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Classroom Cheating Among Natural Science and Engineering Majors*

Donald L. McCabe, *Rutgers, The State University of New Jersey, USA*

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ABSTRACT: *The topic of cheating among college students has received considerable attention in the education and psychology literatures. But most of this research has been conducted with relatively small samples and individual projects have generally focused on students from a single campus. These studies have improved our understanding of cheating in college, but it is difficult to generalize their findings and it is also difficult to develop a good understanding of the differences that exist among different academic majors. Understanding such differences may be important in developing improved strategies for combating college cheating. The objective of this paper is to examine the relation between cheating and the choice of academic major with a particular focus on natural science and engineering majors. The data source for this analysis is a study of over 4,000 students from 31 campuses which was conducted in the 1995-1996 academic year.*

INTRODUCTION

One doesn't need to talk to a natural science or engineering student very long to learn that today's students feel considerable pressures from what they often consider to be excessive workloads and extreme competitive pressures in the classroom and job market. Unfortunately, for many students these pressures turn into easy justifications for various forms of academic dishonesty or cheating. In a recent survey of college students, an engineering major at one of the nation's leading universities probably captured the sentiments of many when he said, "The pressure, workload, and difficulty of subject matter ... combine to build an attitude of 'doing whatever it takes'. I would cheat at any chance I could if I felt it would improve my chances at getting a good grade."

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Address for correspondence: Donald L. McCabe, Rutgers, The State University of New Jersey, 15 Washington Street, Newark, NJ 07102, USA.

Dr. McCabe is a Professor of Management at Rutgers and is currently serving as Associate Provost for Campus Development at Rutgers-Newark.

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Although these sentiments are not unique to engineering majors, or to the current generation of college students, it has been over 30 years since data have been reported that address the question of cheating among natural science and engineering students in any substantive way.[1] Since that time there have been significant changes in college curricula in general, and engineering programs in particular. For example, engineering students today increasingly find themselves involved in group projects and collaborative assignments which present a different set of issues with regard to cheating. In addition, today's natural science and engineering classrooms contain significantly greater numbers of women and minorities. This demographic change may have implications for the group norms that develop among natural science and engineering students.

This paper examines current trends in cheating among natural science and engineering students using data that were gathered in a large scale study of college cheating conducted in the 1995-1996 academic year. It also compares the behavior of natural science and engineering students with their peers in other majors. Finally, it suggests strategies that may help address the issue of cheating in today's natural science and engineering classrooms.

THE LARGER PICTURE

To fully understand the issue of cheating among natural science and engineering students, it will be helpful to first develop a broader perspective on the question of cheating in college. The most informative multi-campus study of college cheating available is one conducted by Bowers[1] in the early 1960's. In a mail survey of 5,422 students on 99 campuses, Bowers gathered data on the prevalence of cheating, student attitudes toward cheating, and the effectiveness of different institutional arrangements for controlling cheating among students.

More than 75% of the students responding admitted that they had engaged in one or more of 13 specific acts that might be considered cheating, ranging from such serious behaviors as using unauthorized crib notes on an exam to instances of working on homework assignments with other students when the teacher does not allow it. Half of the respondents admitted they had engaged in at least one of the four most serious forms of cheating identified by Bowers.

Although Bowers found many different factors were related to the prevalence of cheating on a particular campus, the most significant was the climate of peer disapproval of cheating among the student body as a whole, as well as among one's immediate peer group. Although many students viewed cheating as morally wrong, their actual behavior was powerfully influenced by this climate of peer disapproval of cheating. Bowers also found that the formal arrangements for controlling academic dishonesty on a campus had a strong influence on the level of cheating; in particular, the presence or absence of an honor code.

