Imperative Issues and Elusive Solutions in Academic Integrity: A Case Study

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Abstract

This research investigates the issue of academic integrity, specifically plagiarism, as it relates to and affects graduate engineering students. The scope of this project included a comprehensive review of relevant literature and case study analysis in a large enrollment, multi-instructor, 1-credit course entitled Career Management for Engineers. This is a required course for graduate engineering students who desire to participate in a cooperative educational (co-op) work experience as part of their studies.

The author analyzed 83 cases of plagiarism from four different instructors, over a two-semester period during Academic year 2014-2015 and compared the findings from the literature review. In addition, two survey instruments were developed and administered to faculty and students during the winter of 2016. The survey was designed to ascertain attitudes, experience with, and perceptions of plagiarism as an issue in graduate school. Conclusions derived from the findings pose questions to the larger graduate engineering community and the authors suggest recommendations and solutions with the belief that other universities may benefit from a greater understanding of the complexity of the issue.

Background

Is cheating on the rise and do educators in graduate engineering programs need to be concerned? Unfortunately, there is no easy answer to this question. It is difficult to determine how prevalent cheating in within graduate engineering-related programs without systematic collection and analysis of data. However, as one researcher stated after 20 years of looking at all the available data from focused research, “...no matter how one looks at the data, the prevalence of self-reported cheating is high enough for all of us—students, faculty, and administrators—to be seriously concerned. When more than two-thirds of college students are reporting that they have cheated, we need to pay attention.”[1]

The author speculates that the prevalence of cheating may be linked with recent changes in the graduate engineering populations found at colleges and universities throughout the developed world. For example, when speaking of the reasons for growth in the competitive Australian higher education climate of today, one scholar indicated that “many universities are working to increase international student intake in order to reap the accompanying educational, cultural, and economic benefits that this provides.”[2] The same phenomena was observed in the research institution selected for study, which values fostering a diverse student population, and which also benefits from the full tuition revenues from international students. While the benefits of diversity are significant and well documented, they may also come with a cost, as some have noted, “the lack of rigid requirements with admission processes, and thus many unprepared students are accepted into programs in the United Kingdom, Australia, the United States, and other parts of the world.”[3] Thus, the increase in students who are unprepared for rigorous academic work may also be a factor influencing observed increases in cases of plagiarism. In
fact, several scholars have described this increase as a “significant academic concern and one that is reaching epidemic levels.”[2, 4]

A survey of enrollment trends indicated an increasing percentage of international students, especially in STEM-related fields, as this group brings cultural diversity and full tuition revenue streams to host schools.

Colleges and universities in the United States have become increasingly reliant on international students to fill Science, Technology, Engineering, and Mathematics (STEM)-related graduate programs and support their STEM-related research agendas and patent generation. Moreover, because demand among foreign students for a U.S. degree seems unlimited, many colleges and universities have seen them as a quick fix for offsetting lagging interest among domestic students in graduate education, especially in STEM fields.

These international students represent real revenues and significant enrollments. According to the latest data from National Center for Educational Statistics, international students account for around 10 percent of all graduate enrollments (compared to about 3 percent in undergraduate programs). In many fields, programs would not be viable if not for the significant international enrollment they draw. Many pay full fees... Much like the easy-to-obtain loans prevalent before the housing market crash in 2008, international students have been considered a triple-A investment with reliable returns.[5]

Recent reportage from the Council of Graduate Schools and other sources indicates that international students earn 47.4% of master’s degrees in engineering and 54.8% of PhDs in the US.[6] Furthermore, the number of students in graduate engineering has been on the rise for over 10 years.[7]

**Plagiarism**

Definitions of plagiarism are often similar and the following definition, found in the academic integrity policy published by Case Study University, illustrates the guidelines provided to students on the issue.

Plagiarism: The University defines plagiarism as using as one’s own the words, ideas, data, code, or other original academic material of another without providing proper citation or attribution. Plagiarism can apply to any assignment, either final or drafted copies, and it can occur either accidentally or deliberately. Claiming that one has “forgotten” to document ideas or material taken from another source does not exempt one from plagiarizing.

