, classroom discussion, assignments, and exams. Last, participants discussed several challenges when incorporating academic integrity into their courses, such as limited class time and unexpected extra workload. This work constituted our first steps in facilitating the discussion of academic integrity in engineering courses and supporting faculty members as they prepare students for ethical professional conducts. By exploring faculty members' perspectives about teaching academic integrity and the changes in their instructional design, this study provided important implications for future ethics education in engineering.

Introduction

Ethical practice is central to the integrity of the engineering profession. Yet, research demonstrates that engineering students are among those most likely to engage in academic dishonesty in higher education[1, 2]. This is problematic as it can lead to insufficient skills and knowledge in new engineers and result in established behaviors that threaten the integrity of the profession. Engineering institutions and faculty members play a critical role in facilitating academic integrity among engineering students. The overarching goal of this work is to explore practices that can support institutional efforts in enhancing student academic integrity. Embedded in the context of a new initiative at a large Mid-Atlantic University on promoting academic integrity, this study examines how a professional development workshop may affect faculty members' perspectives about incorporating academic integrity into their engineering courses.

Background

In the past decades, a large body of research has investigated academic dishonesty in higher education[3, 4, 5]. Colnerud and Rosander[6] summarized that academic dishonesty involves three main categories of behaviors: cheating, unauthorized collaboration, and plagiarism and

fabrication. In this line of research, the primary focus has been on undergraduate students' cheating behaviors. Early studies revealed a high rate of student cheating in college. For example, Jendrek[7] found that about 74% of college students reported having engaged in cheating. Unfortunately, this high rate does not appear to have declined in subsequent years. Williams[8] reported that by 2000, about three-quarters of American college students admitted having cheated on an exam. An even higher rate has been revealed in some studies where students self-reported that they had cheated at least once in college[9, 10].

Given the stringent requirements in engineering programs, engineering students are among those students who are more likely to cheat in college[2, 11, 12, 13, 14]. Carpenter and colleagues[1] found that over 96% of engineering students admitted having cheated or performed unethical behaviors in their studies. Such high rate serves as a warning to educators and presents the urgent need to enhance engineering students' academic integrity and reduce their cheating behaviors. More importantly, academic dishonesty is a strong predictor for violations of professional ethics[15]. Students who cheat in college are more likely to cheat in the workplace[16, 17, 18]. Given that "the engineering profession requires the utmost ethical standards"[15], increased emphasis has been placed on enhancing engineering students' academic and professional ethics both in the U.S. and abroad[19, 20]. Clearly, strategies and techniques to encourage academic integrity in higher education are needed.

Faculty members play a critical role in promoting academic integrity among students[21]. Research has shown that professors who place more emphasis on academic integrity see fewer dishonest behaviors among their students than professors who do not focus on the importance of integrity[22]. After all, to act with integrity, students are in great need of support in the classroom to better understand the importance of academic integrity and its relationship with professional ethics[23, 24]. In order to provide such support effectively, faculty should first hold a thorough understanding of academic integrity and professional ethics. Unfortunately, while research abounds on promoting students' understanding of academic integrity, studies that investigate how to enhance faculty members' understanding of academic integrity and translate this understanding into classroom teaching are relatively sparse. More importantly, there is little work that evaluates helpful strategies for supporting faculty as they address academic integrity in their classrooms[25].

Within the limited literature on strategies to support academic integrity, professional development emerged as an effective approach to enhance faculty knowledge and teaching practices: it provides opportunities for faculty to rethink their teaching practices and may eventually result in a positive attitude change towards the topic of interest[26, 27]. The primary goal of the present study is to investigate how a professional development workshop on academic integrity may influence faculty members' understanding of this topic by empowering them with approaches to incorporate academic integrity into their engineering courses. In particular, three research questions guided this work:

1. What changes did the faculty members perceive in their understanding of academic integrity after the workshop?
2. What instructional changes did the faculty members make after participating in the workshop?