Thirty years later, in a study of 6,096 students at 31 schools with highly selective admissions standards, McCabe and Trevino[2] reported similar findings. Relying on a social learning perspective,[3] McCabe and Trevino concluded that the strong relation

they observed between student cheating and students' perceptions of dishonest behavior on the part of their peers, "may suggest that academic dishonesty is not only learned from observing the behavior of peers, but that the peers' behavior provides a kind of normative support for cheating." [p. 533] [2]

Although McCabe and Trevino, like Bowers, concluded that honor codes were effective in reducing academic dishonesty among students,* they reported that the most critical factor in reducing student cheating is the ability of an institution "to develop a shared understanding and acceptance of its academic integrity policies [which] has a significant and substantive impact on student perceptions of their peers' behaviors, the most powerful influence on self-reported cheating." [p. 533] [2] Honor codes are one effective way to do this, but not the only way.

Even though McCabe and Trevino gathered their data at institutions that were small to medium in size and where most students lived on campus (factors generally associated with lower levels of cheating), and although half of them had traditional academic honor codes, two out of three students reported they had engaged in at least one of 14 specific acts that might be considered cheating. These acts were very similar to the 13 behaviors studied by Bowers (10 were identical), ranging from the use of unauthorized crib notes to instances of unpermitted collaboration among students on course assignments.

In 1993, McCabe and Trevino[4,5] surveyed 1,793 students at nine medium to large state universities with moderately selective admissions policies. None of these schools had academic honor codes but all had participated in the original Bowers survey in 1963. Eighty-two percent of the survey respondents at these nine schools admitted to at least one incident of cheating in the Bowers survey and this number had increased slightly to 84% in 1993, an increase that belies the media's general characterization of cheating on college campuses as 'epidemic'.[6]

However, McCabe and Trevino did find a substantial increase in the number of students who reported incidents of the most serious forms of cheating on examinations. For example, students admitting to copying from another student on an examination doubled from 26% to 52% between 1963 and 1993. Instances of helping someone else cheat on an examination and the use of crib notes each increased more than 50%. McCabe and Trevino also observed a four-fold increase (from 11% to 49%) in the number of students who admitted they had collaborated on assignments when the instructor had specifically asked for individual work. This survey[4] also provided additional support for Bowers' findings on the importance of peer disapproval as a deterrent of academic dishonesty. A stepwise regression of the personal and contextual variables studied by McCabe and Trevino revealed that peer disapproval explained more of the variance in academic dishonesty (16%) than the rest of the variables in their model combined. Perceived peer behavior was the second most significant independent variable in the regression model.

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* Fourteen of the 31 schools in the McCabe and Trevino sample employed traditional honor codes. Such codes typically feature non-proctored exams, a student judiciary, the use of a pledge which students sign to indicate their work is their own, and/or some form of reporting requirement for students who observe others cheating.

Several consistent themes emerge from the Bowers and McCabe and Trevino studies. First, even though students generally agree that cheating is wrong, cheating is prevalent on most campuses. Second, peer behavior and peer disapproval are major influences on a student's decision to cheat or not to cheat. However, a number of other contextual factors (e.g., academic selectivity and size) and, in particular, the presence of an academic honor code, also exhibit a significant relation with the level of campus cheating. Finally, there have been significant increases in the incidence of collaboration and serious forms of examination cheating over the last 30 years.

THE RELATIONSHIP BETWEEN CHEATING AND ACADEMIC MAJOR

Several studies have examined the relationship between academic major and the prevalence of cheating. Although some only include students from a single campus, they are still informative. For example, Harp and Taietz[7] examined the incidence of cheating among men in three different colleges of an Ivy League institution. One of their objectives was to understand whether differences in curriculum or differences in the individual characteristics of students entering the different colleges (arts and sciences, engineering, and agriculture) might lead to differences in the level of academic dishonesty. Using self-reported cheating on term papers as their measure of academic dishonesty, Harp and Taietz reported, "(f)ollowing freshman year a significant difference in the incidence of cheating on term papers is found for the three colleges. Forty-two and fifty per cent of the students in Agriculture and Engineering reported cheating compared with twenty-six per cent for Arts and Sciences." [p. 367][7] Harp and Taietz noted this result was consistent with earlier findings that cheating is often greater among students in more vocationally oriented majors or colleges.