The following sources require citation:

- Word-for-word quotations from a source, including another student’s work.
- Paraphrasing (using the ideas of others in your own words).
- Unusual or controversial facts not widely recognized.
- Audio, video, digital, or live exchanges of ideas, dialogue, or information.[8]
But the issue of plagiarism, especially with international students, is not simple or straightforward. Rather, it appears to be a rapidly growing and a widespread problem facing all western universities with international students from non-English speaking countries.\[2, 4\] Further adding to the difficulty of the issue is the fact is that students “arrive at an American university with little, if any, understanding of the concept of plagiarism.” \[9\] While there is no single motivation for plagiarism, scholars have identified three primary factors such as different cultural views of the issue, lack of ability with the English language, and lack of knowledge or skills in citing references.\[9-17\] Other reasons for plagiarism can include the ease of using, and accessibility of, material on the Internet as well as poor time management. \[10\] Some students may also lack the motivation to complete an assignment, lack knowledge of how to write it, or lack knowledge of how to properly cite sources.\[18\] These factors also contribute to the likelihood of cheating. Time management failures, running out of time for the assignment or waiting until the last moment and then copying work without citations are other potential influences, and some students may be uncertain about what constitutes academic integrity and what constitutes plagiarism if they are new to the English language and or western educational standards.\[1, 18\] In summary, the reasons for plagiarism are many and complex.\[9\]

Engineering educators may debate the relevance of plagiarism to the practice of engineering today. The reality is that many master of science degree programs in engineering fields rely on the development of technical and problem solving skills in their respective curriculum. As a result, students may not be required to develop and refine writing or research skills. Often, the primary objective most masters programs at the Case Study University, is securing full-time employment. Because of the demands of highly technical curriculum, the syllabi, projects and learning activities often include little if any information about the concept of academic integrity. It is ironic to note that cheating is related directly to concepts found within the National Society of Professional Engineers Code of Ethics, where it states: Section III. Professional Obligations. Item 9. a. “Engineers shall, whenever possible, name the person or persons who may be individually responsible for designs, inventions, writings, or other accomplishments”\[19\] (emphasis added).

In addition, many industries who hire engineers also place a high value of intellectual property, such as reported in Duke University’s Engineering Management Blog, which states that “The value of a firm today is all about the knowledge the firm has.”\[20\] Furthermore, through surveys of over 1000 business students, both graduate and undergraduate, on six different campuses in the US, Nonis and Swift found, “a strong correlation has been demonstrated between academic dishonesty of students and unethical behavior once they enter the workforce.”\[2\] They found this to be true even as they controlled for age and gender differences. In fact, the research suggests that students who cheated in the academic environment were predicted to be the ones who tended to cheat in the corporate environment.\[21\] Their study also showed that “students who believed dishonest acts are acceptable were more likely to engage in those dishonest acts than were those who believed the dishonest acts were unacceptable, and students who engaged in dishonest behavior in their college were more likely to engage in dishonest behavior on the job.”\[21\]
The Nonis and Swift findings also show that “cheating is not situation specific. Once an individual forms the attitude that cheating is acceptable behavior, he or she is likely to use this behavior, not only in the educational area but also in other areas.”[21] In a similar way, a recent article in the Wall Street Journal highlighted the firing of 20 junior staffers, who were earning starting salaries of about $85,000 per year, for cheating on online tests. Other employees, both current and former, described the tests as “annoying”, but “unavoidable chores”, which were usually left until the last minute to be completed. Doing poorly on the tests could result in negative attention from supervisors. It was also divulged that sharing answers “became a routine way to save time during a hectic work week.”[22] This story makes one wonder if this was the first time these individuals acted in such a way, or had they, even if unintentionally, learned that this was acceptable behavior during their formative education.

If there is still any doubt about the relevance of plagiarism for engineering educators, consider the fact that researchers have found that engineering is among the top five disciplines listed for academic integrity issues, with 80 percent of engineering students reporting having cheated at least once, while the rate of business students was higher, this is not a reason for celebration.[23]

Case Study

The University in this case study is a private, not for profit, research institution, and is categorized as a RU/H Research University (high research activity) by the Carnegie Classification of Institutions of Higher Education. The graduate engineering program has roughly 2600 students with approximately a 20/80 split between doctoral and master’s degree candidates. Like many universities in the U.S., and other English speaking western countries as well, it is experiencing an increase in the growth of international engineering graduate students. In the United States, the growth of international graduate engineering students has been increasing at annual average growth rate of 2.7% between 2003 and 2013 and the average annual growth rate was 3.3% if looking form 2008 to 2013. [7] In the case study, the College of Engineering experienced a 97% increase in graduate engineering student enrollment in the past five years and international students made up 87% of the most recent class, up from 68% just five years ago; international student admits have increased 153% over the same time period. The students come mainly from developing, non-English speaking countries, 79% over the past five years. The make-up of the population over the past five years is such that 32% of students originated from China and India each and the remaining 15% of students originated from countries located throughout the world, with no single country supplying more than 1% of the total number students. It is the author’s speculation that the majority of international students feel both cultural and academic shock when faced with a two-year program (most of the master’s degree students take two or more years to complete the typical 32-credit degree offered) in a foreign country and academic system that does align with their previous experiences.

