

# Results of a 16-Year Study of Cheating in Introductory Science Classes

Randy Moore and Murray Jensen  
University of Minnesota, Minneapolis, MN, USA  
RMoore@umn.edu

## *Abstract*

In a 16-year study involving more than 4,800 students, fewer than 2% of students were caught cheating in introductory science classes. The most common type of cheating was plagiarism in lab reports (50% of incidents), followed by altering exams (41%) and submitting falsified lab data (9%). Cheating occurred among students earning all grades in the course. When the penalties for cheating were ignored, the overall course letter-grade distributions for cheaters and non-cheaters were similar. The results indicate that cheating in introductory science classes is not as prevalent as has often been reported, and that cheating has no clear benefit in terms of percentage grades.

## *Introduction*

Introductory science classes are among the most difficult classes at most colleges and universities; at many schools, more than one half of the students in these courses earn a D, F, or W (Congos, Langsam, & Schoeps, 1997). The challenges of these courses, combined with many students' poor preparation for college science classes (e.g., only 26% of high school graduates in 2004 who took a widely used college-entrance exam in the United States were academically prepared to take college biology [Cavanagh, 2004]), often create high-pressure, highly-competitive environments. Although many students thrive in such environments, others struggle, and many students search for shortcuts to success. These factors contribute to a problem that is widely acknowledged and frequently discussed, but never studied: cheating by students enrolled in introductory science classes.

To ensure that grades are an accurate representation of students' knowledge and mastery of skills, instructors struggle against teaching and its justifications. This is a major challenge. For example:

- From 40-90% of all students cheat (Aiken, 1991; Genereaux & McLeod, 1995; McCabe, 1996, 2005; McCabe & Treviño, 1996; Milton, Pollio, & Eison, 1986; Slobogin, 2002).
- The frequency of cheating at colleges and universities is increasing (McCabe, 2005; Rittman, 1996). This increased incidence of cheating is correlated with an increase in the percentage of students who want to do as little as possible to earn a college degree (McCabe, 1996).
- Many students do not see anything wrong with cheating. For example, one half do not consider copying questions and answers from a test to be cheating (Slobogin, 2002).
- Although academic honor-codes reduce cheating, faculty are often reluctant to report or penalize cheaters; almost one half of teachers who know of cheating in their courses have never reported a cheater to an appropriate campus authority (Innerst, 1998; Kuriakose, 2003; McCabe, 2005; McCabe, Treviño, & Butterfield, 2001). Undergraduates who cheat are supported by a large array of how-to books and websites (e.g., *Cheater.com*, 2006; *School Sucks*, 2006).

These data have prompted researchers to describe cheating at colleges and universities as “prevalent,” (McCabe, Treviño, & Butterfield, 2001, p. 29), “rampant” (Cizek, 1999, p. 9),

“epidemic” (Kuriakose, 2003, p. B3), and “widespread” (Tang & Zuo, 1997, p. 340). Because such descriptions are not consistent with our experiences in introductory science classrooms, we searched the literature to determine if there had been any published studies of cheating in college science courses. We were surprised to learn that there have not been any such studies. A study of cheating in college science classes would be important because students who cheat in academic settings are more likely to demonstrate future professional misconduct (Turrens, Staik, Gilbert, Small, & Burling, 2001).

Many factors are associated with cheating, including competition and pressure (Aiken, 1991; McCabe, Treviño, & Butterfield, 2001), students’ lack of mastery motivation (Jordan, 2001), situations perceived as unfair (Barnett & Dalton, 1981), instructors’ lax attitudes toward cheating (Davis, Grover, Becker, & McGregor, 1992), and a decline in ethical values (Roberts & Rabinowitz, 1992). Most studies of undergraduate cheating have studied students’ motivation and morals (Newstead, Franklyn-Stokes, & Arnold, 1996). Virtually all of these studies have been based on self-reported data instead of actual classroom events, and have involved widely differing standards (e.g., glancing at a classmate’s paper was evaluated the same as repeated instances of plagiarism).