Bowers[1] reached essentially the same conclusion. Looking at cheating by major, Bowers found significant variations in the percentage of students who self-reported one or more incidents of academic dishonesty ranging from 66% for business students and 58% for engineering students to as low as 37% for students majoring in languages and 39% for humanities majors. Bowers suggested that students majoring in business, engineering, and teacher training were pursuing majors with more immediate career pay-offs and he interpreted his findings on the relation between cheating and choice of academic major as confirmation that such students were less committed to "the intellectual life" and thus more likely to cheat.

NATURAL SCIENCE AND ENGINEERING STUDENTS IN THE 1990'S

Although these studies are informative, it has been 30 years since any significant data has been reported on cheating among natural science and engineering students. During that time, the natural science and engineering majors have undergone dramatic change —e.g., an increasing emphasis on group projects and other forms of collaborative learning, a greater number of female students in both majors, and increased cultural and ethnic diversity among students.

As suggested earlier, the primary objective of this paper is to examine current trends in cheating among natural science and engineering students and to compare the

behavior of natural science and engineering students with their peers in other majors. The data employed in this study were collected in the 1995-1996 academic year in a replication of McCabe and Trevino's[2] 1990-1991 survey of students at 31 highly selective institutions. The same 31 schools participated in both surveys and similar methodologies were employed in both survey administrations — an anonymous mail survey that asked respondents about their own cheating behaviors, their personal attitudes about cheating, their assessment of cheating among their peers, and their assessment of their institution's policies on academic dishonesty.

In 1995-1996 surveys were sent to 400 students at 30 of the participating schools but only 100 surveys were distributed at the remaining school due to a misunderstanding about the distribution protocol. Of the 12,100 surveys mailed, 128 (1.1%) were non-deliverable and 4,279 completed surveys were returned, a response rate (35.7%) comparable to the original McCabe and Trevino survey. The response rate among students at honor code schools (41.4%) was significantly higher than the rate among students at non-honor code schools (30.8%) and at individual schools the response rate ranged from a low of 22.3% to a high of 57.8%. The general profile of the respondent group (age, class, ethnicity, majors) compared favorably with the overall student profile of the participating schools with a single exception. As was true in the original McCabe and Trevino survey, women were over-represented in the final sample, accounting for 67% of the respondents, about 11% more than expected.

McCabe and Trevino[2] observed that significant variations exist in the cheating behaviors and attitudes of students on different campuses. Since natural science and engineering students are the focus of the present analysis, the decision was made to retain in the final sample only those schools which offer both majors. This reduced the final sample to 16 schools — 11 of the 17 non-code schools and 5 of the 11 code schools surveyed. This reduced sample included 1,164 respondents at the non-code schools and 782 respondents at schools with honor codes.

Several summary indicators of cheating were used to characterize the propensity of students to cheat. Four behaviors which prior research has shown students consider to be cheating in almost all circumstances (copying from another student on an examination without his/her knowledge, copying from another student with his/her knowledge, using unauthorized crib notes or cheat notes, and helping someone else to cheat on an examination) were included in a statistic called 'Serious Examination Cheating'. A fifth behavior, finding out what is on an exam ahead of time from someone who has taken the exam earlier, which many students do not consider to be cheating, was included with the four serious forms of examination cheating to create a measure called 'All Examination Cheating'. Similar statistics were constructed for cheating on written work. The index 'Serious Written Cheating' included turning in copied material as your own work, fabricating or falsifying a bibliography, turning in work done by someone else, and copying a few sentences without footnoting them. The index 'All Written Cheating' included these four behaviors plus instances of working with other students on assignments where the instructor wanted individual work. As suggested earlier, many students do not consider this cheating. Finally, a statistic labeled 'Repetitive Examination Cheating' was constructed and included all

students who admitted to four or more incidents of serious examination cheating. A similar statistic was constructed for 'Repetitive Written Cheating'. The percent of students who self-reported cheating in these different ways is shown in Table 1 for students attending schools that do not have an academic honor code and in Table 2 for those that do.