The course that is the focus of the case study is a 1-credit career management course, which students take in addition to their normal program requirements and is only required if they desire to participate in a cooperative educational work experience to supplement their academic curriculum. Data indicates that 96% of those enrolled in this course were international students. In the academic year 2014-2015, 514 students enrolled in the course, which was divided into 18
sections of 25-30 students each, in two semesters. It should be noted that the course had
dergotten a major redesign and was being taught for the first time with graded assignments
related to career management such as career goals, resume, LinkedIn profile, professional
correspondence, learning outcomes for a co-op position, etc.

Previously the course was pass/fail and no assignments were assessed, reviewed, or checked for
plagiarism utilizing Turnitin software. A warning was include in the course policies that
plagiarism would result in a zero grade for any offending assignment. Plagiarism was also
specifically mentioned during the first lesson in class.

Course-specific Findings

During the academic year 2014-2015, there were 83 cases of plagiarism, which represented 16%
of the course population over the two semesters. It was interesting to note that the first term rate
was closer to 20% and the second term closer to 10%. This may have been the result of the
“word getting out,” after students discussed their experiences with each other, but further
research is needed to confirm this speculation. Faculty reported all of the plagiarism cases to the
university conduct office who held a hearing to determine if the students had violated the
Academic Integrity Policy and if so, what measures or sanctions would apply to them. All 83
cases were determined to have been at least “more likely than not” to have violated the policy.
In each case a hearing document was produced that summarized the hearing, set out any
sanctions or remedial actions that student would have to take. Sanctions could include a
warning, conduct probation, suspended expulsion or even expulsion. Remedial actions could
include writing a research paper about the incident and what led to it, attending classes on the
academic integrity policy, or meeting with counselors to go over the policy.

The author was able to view all the hearings procedure documents and to conduct an analysis of
the violations and actions by the University. This process involved subjective interpretation but
the common language used in the formation of the reports allowed comparisons. For instance,
the demographics of the students who plagiarized closely mirrored the course population for
nationality, although a slightly higher percentage of males plagiarized. The reasons and causes
are varied, and more than one of these reasons could apply to a single incident. Time
management (other competing assignments, waiting until last minute, etc.) was a reason given by
students in 29% of the cases.

Forty three per cent of the students who plagiarized mentioned that the standards or expectations
were different from their home country and prior experience and were thus unaware they were
doing anything wrong. This finding matches the research found in the literature review that
indicated that cultural differences were a primary reason for plagiarism among international
students. It is not hard to understand that many international students, especially those coming to
the US from non-English speaking backgrounds are entering into a cultural experience that is
very far and different from their own in terms of religious, social, academic life, and
expectations. These differences often play a role in how they view plagiarism. “Defects in
academic integrity are typically found when a student’s work is measured against the Western
benchmark, which hails the originator of knowledge—the author—as all-important.” Some
cultures have a collectivist view of text ownership, believing that information is “owned by the whole society”, so all can use it freely.\textsuperscript{[24]} It appeared from the responses that many of the students in the case study were clearly perplexed that an issue was being made at all about their cheating. This finding aligns with other research that indicates that differing cultural attitudes towards textual ownership and differences in academic training can result in unintentional plagiarism.\textsuperscript{[9]}

Cultural Influences

An informal survey taken in 2007 at Boston College, sent to all international students, confers that “The majority of students indicated that plagiarism was not a big issue in their countries of origin.”\textsuperscript{[3]} Other scholars have indicated that in the Chinese culture, the act of ‘copying’ is a sign of respect and that students are rewarded for copying.\textsuperscript{[10-12]} Further complicating the issue, it has been noted that in the Chinese educational style, repeating a text from memory indicates both an appreciation for the text as well as understanding of the material.\textsuperscript{[12, 13]} Several students from China, who enrolled in the course utilized in the case study, expressed this same rationale, explaining that they were copying to “learn” (as they were taught). These students did not understand how to learn without copying. These ideas are not limited to Chinese students. For instance, Greek students also consider copying to be a display of learning rather than cheating.\textsuperscript{[12]} These findings, although limited, may help to explain why some international students do not recognize plagiarism as a serious problem.\textsuperscript{[10]}

