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Using Research to Identify Academic Dishonesty Deterrents Among Engineering Undergraduates*

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The E³ Research Team, lead by the authors, has conducted several major investigations and has surveyed and/or interviewed over 1500 engineering and non-engineering undergraduates at 23 institutions [http://www.engin.umich.edu/research/e3/]. The team is motivated by decades of work showing engineering students are among the most frequent cheaters as well as by studies indicating a correlation between cheating and unethical professional behavior. The team's research suggests that the explanation for higher rates of cheating among engineering students may lie in curricular or engineering program cultural differences rather than in differences in opportunities to cheat or in the nature of students entering these disciplines. The team has also identified a willingness of students to engage in dishonest behaviors that have significant punitive consequences, a clear relationship between students' attitude toward a behavior and their propensity to engage in that behavior, and a strong correspondence between cheating in high school and college and engaging in unethical behaviors in the workplace. As such, to promote integrity it is important to identify key pedagogical interventions. This paper will summarize some of the team's important research findings and will discuss psychological and physical deterrents to cheating and their apparent effectiveness. The paper translates these findings into practical suggestions for educators and professionals interested in promoting integrity in the curriculum and the classroom.

Keywords: cheating; ethics; integrity

1. INTRODUCTION

ACADEMIC DISHONESTY is distressingly prevalent on college campuses throughout the United States (U.S.), with upwards of 80% of undergraduates reporting that they have cheated at least once during college [1–6]. The pattern of cheating among *engineering* students is of particular interest with students enrolled in 'vocationally-oriented majors such as business and engineering' reporting the highest levels of cheating—91% and 82% respectively compared with 73% for students in social sciences [4]. In an investigation by the authors, the percentage of engineering students who reported cheating on an exam 'at least a few times they took tests during the previous term' was about twice that of non-engineering students (33% versus 18%). Similarly, when queried about cheating on homework (where homework is defined as problem sets completed by the students on their own time), the percentage of engineering students who reported cheating 'at least a few times they worked on an assignment' was about twice that of non-engineering students (60% versus 36%) [7–9]. This is consistent with other research indicating that non-engineering students tend to self-report cheating rates at lower levels than engineering students [1, 10, 11]. Finally, in a study conducted by the authors, over 96% of engineering undergraduates admitted to performing at least one academic act that they defined as either cheating or unethical [12–14].

2. IMPLICATIONS OF ACADEMIC DISHONESTY

The consequences of unethical behavior are immediately apparent at the collegiate level. Students who cheat misrepresent their abilities and may receive an advantage over their peers. Acts of academic dishonesty also undermine the validity of measures of student learning. Wide-

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spread cheating and highly-publicized cheating scandals at high profile universities may erode the general populations' faith in the higher educational system for producing ethical and competent graduates. In addition, cheating can diminish student and faculty morale and the sanctity of the educational process and the mission of the institution. However, much more than the integrity of the academic process is at stake because engineers (more often than their business counterparts) are responsible for the health and physical welfare of the public.

The longer-term consequences are cause for even greater concern. A student who has managed to cheat his way through college not only presents a false impression to future employers, but may also have such a poor sense of moral obligation and responsibility that he cannot be expected to act ethically as a professional engineer. As an indication, research by the authors found distinct similarities in the decision-making process used by respondents in the workplace and in college when deciding whether to engage in unethical behavior (i.e. cheating in college or violating workplace policies) [15–18]. As corroborating evidence, college cheating has been linked to other unethical behaviors. Research has shown that students who cheat in college are more likely to cheat in graduate and professional schooling [19], to engage in unethical work-place behavior [17, 20–24], and to cheat on income taxes [25].