3. What are the faculty members' perceived challenges and barriers when incorporating academic integrity in their teaching?

Methods

Context and Participants

This research was embedded in the context of a new initiative at a large Mid-Atlantic University that aims to enhance engineering students' understanding of academic integrity and professional ethics. As part of this initiative, a professional development workshop was provided to faculty in different engineering programs. The two-day workshop took place in the summer of 2013, where seven faculty participants (3 females and 4 males) developed and shared strategies for incorporating academic integrity into classroom activities and course assignments.

The workshop, designed and facilitated by an expert in ethics education at a large public research university, aims to prepare faculty for infusing academic integrity and professional ethics into undergraduate engineering courses. The workshop featured three aspects: 1) enhancing participants' self-efficacy in teaching academic integrity and professional ethics; 2) facilitating their development of instructional strategies for teaching integrity and ethics; and 3) supporting their classroom implementation of instructional plans. Table 1 presents the content of the workshop. One month after the workshop, the participants gathered to present their revised syllabi and lesson plans to receive constructive feedback from the workshop facilitator and their colleagues. For the purpose of this study, the participants were interviewed after they implemented the lesson plans in the semester following the workshop.

Table 1 Description of workshop content

Timeline	Content
Day 1	Introduction to background research on academic integrity; Activity: Comparing the institution's academic integrity policy and the engineering code of ethics; Seminar: Exploring best practices in talking about academic integrity with students; Activity: Developing plans for incorporating academic integrity into classroom teaching.
Day 2	Introduction to background research on teaching ethics and integrity, such as possible learning outcomes and active learning pedagogies; Activity: Group work on incorporating academic integrity into classroom activities and course materials; Discussion: Strategies of responding to student cheating.

Materials

A semi-structured interview was designed to obtain an in-depth understanding of the participants' perspectives about academic integrity and how to incorporate it into their courses

after the workshop. The interview protocol tapped into four aspects: 1) self-efficacy in teaching academic integrity and professional ethics; 2) use of instructional strategies before and after the workshop; 3) perceptions about the effectiveness of the workshop; and 4) experienced challenges in implementing the lesson plans (see Appendix).

In addition, to evaluate faculty participants' lesson plan implementation, we developed pre-post surveys to assess their students' understanding of academic integrity and its importance. As the primary goal of this paper is to discuss faculty members' perceptions of the workshop and changes in their teaching, data from student survey will not be presented here. A detailed discussion of student data is presented in another paper at 2015 ASEE Annual Conference[28].

Data analysis

The interviews were transcribed verbatim and coded qualitatively. The inductive analysis approach[29] was used in the coding process. Inductive analysis allows themes to emerge without the influence of researchers' pre-dispositions, which makes it possible for us to obtain a "grounded" understanding of faculty's perspectives about the workshop and their teaching practices.

Results

This section presents three themes that emerged from the interviews. First, we will illustrate faculty participants' enhanced awareness of the importance of teaching academic integrity in engineering courses. Second, faculty participants' instructional efforts before and after the workshop will be compared along with how they perceived student outcomes may have been affected. Last, we will discuss the challenges that faculty participants experienced when incorporating academic integrity into their teaching, as well as the further support they may require in their endeavors. Pseudonyms are used here for confidentiality.

Enhanced Awareness of Teaching Academic Integrity

All participants reported that the workshop helped them become more aware of the importance of incorporating academic integrity into their teaching. At the same time, they were more reflective on how to effectively discuss this critical issue with their students. For example, Mark reflected on how the workshop helped to elicit his ideas on enhancing students' understanding of academic integrity at an early stage of their academic career:

> So one thing that hit me pretty strongly [during the workshop] was the idea of preparing the students so that they don't feel so much need to cheat; and that they feel prepared; and to also maybe discuss the expectations ahead of time. Because I don't know that anybody has ever explained to these students particularly what academic integrity is about. I think it is important to introduce it [academic integrity] in that early stage [when students first came into the major]. Then it became part of the expectations. If we were to introduce it to the senior class, they may have something to say. It's like, "How come you didn't bring it up sooner?" But because I brought it up with the second-years, it just feels like part of the

> introduction of what [my discipline] is all about. So I'm all for introducing this as early as possible in the students' career even at freshmen orientation if we could. And that way, you have the students prepared.