Language

Fifty nine per cent of students expressed that language was an issue. Specifically they articulated that their unfamiliarity with English, their inability to change the words copied and to retain the original meaning, not understanding the assignment, were also challenges. This finding aligned other research which confirmed that language problems and a lack of skills are considered to be major reasons for plagiarism among international students, as is the existing level of English proficiency.\textsuperscript{[10, 14]} Scholars also indicate that students may copy because they feel they lack the language ability to express themselves as well as the copied material. A variation of this reasoning was found in research that suggested that plagiarism occurs because students lack confidence in their language ability and skill at using different words to convey the original meaning of a given text. Some students rationalized that as long as they understood what the original author meant, copying was allowable.\textsuperscript{[9, 15]}

Another discovery is the method used by some international students to write English. Known as Patchwriting, this is a procedure defined as “a combination of the student’s and the original author’s writing in which the student has substituted words or phrases, but maintained the structure of the original work.” It was stressed that this method would not be acceptable for a final submission for credit but rather was an intermediate writing learning step.\textsuperscript{[16]} Unfortunately students with weak academic English language skills, or simply unfamiliar with them, may have difficulty distinguishing between the use of stock phrases, common usage, Patchwriting, or verbatim copying.\textsuperscript{[9]} Based on the evidence from the literature review and from the case study, it
appears that “language problems and skills deficiencies” are the primary reasons international students plagiarize.\textsuperscript{14}

In the case study sample, 59\% of plagiarism cases involved students taking material from the Internet, submitted as their own, often from sites aimed at students, and supplying example documents that related to various assignments. When meeting with students about suspected instances of plagiarism, some seemed to go to great pains to make sure faculty understood they did not copy the work from another student. They did not appear to view copying from the Internet as the same thing as copying from another student. This aligns with the view that the Internet is a “free use zone.” In a survey of 186 students taking English as a Second Language courses in Australia, 62\% said they had not received any instruction on plagiarism in their home country. Over 30\% of the students said, they do not cite information from the Internet, many believing that information in the public domain, and thereby common knowledge, did not require citing. In a review with 30 of the surveyed students, 25 of them (83\%) said cutting and pasting information directly from the Internet into their work was permissible. They did not feel copying (including pictures, graphs, or statistics) into written work they were turning in required a citation.\textsuperscript{11} In a survey of graduate engineering faculty developed for this case study (discussed later in this paper), one faculty member stated that they never report cases of plagiarism from the Internet “because the students don’t consider it copying.”

University-wide Findings

To provide additional perspective, plagiarism data from the entire University was also examined. (see Table 2—Make up of academic integrity cases by population). This data indicates that almost two thirds of the cases involved graduate students and of those, 53\% were engineers, who make up 40\% of the total graduate student population. In addition, international students constitute 100\% of the cases among engineering graduate students. This finding is similar to other research that has also found that the rate of academic integrity violations is greater with international students than domestic.\textsuperscript{14} Of additional note is the fact that the one-credit course utilized in this case study accounted for 44\% of the graduate student plagiarism cases, while students in the course only represent 19\% of the total graduate population. One possible explanation is that the faculty members in the graduate coop unit who taught the course during the Academic year 2014-2015 were especially diligent in monitoring plagiarism.

It is not known with certainty if other faculty, outside the coop unit, were as concerned with this issue. However, results of the faculty survey (discussed in detail below) indicate that 77\% of the graduate faculty reported they had experienced suspected cases of plagiarism. Yet 54\% of those indicated they never reported the cases, and 24\% indicated that they seldom reported them. The reasons for not reporting included cases being handled in the course, lack of faith in the system, amount of time required to make a report, or lack of knowledge of the system, among others.
<table>
<thead>
<tr>
<th>Academic Integrity Category</th>
<th>Undergraduate</th>
<th>Graduate</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Cases</td>
<td>104</td>
<td>188</td>
</tr>
<tr>
<td>1. International students/percentage total cases</td>
<td>37/36%</td>
<td>171/91%</td>
</tr>
<tr>
<td>2. Engineering students/percentage of total cases</td>
<td>4/4%</td>
<td>100/53%</td>
</tr>
<tr>
<td>a. Engineering international students/percentage of engineering cases</td>
<td>1/25%</td>
<td>100/100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Student Population</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>All Students</td>
<td>19,964</td>
<td>13,710</td>
</tr>
<tr>
<td>1. International students/percentage total students</td>
<td>3,762/19%</td>
<td>5,466/40%</td>
</tr>
<tr>
<td>2. Engineering students/percentage of total students</td>
<td>3,410/17%</td>
<td>2,637/19%</td>
</tr>
<tr>
<td>a. Engineering international students/percentage of engineering students</td>
<td>484/14%</td>
<td>2,194/83%</td>
</tr>
</tbody>
</table>