The issue of academic dishonesty does not originate in college. According to the Josephson Institute, 64% of the 29,760 high school students surveyed admitted to cheating on an exam in the previous year with 38% cheating on two or more [26]. These numbers are both higher than reported in 2006 and high school cheating has been correlated to collegiate academic dishonesty [1]. In a study conducted by the authors [16–19], students who reported a prior tendency to cheat in high school were more likely to report cheating in a specific college situation and to report violating workplace policies. Of those who reported *never* cheating in high school, almost 70% decided not to cheat in a specific student-identified instance in college and 50% decided not to violate workplace policies for a similar self-identified situation. On the other hand, less than 40% of those who reported *frequently* cheating in high school decided not to cheat in a specific instance in college and less than 10% decided not to violate workplace policies. Since this pattern of dishonesty can be linked from high school to college and then continue into the workplace, we as engineering educators have the obligation to disrupt this pattern with purposeful interventions.

3. THE *PACES* STUDIES

The authors are founding members and leaders of the Exploring Ethical decision-making in Engineering (E^3) Team. While the E^3 Team has conducted multiple educational research projects about academic integrity and ethical decision making, a majority of the practical discussion in this paper revolves around two projects—*PACES-1* [13–15, 27–29] and *PACES-2* [7–9, 30]. As such, the research methodologies and sample group demographics for those two investigations are summarized here.

The authors designed the *PACES-1 Survey* to understand perceptions and attitudes of engineering undergraduate students about cheating and to use this information to identify factors that influence a student's decision on whether to cheat or not. The survey was developed after an extensive review of literature on the subject [31, 32] and is modeled on the work of several researchers [12, 33]. The seven-page survey contains 139 questions that are subdivided into sections that addressed student definitions and frequency of cheating, opinions on likely deterrents, and their overall perceptions and attitudes about cheating in engineering undergraduate programs.

The survey was completed by 643 undergraduate engineering and pre-engineering undergraduates at nine institutions within the U.S. and two abroad (one in the Middle East and one in Latin America), including large public universities, small private universities, and community colleges with pre-engineering programs. A total of 81.0% of respondents were male and 18.8% female. The mean age was 21.6 years with a range of 17 to 48 years of age (however, 89.5% of the respondents were under 26 years of age). There is good representation of class year in college with 22.9% of respondents being in their first year, 13.7% in their second year, 24.1% in their third year, 21.3% in their fourth year, and 18.7% being in their fifth or more year of undergraduate instruction. Finally, a wide range of engineering disciplines were represented in the sample.

The E^3 Team engaged in the *PACES-2 Study* to develop and test a theoretical model of the decision-making process used by students when deciding on whether or not to engage in unethical behavior in college. The team applied a modified version of Ajzen's Theory of Planned Behavior [34–36] that includes the variables of Ajzen's original model (attitude toward behavior, subjective norm, perceived behavioral control, and intention) as well as measures of past behavior, demographics, behavioral context, moral obligation, and moral judgment. Moral judgment is described by Kohlberg [37] as the process by which an individual reasons about moral issues when presented with a moral dilemma. To validate the model, the team designed a two-part survey instrument. The first part, the *PACES-2 Survey*, consists of appropriate demographic questions, items to assess the variables of the original Theory of Planned Behavior model, and self-report items about college cheating. The survey also includes questions to address moral obliga-

tion, frequency of high school cheating, and social desirability bias (as measured by the Balanced Inventory of Desirable Responding (BIDR) [38]). BIDR scores indicated student responses to the questions were within the 'normal' anticipated response range—suggesting that there is no biased reporting and that students responded 'honestly' to the questions as presented. The second part of the instrument, the DIT2, is a multiple-choice test that presents five moral dilemmas [39]. The test is based on Kohlberg's Theory of Moral Development [37] and it provides a score that indicates how an individual reasons when faced with a moral dilemma. Respondents are asked to identify concepts important in resolving each dilemma and each individual receives a moral judgment score for each dilemma as well as an average moral judgment score. Respondents with higher scores have an understanding of justice that progresses from self centered to societal to principled. The DIT2 has been shown to have good internal and test-retest reliability and has shown discriminate validity [39]. The instrument was pilot tested to develop reliable, internally-consistent scales from the PACES-2 Survey and to identify how the scales relate to scores generated by the DIT2.