More importantly, Mark emphasized that his current instructional approaches regarding academic integrity aligned with his perspectives about what it takes to be a good engineer:

> To me, because I believe in developing the total person, not just give them the academic information, I don't have a lot of difficulties working it in. So I think if we take on the attitude that we are preparing the student to be a total person, not just an engineer – just a technical engineer, because you need the rest of it to be a good engineer – then I think we shouldn't have any problem incorporating it. It will become what we expect to deliver and we expect the students who have gotten from here.

While participants considered academic integrity a critical topic to communicate with their students, how to incorporate such discussion into their teaching was not always clear before the workshop. Kelly reflected that "I know that was an important message before (the workshop); I just didn't know how to get there", and thus "it goes without saying that the workshop materials were not intuitive. So that was all needed information for me". More importantly, participating in the workshop provided helpful information to bridge Kelly's awareness of the importance of academic integrity and her actual teaching:

> It [the workshop] sparked a lot of creative thoughts for me about how I could be more intentional in weaving that into the deliverables that my students could not only get in the class but, hopefully, thereafter be a springboard for their careers here as students, especially because they are first-semester students.

Similar to Kelly, Emma explained how her perspective about academic integrity was broadened with the learning experience through the workshop:

> So I thought it was helpful to kind of place the idea of academic integrity into the bigger picture of how it affects other students, how it affects the university. And so to kind of help convey those messages to the students because I don't think I would have necessarily – if I had to go in without doing the workshop and discuss the academic integrity – we made the connections the same way that she [the workshop facilitator] helped me to see them.

While participants mainly focused on the changes in the way they perceived and taught academic integrity, Beth revealed in her interview that she became "more cognizant of weaving thoughts of academic integrity and professional integrity into future lectures." She explained how she would communicate the tie between academic and professional integrity with the students:

> I'm just more cognizant of saying, 'Now this is an example of integrity, or this is a place where if we're practicing academic integrity now with getting our data

> from good sources or things, whatever on the profession, then we'll be able to get that data and make good engineering judgment.' So I'm very much more trying to remember to say it throughout the year.

The majority of participants mentioned experiencing changes in both their own understandings of academic integrity and perspectives about how to teach it. However, these two changes did not always occur together. For example, Barry specified that while the workshop did not necessarily change his own perspective about academic integrity, it promoted his reflection on incorporating this topic into his teaching:

> I'm not sure that my perception of it [academic integrity] changed at all. But my perception of how to raise the level of importance with students changed. The workshop provided me with ideas about how to do this in a way that sort of naturally incorporated it into the class instead of just suddenly stopping in the middle of some mathematical derivation and saying, 'Now we're going to talk about integrity.'

Doug also pointed out that he did not consider his perception of academic integrity changed but "certainly my perceptions of how to present it to the students, presenting it in a positive light rather than a negative light is certainly something new that I picked up from the workshop." Doug explained that from his experience, "academic integrity is one of those things that nobody likes to deal with," and he "never presented academic integrity as a positive thing at all. It was always, 'Don't do this; don't do that; don't do the other thing.'" However, after the workshop, he became more explicit and try to explain to students "this is why you want to do this; this is why this is good for your career; this is why it's good for your growth as a human."

Nonetheless, despite the changes he made to facilitate discussion of academic integrity, Doug continued to feel discomfort in infusing this topic into his engineering course:

> Did I feel comfortable? No. I think that you always feel a little preachy when you do it, especially as engineers. If I was teaching a course in philosophy, maybe it would be easier. We're engineers; we don't deal with stuff like that well. But I certainly felt more prepared and more comfortable than I would have two years ago.