Table 2—Make up of academic integrity cases by population

Student Survey

In an effort to gage the views and opinions of a wider audience, and to better understand the attitudes about, understanding of, and believed prevalence of plagiarism, the author conducted a confidential survey in January 2016. The survey asked a series of multiple choice questions on a variety of topics related to plagiarism, their prior knowledge of it, their views on academic integrity among their fellow students, and their knowledge of university policies related to academic integrity. Specifically, five questions asked about the students’ background knowledge of plagiarism prior to starting their graduate program. These questions were based on a survey of international mechanical engineering students in Australia.[2] There were three questions that dealt with the students’ beliefs about using material from the Internet, without citing it, and the prevalence of plagiarism. Four additional questions asked about the students’ awareness and understanding of university policies and their education on them. Four questions asked about their personal engagement in and views on plagiarism in their school. There was also a single question asking about their level of comfort in their ability to cite and reference sources. Prior to asking for demographic information, there was an open question where they could provide free form comments.

The survey was distributed to all 2834 graduate engineering students from the fall term of 2015 in the first week in January 2016, just prior to the start of the new term. As an incentive, students who completed the survey could enter into a random drawing for one of 25 $20 Amazon gift cards. Students could complete the survey on a computer or a mobile device. Seven reminders were sent over a three-week period, and the survey received a bump in replies each time one was sent. Most students completed the survey in 10 minutes or less. From all the surveys sent, 2355 (83%) opened one of the messages with the survey link, 1152 students (41% of the total and 49% of those who opened the message) started the survey, and 1027 (36% of those sent, 44% of those open, and 89% of those started) completed the survey. Table 3—Survey demographics, shows the demographic make-up of those who completed the survey. It should be noted that women constituted a slightly higher percentage of the survey group than found in the entire student population in the College of Engineering, as did American born
students. In addition, Indian and Iranian students also completed the survey in rates higher than their school population while Chinese students participated at lower rates in the survey.

It is important to consider the data carefully before making conclusions. For example, Table 4—(Survey results prior knowledge of plagiarism) presents the overall results of the survey looking at three of the questions dealing with prior knowledge of plagiarism. From these results, it appears that there is prior knowledge that plagiarism is wrong and academic penalties can be associated with violations, although the response to the first question might indicate that 20% do not truly understand plagiarism.

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>Do not know or Unsure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. In my studies prior to coming to our university for graduate studies, I was taught about plagiarism— the practice of using someone else's work or ideas and presenting them in your work without crediting that source.</td>
<td></td>
<td>17%</td>
<td>3%</td>
</tr>
<tr>
<td>4. Before starting my graduate studies at our university, I understood that engaging in the practice of using someone else's work or ideas and presenting them in your work without crediting that source, would result in academic misconduct penalties.</td>
<td></td>
<td>8%</td>
<td>2%</td>
</tr>
<tr>
<td>5. Before starting my graduate studies at our university, I believed it was wrong to use someone else's work or ideas and present them in your work without crediting that source.</td>
<td></td>
<td>3%</td>
<td>1%</td>
</tr>
</tbody>
</table>

Table 4—Survey results prior knowledge of plagiarism

The differences in responses observed revealed relative differences between nationalities. For example, the data indicates that 98% of U.S. students had been taught about plagiarism prior to the start of their graduate studies, while only 2% said they had not, and less than 1% were unsure. But the Chinese, Indians, and Iranians each recorded between 74% and 75% indicated that they had, while between 22% and 23% had not and 3% were unsure (see Chart 1—Differences in prior knowledge of plagiarism). This data aligns with other research that suggests that many international students arrive without any real knowledge of plagiarism.[9] It should be noted that this sample represents the responses from approximately 20% of the survey respondents, which if applied to the total graduate engineering student population (2834), could