A total of 527 engineering undergraduates from three institutions responded to the survey. Of this number, 223 attended a large Doctoral Research Extensive (DRE) public institution, 208 attended a small private Baccalaureate Specialty institution, and 96 attended a mid-sized private Masters I institution. Students from two disciplines were included in the sample for comparative purposes: engineering and non-engineering (primarily humanities and social sciences). Engineering students made up 78.5% of the sample, with non-engineering students accounting for the remainder. Unlike the engineering students, the non-engineering students were recruited from DRE public institution only. The sample consisted of 32.5% females. However, among the engineering students included in the sample, women constituted only 21.2%. The average age of respondents was 20.0 years (σ = 2.81), with 96% of the sample being 23 years of age or less. Freshman comprised of 57.5% of the sample size and seniors 38.1%. The recruitment of only freshmen and seniors was an intentional effort to survey students at the very beginning and end of a baccalaureate experience to assess the effect of a traditional four year program on the study outcome variables. However, a small percentage of sophomore and juniors (4.4% total) were in the sample.

4. RESULTS

To determine what acts students defined as being academically dishonest, in the *PACES-1 Study* students were given twenty behavioral acts and asked whether they considered each to be cheating, unethical, or neither. The results are presented in Table 1 where the first column lists the survey item verbatim, the next three columns list the percentage of students defining each scenario as 'Cheating', as 'Unethical but not cheating' and as 'Neither,' and the last three columns indicate how often (in percentage of responses) respondents engaged in the behavior. This provides the students' definition of cheating, which was subsequently used to interpret students' reports of how frequently they engaged in each action as a college student.

Table 1 presents several interesting and relevant findings. For example, when considering questions regarding examinations, 96.4% of students responded that 'copying from another student during a test or quiz' (item *a*) was cheating; yet only 73.3% responded that 'permitting someone else to look at your answer during a quiz or exam' (item *b*) was cheating. Many students made a definite distinction between performing the act of copying and permitting others to copy. Additionally, only 40.7% responded that 'working in groups on web-based quizzes' (item *p*) was cheating with 29.4% stating it is neither cheating nor unethical. Similar rates were reported for 'working in groups on take-home exams' (item *q*). These rates are significantly lower than if the quiz or exam was held in the class. It appears as if the use of technology and/or the use of out of class examinations change students' opinions on cheating. This is potentially a very significant finding, considering trends in higher education towards more web-based instruction, distance learning, and use of technology in the classroom.

Even after determining what students define as cheating, there is still the problem of determining why they cheat. Each individual student will decide whether or not to cheat in a given situation based on a variety of factors. One way to address this question is to consider common postulations of why students cheat including a growing social acceptability, local institutional culture, grade competition, heavy course loads, and peer pressure. To elicit student opinions on these common hypotheses, the *PACES-1 Survey* included a list of statements about cheating and students responded using a 5-point Likert scale from 'Strongly disagree' to 'Strongly agree' with the results presented in Table 2.

Table 2 provides some indication that academic dishonesty is becoming more socially acceptable as is commonly hypothesized, but a majority of students still disagreed with the statement 'cheating is a necessary part of life' (item *e*). Engineering is commonly considered a highly competitive environment in which students might feel more compelled to cheat to compete with other students. However, only 4.9% of students agreed or strongly agreed with the statement 'I have to cheat just to get grades good enough to compete with the other students at this school' (item *j*) and 46.5% strongly disagreed. Regarding the hypothesis that peer

Table 1. Percentage of students defining each category as cheating and frequency of each (highest percentage of each category is bold) [13]