### ***Purpose of the Study***

The purpose of this study was to characterize the cheating that occurs in introductory science courses. We wanted to answer several questions, including the following:

- How common is cheating?
- What types of cheating are most common?
- What kinds of students cheat?
- How do students respond when they’re caught cheating?

Answering these questions is important because cheating corrupts academic integrity, predicts future misconduct, is unfair to students who do not cheat, and misguides students in their future work.

### ***Methods***

This study was conducted over 16 years (from 1988-1998 and 2000-2006) at three large research-oriented universities in the upper Midwest of the United States. All of the studies were done in large, traditional, introductory biology courses that were taught by the same instructor. Like most introductory science courses, the ones studied here included 3 hours of lecture and 2 hours of lab per week. Lecture exams and the final exam consisted only of multiple-choice questions, and lab grades were based on written lab reports that were due the week after each lab.

The importance of academic integrity and the consequences of cheating were discussed at length in the syllabus, on the first day of class, and in the first lab. This study included 34 sections that enrolled a total of 4831 students; each section enrolled an average of  $142 \pm 13$  students (range = 78-202). We tried to minimize cheating by 1) seating students far apart during exams, 2) informing students of the ethical problems and academic risks associated with cheating, and 3) not allowing them to bring food, drinks, books, notes, electronic devices, cell phones, or any other items to exams.

To avoid the complications associated with some of the previous studies of cheating, we restricted this study to students who committed the same types of cheating in the same course. We characterized only the most egregious types of cheating in which the evidence of cheating was irrefutable (see below). Throughout the study, all of the systems for detecting cheating were similar. The 82 students who were caught cheating in this study cheated in the following three ways:

1. *Submitting falsified data.* These incidents involved students who missed labs but submitted falsified data in a subsequent lab report. These incidents were detected when students who had missed the previous week's lab submitted lab reports describing work that they had allegedly done in the missed lab.
2. *Altering exams.* All of these incidents involved students changing their exams and then claiming that the exam had been misgraded. These incidents were detected by comparing the altered exam with a photocopy of the exam made before the exams were returned to students.
3. *Plagiarism.* These incidents involved entire paragraphs, or multiple paragraphs, in lab reports and not isolated phrases or single sentences. In some instances, the plagiarism was easy to detect (e.g., when students also cut-and-pasted advertisements or other students' names from the websites that they plagiarized). Because we almost certainly did not detect all incidents of plagiarism, the data reported here for plagiarism underestimate the extent of plagiarism. There were no "favorite" labs that were plagiarized more often than other labs.

One of us (plus a witness) met with each of the 82 students individually at the end of the term. Each of these meetings began with us asking the student about their specific incident of cheating; that is, if they had altered their exam, if they had gathered the data that they submitted in their lab report, or if their lab report included plagiarized text. If the cheaters admitted during the meeting that they had cheated, we lowered their final course-grade by one letter-grade. If they did not admit that they had cheated, they received an F in the course. One of the 82 students was caught cheating multiple times during the same semester. All of the incidents of cheating were reported to university officials, and students were encouraged to appeal our sanctions if they believed that they had not, in fact, cheated.

## **Results**

*How many students cheat?* The average percentage of students who were caught cheating was  $1.68 \pm 0.24\%$  (range = 0-4.2%). Plagiarism comprised 50% of the incidents of cheating, followed by altering exams (41%) and submitting falsified data (9%). Only two (i.e., 6%) of the 34 sections had no cheating. None of the students appealed our accusation or sanction. There were no discernible differences in the prevalence of cheating in Fall as compared to Spring classes, in different years of the study, in early-morning classes as compared to classes offered later in the day, and among men as compared to women.