Table 1
Summary Cheating Indicators
% Students Admitting to Various Forms of Cheating — By Major at No Code Schools

	Business (N=111)	Engineering (N=255)	Natural Sciences (N=235)	Social Sciences (N=385)	Other (N=153)
Serious Examination Cheating	64%	51%	45%	46%	48%
Repetitive Examination Cheating	36%	23%	16%	19%	16%
All Examination Cheating	85%	68%	60%	63%	66%
Serious Written Cheating	75%	70%	60%	56%	57%
Repetitive Written Cheating	32%	27%	16%	20%	16%
All Written Cheating	86%	82%	77%	70%	70%
All Serious Cheating	88%	81%	73%	70%	70%
Total Cheating	96%	90%	83%	83%	85%

Table 2
Summary Cheating Indicators
% Students Admitting to Various Forms of Cheating — By Major at Code Schools

	Business (N=37)	Engineering (N=139)	Natural Sciences (N=206)	Social Sciences (N=304)	Other (N=85)
Serious Examination Cheating	46%	21%	25%	30%	32%
Repetitive Examination Cheating	27%	5%	5%	9%	7%
All Examination Cheating	62%	29%	31%	39%	45%
Serious Written Cheating	65%	50%	38%	40%	33%
Repetitive Written Cheating	16%	17%	4%	8%	14%
All Written Cheating	70%	61%	49%	51%	44%
All Serious Cheating	73%	56%	49%	53%	51%
Total Cheating	76%	68%	57%	61%	60%

These data support several important conclusions. First, we once again see that cheating is prevalent with 83% to 96% of the students in the no code sample admitting to one or more incidents of cheating and 70% to 88% admitting to at least one incident of serious cheating. In the case of code schools, 57% to 76% of the respondents self-reported at least one incident of cheating, with 49% to 73% admitting to at least one serious incident. Among students in the no code sample, one in three business majors

and one in four engineering majors were classified as repetitive exam cheaters—i.e., students who admit to four or more incidents of serious examination cheating.

The second major finding we observe in comparing Tables 1 and 2 is the expected lower rate of academic dishonesty at schools with honor codes. Whether we look at examination cheating or cheating on written work, there is a significant difference in the number of students who admit to cheating at no code and code schools. All but one of these differences (repetitive cheating on written work in the 'Other' major category) are statistically significant ($p<.05$ or better).

As suggested by prior research, students majoring in business report higher levels of cheating on all of the summary indicators. The differences for cheating on examinations are significant vs. all majors ($p<.01$) while the differences for cheating on written work are generally significant ($p<.01$) vs. all majors except engineering. While students majoring in the natural sciences generally report levels of cheating comparable to students in the social sciences and other majors, we see a somewhat different pattern for the engineering students. First, although the differences are only consistently significant in the case of written work ($p<.05$), engineering students at schools without an honor code (Table 1) report higher levels of cheating than students majoring in the natural sciences, the social sciences, and the other major category. At schools with honor codes (Table 2), although engineering students report higher levels of cheating on written work than natural science, social science, and other majors ($p<.05$), they consistently report the lowest levels of cheating on examinations although the differences vs. natural science majors are not statistically significant ($p<.05$).

In general, these results are consistent with prior research—higher levels of cheating are found in the more vocationally oriented majors of business and engineering, with the highest levels found among business majors. In contrast, self-reported cheating among natural science majors is generally comparable to students majoring in the social sciences and humanities. The one surprising finding is the lower levels of self-reported cheating on examinations among engineering students at honor code schools. The data collected in this project do not provide an explanation for this result but one possibility may merit further study.