	Attitude Toward Cheating			Frequency of Cheating Behavior		
	Cheating	**Unethical but not cheating**	**Neither**	**0**	**1–2**	**3+**
(a) Copying from another student during a test or quiz.	**96.4**	2.3	1.1	**63.3**	20.2	11.5
(b) Permitting another student to look at your answer during a quiz or exam.	**73.3**	23.3	3.4	**53.7**	25.3	15.4
(c) Asking another student about questions on an exam you have not yet taken.	26.7	**45.6**	26.6	27.2	29.9	**37.5**
(d) Delaying taking an exam or turning in a paper later with a false excuse.	24.9	**65.5**	8.7	**68.9**	19.4	6.4
(e) Copying from an unapproved reference sheet during a closed-book test or quiz.	**91.6**	5.8	1.9	**68.1**	19.0	7.3
(f) Claiming to have handed in an assignment or exam when you did not.	**61.1**	33.0	4.5	**86.6**	4.4	1.9
(g) Taking an exam for another student.	**92.1**	5.4	1.7	**89.9**	2.0	1.2
(h) Working in groups on assignments when there is no class policy on group work.	6.4	20.1	**72.5**	14.6	19.1	**59.6**
(i) Copying an old term paper or lab-report from a previous year.	**60.7**	26.1	12.3	**55.7**	22.9	14.2
(j) Studying with other students for a test.	0.6	2.2	**96.3**	3.7	5.3	**85.1**
(k) Copying another student's homework when it is not permitted by the instructor.	**72.9**	22.6	3.9	**37.9**	31.7	24.3
(l) Submitting or copying homework assignments from previous terms.	**52.3**	31.1	16.0	**58.2**	18.4	16.8
(m) Witnessing a case of cheating in a class and not reporting it to the instructor.	9.2	**59.6**	30.3	**41.1**	26.0	27.2
(n) Storing answers to a test in a calculator or Personal Digital Assistant (PDA).	**74.5**	15.6	9.8	**54.9**	18.8	20.1
(o) Paying someone else to take an exam/write a paper for you.	**87.1**	10.7	1.6	**89.1**	3.4	1.1
(p) Working in groups on web-based quizzes.	**40.7**	29.4	29.1	**66.4**	14.8	11.8
(q) Working in groups on take-home exams.	**39.0**	28.6	31.4	**53.2**	25.2	14.9

pressure is a reason students cheat, 60.4% of respondents disagreed or strongly disagreed with the statement 'if a good friend asked me to cheat for them, I wouldn't be able to say no' (item *l*), which suggests limited effects of peer pressure. Finally, nearly half (48.5%) of respondents disagreed or strongly disagreed with 'I would cheat in a class if it seemed everyone else was cheating' (item *m*).

Another explanation for why students cheat is the existence of situations in which students might consider it acceptable to cheat or situations in which students might rationalize their behavior and behave differently than their responses in Table 2 indicate. To examine this possibility, on the *PACES-1 Survey* students were asked to respond to twelve situations, or 'neutralizations', in which they might consider cheating (Table 3). According to Haines et al. [40], neutralizations are used by students to justify their improper actions because the situation is beyond their control. Common neutralizations include 'the course information seems useless,' 'the instructor doesn't care if I learn the material,' and 'the material is too hard.' Students will use these situations as an excuse for cheating because they are beyond their control and possibly unjust from the students' perspective.

Of the neutralizations listed in Table 3, the top five in which respondents were in disagreement (Disagree or Strongly disagree) were all instructor-related (items *b*, *e*, *j*, *c* and *f* in descending order). This suggests that students will place blame for cheating on the instructor as a method of rationalizing their behavior. These results agree with student responses in Table 2, which indicate students believe it is the instructors' responsibility to limit cheating.