Changes in Instructional Approaches and Perceived Outcomes

Before the workshop, participants did not veer far from common practice, which was to include the required University academic dishonesty statement in the course syllabus. Such statements were mostly brief, either stating the consequences of cheating or overall expectations in the course. For instance, Doug explained how he previously conveyed the importance of academic integrity in his syllabus:

> I really did very little before the workshop. I'd have maybe two lines on my syllabus, and I'd tell the students, "You'd better not cheat; if you do, you're going to be in trouble." And then I wouldn't talk about it – wouldn't touch it – unless

> someone cheated, and then of course, I'd have all that unpleasant task to deal with. So that was really the extent before the workshop.

In contrast, after the workshop, participants made several changes in their courses and applied a variety of strategies to incorporate academic integrity into their teaching. The changes covered four aspects: course syllabus, classroom discussion, assignments, and exams, which are discussed in detail below.

Course syllabus.

Compared to their pre-workshop syllabi, participants' revised syllabi were more focused on details related to the importance of academic integrity and university rules. Doug explained how he modified his syllabus to clarify expectations for specific aspects of his course:

> I went from one line to a whole page, very, very clearly spelling out for the different aspects of the courses. And these courses that I teach have laboratory work, they have lectures, they have homework, they have exams, they have everything. I carefully spelled out what the expectations were and why.

Similarly, Emma explained that before the workshop she "never really talked a lot about academic integrity," except for a short discussion on "when we had to do writing assignments, how to properly cite information" at the beginning of the course. In comparison, after the workshop, she "included a larger description of what academic integrity is in both the syllabus and the introduction to the course."

Barry compared how he structured his course syllabus before and after the workshop as well as how he tried to reinforce the importance of academic integrity among students:

> I used to have sort of the standard blurb in the syllabus that was somewhere on Page 2 or Page 3—pretty far along—but Page 3 is probably more accurate. It effectively said, "I encourage you to work together on homework assignments, but the work you submit should be your own." The space on the syllabus devoted to academic integrity is now probably closer to a full page. It's on Page 2, and we spent time-probably 10 minutes at least-on the first day of class again reiterating this toward the end of the first week. And then at various times through the semester, we talk about different aspects of academic integrity.

Classroom discussion.

To complement their changes in the syllabi, participants embedded classroom discussion to promote students' understanding of academic integrity. For example, Barry further illustrated how he discussed different aspects of academic integrity through the semester:

> We talked about the five common values that we all share of—if I can rattle these off: honesty, trust, fairness, responsibility, and respect… So we talked about each

> one of those in terms of what it meant for them, my role in that, and how it affects our own interactions together.

When reflecting on his efforts in weaving discussion of academic integrity into his teaching, Barry was very glad that some students, after such discussion, "went out of their way to say they thought this was very good. This made them think about all of this [academic integrity] differently not just in my class but in some of the other classes."

Alan mentioned that sometimes his students initiated the discussion on academic integrity. In one of his classes, a student asked the question "Well, yeah, I've heard all these things, but why shouldn't I cheat." Alan considered it a very inspiring teaching moment and "such a good open-ended introduction to the whole area of academic integrity," especially "when it was finally coming from them [the students] and in a very good question." To address this question from a student perspective, Alan first let the students discuss in small groups about why they should not cheat and then share their arguments. This group discussion activity helped Alan communicate with his students about academic integrity through covering "the range of possible arguments that one would answer that question with, including the realization that some people can actually cheat and live with it."