*How do students respond when asked about their behavior?* All of the students initially denied having cheated. When we then showed them the evidence that they had cheated (e.g., the photocopy of their original exam and the altered exam, or the website from which they had cut-and-pasted text), 63% admitted that they had cheated. The other 37% continued to proclaim their innocence, despite the evidence, and often provided remarkable excuses and justifications (e.g., "the photocopy machine made a mistake," "I guess I just happened to use the same words as that website," and "changing only three answers out of 50 isn't really cheating").

*What kinds of students cheat?* Table 1 characterizes the academic performances of the cheaters and non-cheaters in the course. Numbers in the table are percentages that do not include the penalties imposed for cheating. The final percentage grades of cheaters (i.e., 68%) and non-cheaters (i.e., 70%) were not significantly different (i.e.,  $p > 5\%$ ). However, the final grades of students who altered their exams were significantly higher ( $p < 0.1\%$ ) than the final grades of other cheaters, and students who committed plagiarism earned higher final grades than students who falsified data ( $p < 0.1\%$ ). Similar trends characterized all aspects of the students' grades (i.e., lecture exams, final exam, and lab; Table 1).

**Table 1**  
*The Academic Performances and Behaviors of the 82 Cheaters in This Study* (Numbers in the table are percentages that do not include any penalties for cheating.)

Student type	Dimension				
	Lecture exams	Final exam	Attendance	Lab reports	Course
Non-cheaters	67 ± 3	69 ± 5	69 ± 4	73 ± 3	70 ± 3
Cheaters	64 ± 3	58 ± 5	69 ± 5	74 ± 4	68 ± 4
Plagiarism	64 ± 3 <sup>a</sup>	59 ± 5	68 ± 5	69 ± 3	66 ± 4
Exams	67 ± 4	64 ± 5	78 ± 5	82 ± 4	75 ± 4
Lab data	51 ± 3	39 ± 7	41 ± 8	66 ± 4	53 ± 4

<sup>a</sup> For example, students who committed plagiarism had an average score on lecture exams of 64%.

Table 2 contrasts the letter-grade distribution of non-cheaters with the distributions for the different types of cheaters had they not been penalized for cheating. Although the overall distributions of grades were similar for cheaters and non-cheaters, the grade distribution for students who altered their exams was higher than that of non-cheaters (e.g., As and Bs accounted for 49% vs. 35%, respectively). Students who falsified data had the lowest distribution of grades (i.e., all made Ds or Fs).

## **Discussion**

*Strengths of the study.* Unlike many previous studies of college cheating, this study was a multi-year study conducted in the same large, traditional, introductory biology class. The incidence of cheating and the different types of cheating were similar every semester. Moreover, and also unlike previous studies, this study used the same measures to identify explicit and egregious types of cheating; we did not include unsubstantiated accusations, questionable incidents of cheating (e.g., a student allegedly looking at another student's paper), or undocumented suspicions of cheating. With the exception of plagiarism, we identified all of the other incidents of cheating listed above. We also avoided the unreliability of self-reported data (Caron, Whitbourne, & Halgin, 1992; Sappington, Kinsey, & Munsayac, 2002) and differing standards for measuring cheating by using actual classroom events instead of hypothetical situations posed on questionnaires. Finally, this study should provide a baseline for future studies because it is the first study of cheating in introductory college science classes.

Table 2

*The Final Letter-Grades of the 82 Cheaters in This Study had They not Been Penalized for Cheating*

Student type	Course letter grade				
	A	B	C	D	F
Non-cheaters	9 <sup>a</sup>	26	28	18	19
Cheaters	5	26	30	13	26
Plagiarism	0	18	35	12	35
Exams	11	38	28	6	17
Lab data	0	0	0	67	33

<sup>a</sup> For example, 9% of the non-cheaters made an A in the course.

*Weaknesses of the study.* Our study did not address or include all types of cheating (e.g., we did not include suspicions of a student looking at a classmate's exam). Despite the many precautions taken to minimize cheating, some students may have had notes written on the palms of their hands or used concealed "cheat sheets" during an exam. Similarly, we undoubtedly did not catch all instances of plagiarism. There may have also been other types of cheating that occurred that we did not know about.