A comparison of the institutions within (nine) and outside (two) the U.S. from the *PACES-1 Study* reveals some striking differences. Of the seventeen behaviors listed in Table 1, students at the international institutions (n = 86) were statistically less likely to see eleven of these behaviors as cheating (Mann-Whitney U test, p = 0.014) than their peers at U.S. institutions (n = 556). Specifically, the largest differences were observed for 'Taking an exam for another student'

Table 2. Student opinions on statements about cheating (in percentage of responses with highest percentage of each category in bold) [13]

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
(a) Helping someone else cheat is not as bad as cheating myself.	18.4	28.8	18.2	**29.2**	5.1
(b) It is my responsibility to prevent cheating.	17.3	**31.4**	29.4	16.6	5.0
(c) It is the instructor's responsibility to prevent cheating.	2.5	7.0	10.9	**50.1**	29.2
(d) It is the institutions responsibility to prevent cheating.	3.3	9.5	14.0	**47.6**	24.9
(e) Cheating is a necessary part of life.	31.4	**34.4**	20.5	9.0	4.0
(f) If I saw another student cheating I would report the student to the instructor.	20.7	**37.9**	30.6	7.8	2.6
(g) If I saw another student cheating I would confront the student.	21.9	**39.7**	26.1	9.5	2.2
(h) If I saw another student cheating I would do nothing.	3.1	13.1	31.4	**37.2**	14.9
(i) I would cheat to avoid getting a poor or failing grade in class.	22.6	**31.6**	23.2	16.8	5.3
(j) I have to cheat just to get grades good enough to compete with other students at this school.	**46.5**	37.6	10.3	4.0	0.9
(k) Other students cheat more frequently than I do.	1.4	2.2	27.5	**36.7**	29.9
(l) If a good friend asked me to cheat for them, I wouldn't be able to say no.	22.6	**37.8**	19.8	13.7	5.6
(m) I would cheat in a class if it seemed that everyone else was cheating.	16.3	**32.2**	27.7	19.1	4.0
(n) I would cheat if doing so helped me retain my financial assistance.	17.6	**29.7**	25.5	21.2	5.3

Table 3. Percentage of students agreeing with neutralization statements. Highest percentage of each category in bold [13]

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
(a) It is wrong to cheat no matter what the circumstances.	3.9	10.4	14.6	**41.1**	29.9
(b) It is wrong to cheat even if the instructor has done an inadequate job of teaching the course.	6.4	14.3	19.3	**37.0**	22.9
(c) It is wrong to cheat even if the instructor assigned too much material.	3.6	13.7	19.3	**40.1**	22.9
(d) It is wrong to cheat even if the instructor left the room during an exam.	2.8	4.4	8.1	**42.5**	41.8
(e) It is wrong to cheat even if the instructor wrote unfair exams.	5.6	13.7	18.4	**37.3**	24.6
(f) It is wrong to cheat even if the instructor didn't seem to care if I learned the material.	5.3	11.9	16.8	**39.7**	26.0
(g) It is wrong to cheat even if the course material seemed useless.	3.4	9.2	11.8	**48.1**	27.2
(h) It is wrong to cheat even if the course material was too hard.	3.7	6.5	12.6	**46.5**	30.0
(i) It is wrong to cheat even if other students' scores are not affected.	3.0	6.8	13.1	**45.7**	31.4
(j) It is wrong for me to cheat even if the instructor does not grade fairly.	5.4	13.5	15.2	**39.2**	26.0
(k) It is wrong to cheat even if I didn't have time study for an exam.	3.3	4.2	9.6	**46.5**	36.2
(l) It is wrong to cheat even if I am in danger of failing the class.	5.4	8.4	14.2	**41.4**	30.2

(*item g*) and 'Paying someone else to take an exam/write a paper for you' (*item o*). Over 95% of students at U.S. institutions defined taking an exam for another student as cheating compared to only 72% of students at international institutions. Similarly, 91% of U.S. students defined paying someone else to take an exam/write a paper as cheating, while only 64% of students at international institutions did so. The difference in attitude observed plays a critical role for student behavior. In all of the eleven behaviors for which a statistical difference was found in student definition, the students at the international institutions reported engaging in these behaviors more often (Mann-Whitney U test, $p = 0.004$). In the case of the items described above, 13% of international students reported taking an exam for another student at least once, compared to only 2.5% of U.S. students. Likewise, 12% of international students reported paying someone else to take an exam/write a paper for them compared to 4.2% of U.S. students. Sample size and demographics are such that one should interpret these findings with caution, but the results do illuminate the potential

influence societal values and culture play on academic dishonesty.