From a different angle, Mark explained the importance of academic integrity by incorporating it into a broader discussion that was centered on personal development:

> In my one course, I actually have a couple of lectures on personal development because it was the brand new course to the students coming into the major. It's their first exposure to [my discipline]. And so I spend some time in there discussing these issues from a personal character building point of view and leading that into academic integrity. I tell them that it's really part of their personal makeup, character makeup, to be a person of integrity. And we define academic integrity a little bit more because they may not know looking at somebody's solution and then working on their homework is an infraction, or maybe they're so used to cutting and pasting from the Internet that they don't know that it is an infraction. So we define it a little bit more, and I ask for citations more.

Course assignments.

After the workshop, participants employed several new techniques in the development of their course assignments. For example, Kelly designed an interview assignment which required students to interview two practicing engineers and write a report based on the interviews. One of the questions for the interviewees was about dealing with ethics in the workplace. Kelly discussed how this assignment revealed students' understanding about academic and professional ethics:

> What they shared with me was they had no idea. They were very honest which I thought was such a breath of fresh air. Mostly talking of the first person, they were very honest about they had no idea how important ethics was and would be

> in their future and that a lot of the individuals whom they had interviewed spoke very candidly not only about the situations in their workplace at the moment where they had to rely on their ethical standing but also when they were undergraduate students and gave some pretty good examples with great honesty.

While not necessarily making adjustments to the content of assignments, Barry made changes to the way he treated assignments: he stopped grading them. Regarding the nature of his course, Barry explained:

> Through the years I sort of developed these problem sets and sort of honed them to do what I wanted them to do. But of course, that meant that the solutions were all out and freely available. So people were not necessarily all individually working on these things.

With the concern that the solutions to the problems in his course assignments may lead students to dishonest behaviors, Barry made the following changes:

> I now no longer grade homework. So instead, now I still give the same set of practice problems—they're not graded—but I give a quiz every week that's based on the homework. I mean somewhat on concepts from lecture but mostly on homework. So I say, "You have to do the practice problems"—I'm not calling it homework now—"and if you do, you can get a perfect score on the quiz, and if you don't, you're not going to do well on the quiz." I seem to notice some improvement in their overall exam scores-midterm and final exam scores. So I think it's serving the purpose better of holding them responsible individually for doing the homework.

Of note, embedding the discussion of academic integrity in course assignments in turn provided important student feedback for participants. For the first assignment in her course, Beth asked students to first "read a few short cases and look at the code of ethics", and then answer several questions on what they thought they and their course instructor were responsible for in the classroom. To obtain an overview of her students' perspectives revealed in this assignment, Beth made a chart to summarize their responses and reported:

> I got surprising information, I guess, in terms of the students' reactions that what they thought I was the most responsible for was making the link from the work they're doing here to how they would apply that in industry.

Exams.

After the workshop, participants used either verbal or written statements to clarify their expectations and requirements regarding test-taking with the students. Alan explained how he tried to better specify his expectations and the results he observed:

> When I give out a quiz now, I'm more explicit about what would be observed as cheating in an environment like that and just helping them to guard against

> behaviors that might be misinterpreted. I think that's helped. I used to see a lot of looking to the side or like that; I see less of that now that I've let them know that that's not appropriate.

Several participants, including Mark, Doug, and Barry, tried to emphasize their expectations of academic integrity by adding a written statement to the exams. For example, Doug explained that, "In my courses, I also have a statement on the exams now where they need to verify that they're taking the exam with academic integrity." Similarly, Barry started to ask his students to "write out and sign an academic integrity statement." At the same time, he would project the statement on the screen and discuss with students:

> Here's the statement; here's what I intend for this to mean. It's not just supposed to be some meaningless thing that you rattle off. You just need to affirm that this is your own work-and of course before that, that you've taken the responsibility to prepare adequately for the quiz and that should be your intention as a student in the class.

Challenges and Future Improvement

To improve their plans of integrating academic integrity into their teaching, participants received expert feedback on their lesson plans and course materials during the workshop. Such experience promoted the instructional changes presented above. However, as they implemented their lesson plans and used the revised course materials, faculty participants experienced challenges in several aspects.