Comparison of the data collected in this study to that collected by McCabe and Trevino[2] in their 1990-1991 study finds exam cheating, especially serious exam cheating, is one of the few areas showing significant increases in cheating. In contrast to this general result, self-reported exam cheating by engineering students at code schools was unchanged over this period with 21% of engineering students admitting to serious examination cheating in both surveys. In the open-ended comments collected from students in the 1995-1996 survey, many engineering students talk about the increasing emphasis on project assignments, particularly collaborative assignments. If examinations in engineering courses now account for less of a student's total term grade, particularly for students at honor code schools where cheating on an examination is a particularly high risk behavior, we might expect such cheating to decline. Clearly, further work is needed to fully understand these results.

Tables 3 and 4 provide data for the specific behaviors in which students have engaged. In addition to the behaviors that comprise the serious cheating statistics discussed above, Tables 3 and 4 also look at three behaviors that are clearly problematic for engineering and, to a lesser degree, natural science students—collaboration on assignments, copying of computer programs, and falsification of lab data. In the case of serious exam cheating, we again see important differences between engineering students at non-code vs. code schools. While engineering students at non-code schools generally report higher levels of cheating for each of the four behaviors which comprise the serious exam cheating statistic (vs. all majors except business), these comparisons are significant only in the case of using crib notes. In contrast, engineering students at schools with honor codes report among the lowest levels of cheating for each of these behaviors. Most of these comparisons are statistically significant in the case of social science ($p<.10$) and other ($p<.05$) majors, but are not significant in the case of students majoring in the natural sciences. In contrast, engineering students at both code and non-code schools generally report higher levels of cheating on written work ($p<.05$) compared with students in the natural sciences, social sciences, and other majors. Students majoring in the natural sciences, at both code and non-code schools, consistently report among the lowest levels of cheating on both exams and written work.

Table 3

% of Students Admitting to Various Forms of Cheating — By Major at No Code Schools

	Business (N=111)	Engineering (N=255)	Natural Sciences (N=235)	Social Sciences (N=385)	Other (N=153)
Serious Exam Cheating					
Copied on exam without other's knowledge	38%	30%	28%	29%	32%
Copied on exam with other's knowledge	36%	19%	14%	16%	14%
Used crib notes	34%	27%	16%	14%	12%
Helped other cheat on exam	41%	27%	22%	25%	21%
Serious Cheating on Written Work					
Turned in copied material as own work	30%	27%	18%	20%	21%
Fabricated/falsified bibliography	43%	28%	26%	26%	30%
Turned in work done by someone else	17%	24%	15%	10%	10%
Copied a few sentences without footnoting	63%	48%	42%	44%	39%
Other					
Worked on assignment with others when instructor wanted individual work	60%	62%	52%	46%	43%
Copied another's computer program	32%	52%	19%	17%	13%
Falsified lab data	26%	64%	57%	29%	22%

Table 4

% of Students Admitting to Various Forms of Cheating — By Major at Code Schools

	Business (N=37)	Engineering (N=139)	Natural Sciences (N=206)	Social Sciences (N=304)	Other (N=85)
Serious Exam Cheating					
Copied on exam without other's knowledge	32%	14%	19%	21%	29%
Copied on exam with other's knowledge	27%	3%	4%	7%	0%
Used crib notes	19%	9%	5%	10%	5%
Helped other cheat on exam	39%	4%	7%	10%	7%
Serious Cheating on Written Work					
Turned in copied material as own work	16%	23%	7%	9%	12%
Fabricated/falsified bibliography	38%	15%	11%	19%	15%
Turned in work done by someone else	14%	11%	4%	5%	4%
Copied a few sentences without footnoting	54%	34%	30%	29%	24%
Other					
Worked on assignment with others when instructor wanted individual work	54%	31%	29%	26%	24%
Copied another's computer program	11%	17%	5%	3%	1%
Falsified lab data	22%	39%	38%	29%	20%