The *PACES-2 Study* resulted in three major findings. First, results corroborated reported differences in rates of cheating between engineering students and those from other disciplines with engineering students being almost twice as likely to cheat on exams and problem sets [7–9]. The results also indicate that these differences are independent of the number of opportunities an individual student has to cheat. A second major finding was that differences in cheating rates of engineering and non-engineering students exist only in college, not in high school. Both groups of students reported cheating in high school at statistically identical rates. This implies that the historically higher rates of cheating reported by engineering students are more likely a result of the engineering curricula or academic environment than any inherent difference between engineering students and students from other disciplines. This is an important finding when devising practical approaches for reducing dishonesty in engineering curricula. A third major finding is the investigation confirms the use of the modified Theory of Planned Behavior for understanding why students cheat. As such, the model can be used to design and test interventions.

5. PRACTICAL SUGGESTIONS TO REDUCE ACADEMIC DISHONESTY

5.1 Increase the understanding of what constitutes cheating

The *PACES-1* results showed that students clearly made the distinction between cheating and behaving unethically. Through conversations with faculty, the authors have found that most instructors do not distinguish between the two and that they define 'unethical acts' synonymously with 'cheating'. This difference in distinction between students and faculty definitions is noteworthy and efforts should be made to bridge this gap. As such, one of the most important components to promote academic integrity on college campuses is to increase the understanding of what constitutes cheating. The institution's policy of academic integrity must reflect these values and be actively promoted by the administration [41]. For example, 61.1% of engineering undergraduates indicated that faculty and students had either little or no understanding of the academic policies of their institution and nearly half of them thought faculty did not support those policies [13]. However, simply discussing the institution's policy and the penalties associated with cheating has been shown to be ineffective in reducing its occurrence [33, 42]. A preferable approach is to increase the understanding of what constitutes cheating through open communication about academic integrity between students and faculty. This can be accomplished through formal and informal avenues and could include both campus wide and individual course discussion. Such a process would engage students' value systems and sense of fairness. Students might be more willing to uphold policies they either helped to develop or participate in their enforcement.

5.2 Adopt an institutional honor code

A campus wide discussion could include the development and adjudication of an institutional honor code. Properly designed and well-communicated honor codes are known to result in lower rates of cheating [3, 42–44]. This is likely related to the strong correlation between student values and cheating. However, possible weaknesses of honor codes include a reluctance of faculty to work within the academic codes despite institutional requirements to do so. In many cases, faculty prefer to deal with (or ignore) cheating because incidents of cheating are difficult to prove, there is a lack of knowledge regarding the policies of the institution, or the institution has an organizational culture that discourages faculty from reporting such cases [45–47]. This is a sentiment echoed by faculty interviewed by the authors at some institutions in which the faculty indicated little administrative support when dealing with cases of academic dishonesty. Unfortunately, this approach leads to an inherently unfair situation in which similar cases are treated differently, punishments are not consistent, morale is eroded, and repeat offenders are not identified.

5.3 Allow students to participate in in-class discussions to define cheating

Another possibility is to have students define integrity and academic dishonesty through in-class activities early in the semester. Open and candid discussion about expected behaviors will actively engage students' value systems and could lead to a course 'code of conduct.' Developing a course code of conduct also provides an opportunity to discuss professional codes of conduct [48]. This links their classroom behavior with expected professional behavior, and since engineering students are future engineering professionals, treating them as such will foster a better learning environment. However, the authors are not suggesting faculty only work within a student definition or code of conduct, but rather engage the students in drafting a common definition and code. From experience, a moderated discussion tends to yield classroom polices that are acceptable to faculty members and closely aligned with professional codes [48].