First, due to the nature of their courses, participants found it difficult to allocate sufficient time for in-depth discussion centering on academic integrity. Kelly mentioned that of the two first-year seminar courses she taught, "one course is six weeks actually, and the other one is eight weeks. So I have them [students] for such a short amount of time. We are off and running, and then we're done, and then I begin the next one [course]. So…we talked about it [academic integrity] the first day, and that was it". Similarly, Mark mentioned that "we all use our previous years' material to start from, and try to remember to incorporate it and find a time to incorporate it is an issue at times".

On a similar note, Doug found it harder to discuss academic integrity in some courses than others:

> I guess the big thing is incorporating academic integrity discussions into a packed course that really the topic matter has nothing to do with ethical decision-making. That's the hardest thing. If I was teaching a course in civil engineering where we were talking about case studies, it'd be easy to put in academic integrity. If I was teaching a senior design course, it'd be easy to teach academic integrity. First-year seminar, once again, it's fairly easy. Sophomore level logic course, not so much. When you have an established course that's all about this theory, this analytical work, this problem solving, this lab stuff, it's difficult to put in academic integrity without it making it look forced. So I think that's a challenge.

Second, participants considered it important yet challenging to help students make the connection between academic integrity and professional ethics. For example, when reflecting on his instructional changes after the workshop, Barry said:

> The one thing that I didn't do was to formally tie this to professional integrity. So there's a professional code of ethics within [my discipline]. And even though I gave students a copy of this, I never got around to formally going through and saying, "Look here, this item directly ties to honesty, or this ties to respect and so forth." I mean I did ask them to read it and look at it. Now they will see that as seniors-this was a junior level class-they will formally go through that professional code of ethics in the senior year when they do capstone design. But my intent had been to sort of introduce them to it a little earlier. So that part I just didn't get to. It's kind of a big thing but not such as big thing, yet it's easily remedied. I just need to make sure I set aside even just 10 minutes somewhere to do it.

Moreover, while participants were enthusiastic about enhancing students' understanding of academic integrity, they admitted that the instructional changes added to their workload. For example, one course Barry taught was a large class and students "sit elbow to elbow." To minimize any chances for dishonesty, Barry said that he "had to make up three different forms of quiz," which was very time-consuming and he had to "kind of scramble to get all of that done." After embedding more discussion of academic integrity in her class, Beth noticed that "a lot more people come to me complaining about their group mates. But I think it was a result of them thinking about it more that, 'Hey, really, they are not holding up their end of the bargain of the academic integrity side of things.' So they were more cognizant of that, but really that makes more work for us."

To continue revising and implementing the instructional changes in the next semester, several participants suggested that collaborating with other faculty participants may help address the challenges they experienced in the classroom. For example, Emma mentioned that:

> I thought it was also good to be able to interact with the other instructors and kind of exchange ideas about how to actually incorporate these ideas into our course because it's sometimes challenging, I think, to come up with good ways to have it be a meaningful discussion or assignment for the students and not just feel like busy-work for them.

Kelly also discussed how sharing with other faculty participants, who had the same passions for teaching academic integrity, can help facilitate her own teaching:

> I really enjoy the environment being surrounded by colleagues who chose to be there. So a lot of times, when they were discussing, not their questions, their inquiries, their experiences in the past, what they were hoping to do in the future and watching their syllabi really evolve, that was awesome; it was like a math problem for me. It was like, 'Here is the before; here's the solution. How are we

> going to get there? Okay, there is hers; there's his' and a very collaborative group where everybody just – very diverse experiences.

Discussion

This study aimed to explore faculty's perspectives about incorporating academic integrity into engineering courses. Seven faculty members who participated in a professional development workshop were interviewed to discuss the challenges and strategies as they integrated discussion of academic integrity into their classroom teaching. Our findings revealed changes in both participants' perspectives toward the importance of teaching academic integrity in the classroom and their instructional strategies after the workshop. At the same time, the faculty participants discussed the challenges they experienced when implementing their instructional changes.