*How common is cheating in introductory science courses?* Data presented here indicate that when precautions are taken to minimize cheating, very few students are caught cheating in introductory science courses. In fact, cheaters accounted for less than 2% of the students enrolled in the course. These data suggest that cheating, as identified and measured in this study, is relatively rare in introductory science classes. The large discrepancy between previous estimates of cheating among undergraduates and those reported here for those in introductory science classes may be due to the strict policies that were emphasized on the first day of class. Indeed, students are less likely to cheat if they are given few opportunities to do so and are told about a course's strict policies regarding cheating at the beginning of the course (Rittman, 1996).

*What was the average hoped-for benefit of cheating?* Had they gone undetected, the incidents of cheating would have increased each student's course percentage grade an average of only  $0.42 \pm 0.05\%$  (range = 0.2-1.4%). This was determined by calculating the points involved in each incident (in the case of a lab report, this was all points for the lab) and then determining the percentage that those points were of the total. These results indicate that some students will take large risks (i.e., risk failing a course) for negligible improvements in their final grades. These results support the claim of Whitley (1999) that cheating does not substantially improve students' grades.

*What are the most common types of cheating?* Given the restrictions we imposed to minimize cheating (e.g., placing students far apart during exams, not allowing books or electronic devices at exams; see above), plagiarism was the most common type of cheating (one half of all incidents), followed by altering exams (41%) and submitting falsified data (9%). Although various technologies can minimize plagiarism (e.g., *Turnitin*, 2006), all incidents of plagiarism cannot be

eliminated, especially in courses that require written reports (as do most introductory science courses).

*Who cheats?* Students at all grade-levels cheat. When the penalties for cheating were ignored, the average final letter-grades of cheaters were not significantly different from those of non-cheaters (Table 2). Had there not been any penalties for cheating, the cheaters and non-cheaters in this study would have earned similar percentages of all final grades. These results are consistent with studies of non-science classes (Desruisseux, 1999; Kuriakose, 2003; McCabe, 2005; McCabe & Treviño, 1996; Milton, Pollio, & Eison, 1986) reporting that cheating was common among students at all grade-levels. Clearly, the pressure to avoid a failing grade does not explain all of the incidents of cheating.

*Responses to being caught cheating.* When asked if they had cheated, all students initially claimed that they had not cheated, and only 63% admitted to cheating when they were shown the irrefutable evidence that they had cheated. The students who admitted to cheating all claimed that they had learned a lesson and expressed regret, but we could not determine if they regretted their cheating or having been caught cheating. These results indicate that most cheaters will acknowledge and take responsibility for their cheating only after being confronted with evidence that they cheated.

### **Conclusions**

1. Cheating can be minimized, but undoubtedly not eliminated. When instructors take precautions to diminish cheating, fewer than 2% of students commit the most egregious forms of cheating.
2. Even if undetected, cheating makes negligible improvements to cheaters' final percentage-grades.
3. Students will take great risks for negligible improvements in their grades.
4. Students at all grade levels cheat. Pressure to avoid failing does not account for all incidents of cheating.
5. Approximately two thirds of students admit to cheating when shown irrefutable evidence that they have, in fact, cheated.