5.4 Establish a caring classroom environment

Another finding of the authors' research is that students clearly connect rationalizations with cheating and poor faculty instruction. While the authors do not condone cheating simply because of poor instruction, it does seem reasonable to suggest that this presents an opportunity for individual instructors to curtail cheating in their

classrooms by improving instruction, providing topical relevance, and showing concern for student learning. Faculty need to show the practical importance of learning the material and to foster an intrinsic motivation to learn the subject. When students believe that they are learning something for their own reasons, they are far less likely to engage in cheating. This can be accomplished through clearly stated learning objectives reinforced by meaningful learning experiences. This concept is reinforced by the *PACES-2* finding that undergraduates in engineering cheat more frequently than do those in humanities, independent of the number of opportunities to cheat. One plausible explanation involves the pedagogical methods and learning assessments used in the two disciplines.

5.5 Consider using alternative forms of assessment

The clearest result from the authors' research is the finding that students make a clear distinction between cheating on examinations and cheating on other forms of assessment, such as homework (problem sets) and term papers. As educators, we might ask ourselves why such distinctions are made. One hypothesis is that the current mode of educational assessment in the U.S. is one of summative assessment, rather than formative, which leads to an overemphasis on the importance of examinations and high pressure testing situations. Faculty need to ask themselves where the real learning is occurring in our classes and how best to accurately measure this learning. Specifically, the traditional engineering focus on the application of knowledge (versus the development of critical thinking skills) and the quantitative nature of engineering exams and homework (as opposed to the qualitative nature of essays, reports, and projects in humanities) might create a culture in which cheating is seen as an effective means of succeeding in engineering.

5.6 Appeal to students' sense of social obligation

Of the three potential consequences investigated in the *PACES-1 Study* (shame, loss of respect, and punishment) [13], an instructor's influence on whether a student feels shame is probably limited because shame results from a student's own ethical standards and moral values. However, the *PACES-2 Study* indicated college is a time for moral growth for students and an institutional culture can play a role [9, 49]. Therefore, if a student respects the instructor and would feel embarrassed if their instructor discovered they were cheating (i.e., would lose respect of the instructor), then this could be an effective deterrent. Since embarrassment results from social interaction and could be influenced by campus culture, both faculty and students could influence campus culture and promote academic integrity. Finally, punishment and formal sanctions are the most straightforward consequences to influence. However, while student responses indicate sanctions (i.e. the chance of getting caught) play a slightly larger role than shame and embarrassment (according to percentage of agreement), many students do not feel or are unsure whether the threat of sanctions would actually prevent them from cheating.

6. CONCLUSIONS

The authors continue to investigate, develop, and disseminate practical approaches for increasing academic integrity among engineering undergraduate students, which will in turn affect the integrity of engineers. Overall, the authors believe that the responsibility for promoting academic integrity lies with the entire college community, including students, academic institutions, and faculty as well as with engineering professionals who can provide positive role models for students and young engineers.

As a concluding thought, students from the authors' research were willing to engage in behaviors that they defined as wrong and which they perceived to carry risks of punishment. They were also more apt to cheat if they perceive they would feel no shame or embarrassment if discovered. Likewise, students who see little threat of being caught by their institution are also more likely to cheat. The frequency of student cheating depends on the student's definition. This suggests that a student's attitude toward the act has an important influence on their ultimate decision on whether to conduct the act. Likewise, the context in which ethical decisions are made clearly plays an important role in the ultimate behavior of engineering undergraduates. Both the *PACES-1* and *PACES-2* studies indicated that many factors that influence behavior appear to act independently of context including shame (*PACES-1* finding) and moral obligation (*PACES-2* finding). This suggests that approaches designed to affect the ethical decision-making process in one setting could extend to other settings if they are based on common underlying factors. Therefore, effective interventions such as those described in this paper could work across multiple settings thereby extending their influence.

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