The present study revealed positive effects of professional development on faculty's teaching practices and perspectives about teaching. Before the workshop, the participants expended very minimal efforts in addressing academic integrity in the classroom, primarily because they were unclear about how to sufficiently communicate it with students. The workshop provided them with expert support to revise their lesson plans and timely feedback on such revisions, which helped the participants to become more comfortable and effective when teaching this topic. Moreover, the workshop facilitated participants' reflection on how to teach the topic of academic integrity. Teachers' understanding of the instructional approaches to teaching a specific topic is commonly referred to as pedagogical content knowledge (PCK) [30, 31]. There have been debates regarding the duration of professional development workshops for any positive changes in teachers' PCK[32, 33]. This work reveals that even professional development within a short period of time may be effective, if implemented in a practical and timely manner. In addition, the learning experience through the workshop was perceived as helpful for not only the feedback provided, but the collaborative environment. Participants enjoyed sharing their experiences with other faculty members and discussing the challenges they encountered when teaching.

The present study constituted our first steps in facilitating the discussion of academic integrity in engineering courses and supporting faculty members as they prepare students for ethical professional conduct. By exploring faculty members' perspectives about teaching academic integrity and the changes in their instructional design, this work provides important implications for ethics education in engineering. Our findings suggest that future professional development in ethics education should consider promoting a collaborative environment among faculty members in addition to expert support to facilitate the incorporation of academic integrity into engineering courses.

Limitations and Future Directions

As work in progress, the present study focused on faculty participants' perspectives on the workshop and their experiences when implementing instructional changes after the workshop. Several limitations exist in the present study that should be addressed in future research. First, due to the timing of this work, the participants were not interviewed before the workshop. While we tried to design the interview questions to tap into participants' perspectives before and after the workshop, there is a lack of direct comparison of participants' teaching practices. As we are

now in the second year of this project, we are refining the design of this work and will carry out a more rigorous data collection process that involve steps such as both pre- and post-workshop interviews to evaluate faculty's knowledge about academic integrity, their perspectives about how to teach this topic, and more detailed information about their classroom teaching methods.

Moreover, as this work was centered on faculty's perceptions about the workshop and experiences in implementing their instructional changes, there was not a thorough measure of student learning outcomes that may have resulted from such changes. We are currently developing an instrument to assess changes in students' understandings and behaviors regarding academic integrity and professional ethics. In our future research, mixed methods will be used for conducting classroom observation of group discussions and analyzing student artifacts such as their written assignments. Such efforts will provide us with a more comprehensive view of the effects of faculty professional development on academic integrity.

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Appendix Interview Protocol

1. What role did academic integrity play in your courses prior to the workshop?
2. Did you talk about it? Include it in your syllabus?
3. What role did academic integrity play in your courses after the workshop?
4. Did you talk about it? Include it in your syllabus?
5. What did you tell your students about academic integrity this semester?
6. Did you feel comfortable talking about academic integrity in your courses? Did you feel adequately prepared to do this?
7. In what ways did you modify your assignments and exams? Please describe.
8. What results did you see from these modifications?
9. What worked well? What didn't?
10. Did you feel adequately prepared to modify assignments and exams?
11. Describe student behavior in your courses – in what ways did discussions on academic integrity and modified exams/assignments change their behavior?
12. What were the benefits and challenges of incorporating academic integrity into your curriculum?
13. In what ways were your courses similar/different this semester and last semester?
14. Do you think there were less academic integrity violations this semester? Why or why not?
15. Regarding the summer workshop:
    a. What was valuable/helpful to you?
    b. In what areas do you feel you needed more help/information?
    c. In what ways did your perceptions of academic integrity change?
    d. How would you define academic integrity now?
    e. Are you teaching the same course this semester? Are you continuing the changes this semester?