### **References**

- Aiken, L. R. (1991). Detecting, understanding, and controlling for cheating on tests. *Research in Higher Education*, 32 (6), 725-736.
- Barnett, D. C., & Dalton, J. C. (1981). Why college students cheat. *Journal of College Student Personnel*, 22 (6), 545-551.
- Caron, M. D., Whitbourne, S. K., & Halgin, R. P. (1992). Fraudulent excuse making among college students. *Teaching of Psychology*, 19(2), 90-93.
- Cavanagh, S. (2004). Students ill-prepared for college, ACT warns. *Education Week*, 24 (8), p. 5.
- Cheater.com*. (2006). Retrieved August 30, 2006, from <http://www.cheater.com> .
- Cizek, G. J. (1999). *Cheating on tests: How to do it, detect it, and prevent it*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Congos, D. H., Langsam, D. M., & Schoeps, N. (1997). Supplemental Instruction: A successful approach to learning how to learn college introductory biology. *Journal of Teaching and Learning*, 2(1), 2-17.
- Davis, S. F., Grover, C. A., Becker, A. H., & McGregor, L. N. (1992). Academic dishonesty: Prevalence, determinants, techniques, and punishments. *Teaching in Psychology*, 19 (1), 16-20.
- Desruisseux, P. (1999, April 30). Cheating is reaching epidemic proportions worldwide, researchers say. *The Chronicle of Higher Education*, p. A45.
- Genereaux, R. L., & McLeod, B. A. (1995). Circumstances surrounding cheating: A questionnaire study of college students. *Research in Higher Education*, 36 (6), 687-704.
- Innerst, C. (1998, January 29). Universities retreat in war on cheating. *Washington Times*, p. B8.

- Jordan, A. E. (2001). College student cheating: The role of motivation, perceived norms, attitudes, and knowledge of institutional policy. *Ethics and Behavior*, 11 (3), 233-247.
- Kuriakose, E. (2003, March 28). Cheating on college campuses grows with technology. *The Stony Brook Statesman*, p. B3.
- McCabe, D. (1996). What we know about cheating in college. *Change*, 28, 28-33.
- McCabe, D. (2005). Levels of cheating and plagiarism remain high. Retrieved February 5, 2005, from [http://www.academicintegrity.org/cai\\_research.asp](http://www.academicintegrity.org/cai_research.asp) .
- McCabe, D., & Treviño, L. K. (1996). What we know about cheating in college: Longitudinal trends and recent developments. *Change* 28 (1), 29-33.
- McCabe, D., Treviño, L., & Butterfield, K. (2001). Cheating in academic institutions: A decade of research. *Ethics and Behavior*, 11 (3), 219-232.
- Milton, O., Pollio, H. R., & Eison, J. A. (1986). *Making sense of college grades*. San Francisco: Jossey-Bass.
- Newstead, S. E., Franklyn-Stokes, A., & Arnold, P. (1996). Individual differences in student cheating. *Journal of Educational Psychology*, 88, 229-241.
- Rittman, A. L. (1996). Academic dishonesty among college students. Retrieved February 5, 2006, from [www.mwsc.edu/psychology/research/psy302/fall96/andi\\_rittman.html](http://www.mwsc.edu/psychology/research/psy302/fall96/andi_rittman.html) .
- Roberts, D., & Rabinowitz, W. (1992). An investigation of student perceptions of cheating in academic situations. *Review of Higher Education*, 15 (2), 179-190.
- Sappington, J., Kinsey, K., & Munsayac, K. (2002). Two studies of reading compliance among college students. *Teaching of Psychology*, 29(4), 272-4.
- School sucks*. (2006). Retrieved August 30, 2006, from <http://www.schoolsucks.com> .
- Slobogin, K. (2002). Many students say cheating's OK. Retrieved February 5, 2005, from <http://archives.cnn.com/2002/fyi/teachers.ednews/04/05/highschool.cheating/> .
- Tang, S., & Zuo, J. (1997). Profile of college examination cheaters. *College Student Journal*, 31 (3), 340-345.
- Turnitin*. (2006). Retrieved August 30, 2006, from <http://www.turnitin.com/static/home.html> .
- Turens, J. F., Staik, I. M., Gilbert, D. K., Small, W. C., & Burling, J. W. (2001). Undergraduate academic cheating as a risk factor for future professional misconduct. In N. H. Steneck & M. D. Sheetz (Eds.), *Investigating research integrity* (pp. 49-54). Washington, DC: ORI.
- Whitley, B. E. (1999). Does cheating help? *College Student Journal*, 30, 489-493.