Student responses to open-ended survey questions about cheating suggest engineering students typically 'justify' their higher levels of cheating on written work by citing the extreme workloads they are routinely assigned and their inability to keep up with this workload on a consistent basis. Many engineering students believe the only way to survive is to take occasional short cuts such as copying someone else's work and engaging in limited plagiarism. Whether or not they are morally comfortable with this position, some (perhaps many) see it as the only option. Some engineering students noted their frustration with the non-engineering courses they are required to take to meet their school's graduation requirements, especially liberal arts courses. Convinced that they don't need and will never use what they learn in such courses, these courses become particular targets for cheating, especially in cases where the workload is high or where the professor is not performing up to students' expectations. Although much of the cheating on written work by engineering students which is reflected in Tables 3 and 4 probably occurs in their natural science and engineering courses, it is also clear that much of this cheating is done in these 'non-essential' liberal arts courses which are often viewed, as one student put it, simply as "hassle requirements".

The cheating behaviors shown at the bottom of Tables 3 and 4 highlight areas with which natural science and engineering students struggle every day. For example, about 60% of the natural science and engineering students at non-code schools and 40% of those at code schools admit they have falsified or fabricated lab data at least once, rates significantly higher than any other majors. While this result is not surprising since natural science and engineering students almost always take more lab courses than other students, it is of obvious concern since it is the cheating behavior most frequently cited by natural science and engineering students. Although integrity in research is a fundamental principle in the natural sciences, students simply do not see this behavior as problematic. Citing the poor facilities and materials they are provided in their lab courses, the limited time they have access to the lab (so repeating a failed experiment is typically not possible), the inadequate assistance they receive from lab assistants (with language problems cited as an issue by many students), and the less frequently cited issue of the irrelevance of many labs, students often blame their instructor or school for the cheating that necessarily goes on in labs. In an era of shrinking resources at most schools, this is obviously an issue of concern.

In the case of copying computer programs, the rationale for cheating is straightforward for many students - it's simple, almost impossible to get caught if you simply change a few variable names or steps from the original program, it frees up precious time to do other work, and in some cases it's viewed as the only way to complete a difficult assignment. Perhaps a more interesting issue with regard to cheating behaviors enabled by computer technologies is the proliferation of term paper services on the Internet. Word of mouth information would suggest that this type of activity is spreading and it may become a significant concern in the future.

STRATEGIES FOR REDUCING CHEATING

Perhaps the most important question raised by these data is what can be done to reduce the level of cheating among college students, particularly in light of the evidence that there is some continuing erosion of academic integrity among students. While there are no simple answers, there do seem to be some logical strategies that will help. The most important may be the simplest—engaging students on every campus in a dialogue on the issue of academic integrity. Students need to know that their institutions and faculty think the issue is important. As noted earlier, although the data suggest that academic honor codes are effective in reducing cheating, very low levels of cheating were found at selected non-code schools. Study of these schools suggests that the critical factor is establishing a dialogue with students that says the institution, including its faculty, values academic integrity and which encourages students to take responsibility for the issue of academic integrity, to create a climate where cheating is socially unacceptable among students.

While such a strategy is difficult to achieve in large institutions, this may be a significant opportunity for engineering schools or departments. More so than almost any other major at the undergraduate level, engineering students are a community onto themselves. They take many of the same courses (often identical in their first and

second years), experience the same workload pressures (which they feel distinguish them from their non-engineering peers), aspire to belong to a distinct profession (one which has a tradition of adhering to codes of professional behavior), and, in general, develop into a community of their own. The work of Bowers[1] and McCabe and Trevino[4] suggests that the development of community is one reason why smaller schools generally have greater success with honor codes. A sense of community spirit and ownership can be developed which helps students accept responsibility for the governance and behavior of the community, including their own behavior as a member of the community.

THE M.I.T. EXPERIENCE

There is much that individual faculty members can do in their own courses to reduce cheating and several good examples were delineated in a study of cheating conducted at MIT in 1992.[8] At the top of the list was providing students more explicit guidelines (both written and oral) about the limits of collaboration. "Collaboration is clearly helpful to learning and should be widely encouraged, but the limits of collaboration must be clear."[p. 16][8] The MIT study also looked at the issue of workload for natural science and engineering majors and suggested that some mechanisms should be put in place where students can turn for assistance when needed. Putting support mechanisms in place at critical time periods, for example early in one's academic career and during examination periods, might be particularly helpful.

A pervasive problem found on the MIT campus was the availability of course 'bibles' for many courses—a compilation of old homework problem sets, quizzes, and exams for the course. MIT's study suggested that "faculty should minimize their reliance on previously-used homework problem sets, quizzes, and exams," and student comments support this view. Whether it is course 'bibles' or alleged fraternity/sorority files of old exams and papers, when the general belief is that some students have access to such favored information, students who do not feel they are justified in reducing their relative disadvantage in other ways. This is one of the many ways in which students who agree cheating is morally wrong feel justified in cheating. The MIT study also noted the importance of punishment as a deterrent to cheating. Cheating occurs less frequently in environments where students perceive there is some likelihood of punishment and where the likely severity of that punishment is more than a slap on the wrist.

But perhaps the most important result of the MIT study was the finding that the level of cheating found at MIT rivaled the low levels of cheating found among natural science and engineering students at schools with honor codes. MIT, arguably one of the best and most competitive engineering schools in the world, has achieved a degree of success in minimizing academic dishonesty among its students without relying on an honor code strategy. What MIT has done is create a strong sense of community among its students, to put programs in place to ease the transition of students from high school to college, and to send the clear message to students that academic integrity is an important value to the Institute. For example, when a widespread

homework cheating incident was uncovered at MIT in 1990, they did not ignore it, as many schools would have for fear of adverse publicity. Instead, they took the issue head on and embarked on an extensive review of the 'state of cheating' at MIT, which culminated with a very public year long review process in the 1992-1993 academic year during which the Institute clearly let it be known to all of its constituencies that academic integrity must be a core value at MIT. Such outward expressions of commitment to academic integrity by both the institution and its faculty are critical components of any strategy to enhance academic integrity among students

CONCLUSIONS

While cheating among college students is obviously not a recent phenomenon, the data presented here raise several concerns. Clearly, cheating among college students is prevalent and it is even common among students who acknowledge that it is morally wrong. Morality does not seem to be a major influence on student decisions to cheat or not to cheat. Peer disapproval of cheating and the behavior of peers are clearly much greater influences and may help explain the success of academic honor codes in reducing cheating.

While the general level of cheating has not increased dramatically over the last few decades, data suggest that the level of serious cheating on examinations and instances of unauthorized collaboration have increased significantly. In the case of collaboration, students seem confused. They are receiving a clear message from the corporate world that the ability to work together in teams (collaborate) is an important skill to acquire. Yet the message they receive from their instructors is mixed. Some require collaborative work, some encourage it, some forbid it (even in cases where there seems to be an obvious pedagogic advantage to group learning), and in perhaps the worse case, no instructions are provided at all. In the midst of this confusion, students appear to be taking this decision into their own hands, especially in cases where explicit guidelines are not provided or where they see value to collaborative work even if the instructor has asked for individual work. Computer technologies are also introducing a new dimension into the issue of student cheating, making some forms of cheating easier and introducing new forms.

Confirming evidence gathered by Bowers[1] 30 years ago, cheating is highest among students majoring in more vocationally oriented majors such as business and engineering. In general, cheating among students majoring in the natural sciences is unremarkable compared with cheating among students in the social sciences and humanities. Although natural science majors, like engineering majors, report significantly higher levels of cheating in lab courses, this is probably a simple question of greater opportunity. Significantly lower levels of cheating are found among students attending schools with academic honor codes, but at the five honor code schools studied here these codes had a particularly strong impact in reducing serious cheating on examinations among engineering students.

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