<table>
<thead>
<tr>
<th>Gender</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>632</td>
<td>62%</td>
</tr>
<tr>
<td>Female</td>
<td>379</td>
<td>37%</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>&lt; 1%</td>
</tr>
<tr>
<td>Prefer not to say</td>
<td>13</td>
<td>1%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Country</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>478</td>
<td>47%</td>
</tr>
<tr>
<td>China</td>
<td>230</td>
<td>22%</td>
</tr>
<tr>
<td>Iran</td>
<td>39</td>
<td>4%</td>
</tr>
<tr>
<td>US</td>
<td>191</td>
<td>19%</td>
</tr>
<tr>
<td>All Others</td>
<td>89</td>
<td>9%</td>
</tr>
</tbody>
</table>

Table 3—Survey demographics
represent over 500 students. This would represent a significant amount of students who apparently did not know about plagiarism before they matriculated.

Chart 1: Differences in prior knowledge of plagiarism

There was also a divergence in the results between U.S. and international students based on their ‘comfort level with being able to properly cite and reference work of others’ (see Chart 2—Differences in comfort in ability to cite work). Over 90% of the US students in the survey responded they were completely or mostly comfortable in their ability properly cite and reference work. Only 70% of the Chinese, 83% of the Indian students, 85% of the Iranian, and 78% of the others felt the same level of comfort. This also appears to align with other research that suggests that international students report a lack of confidence in their abilities to properly cite sources they referenced, even if they recognize the need to do it.[2, 10, 11]

Attitudes about ‘using material from the Internet’ followed a similar pattern. In the overall results, 59% felt it was never permissible to use work from the Internet without a citation. This meant that approximately 41% felt that in varying degrees, it was ok or they did not know. This is consistent with previous data that indicates 30% of students do not cite the Internet in their work from the literature.[11] The attitudes reported by the Chinese students indicated that only 40% felt it was never permissible to use work from the Internet without a citation. Thus, the amount of students represented is 19% to 27% lower than any other group (see Chart 3—Differences in attitudes about using Internet material without citation). The responses to the question about students’ beliefs that other students copy from the Internet without citing it, there are no major differences by nationality in their perceptions. However, there were a high percentage of students who reported they did not know about their peers who may or may not be copying from the Internet (see Chart 4—Perception of others copying from the Internet). In the next question asking about the perception of students who copy from non-Internet sources (other students, books, journals, etc.), we see the same large percentage of students, regardless of
country of citizenship who “do not know” about their peers actions (see Chart 5—Perception of others copying from non-Internet sources).

Chart 2—Differences in comfort in ability to cite work

Chart 3—Differences in attitudes about using Internet material without citation

One series of questions revolved around their own perception of how often they might have engaged in copying, even if inadvertently, words, ideas, or material from another student without crediting that person or from the Internet without citing it. Another question asked how often they thought other students may have asked for their work, so they could use it to complete an
assignment to be turned in, (see Table 5—Personal experience with using or assisting in uncredited work). Responses to these questions revealed no major differences based on nationality. However, it is notable that 25% of the students reported they had been asked to give their work to another student to complete an assignment very often, often or occasionally, compared to only 9% who very often, often, or occasionally indicated they copied the work of another student.

![Chart 4—Perception of others copying from the Internet](image)

**Chart 4—Perception of others copying from the Internet**

Summary

The survey administered to students indicated that the majority of students, domestic and international do know about plagiarism. They also know it is wrong, they don’t engage in it, and they know that material taken form the Internet should be cited, and they know how to properly cite work. The survey also shows that not all intentional students have issues with plagiarism; however, the data does confirm that some do, and in greater numbers than native English speaking students.
Chart 5— Perception of others copying from non-Internet sources

<table>
<thead>
<tr>
<th>Very often</th>
<th>Often</th>
<th>Occasionally</th>
<th>Seldom</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>1%</td>
<td>2%</td>
<td>6%</td>
<td>22%</td>
<td>70%</td>
</tr>
</tbody>
</table>

How often during your graduate studies at our university do you think you may have copied, even if inadvertently, words, ideas, or material from another student for an assignment and turned it in as your own work without crediting that person?

<table>
<thead>
<tr>
<th>Very often</th>
<th>Often</th>
<th>Occasionally</th>
<th>Seldom</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>1%</td>
<td>2%</td>
<td>7%</td>
<td>27%</td>
<td>63%</td>
</tr>
</tbody>
</table>

How often during your graduate studies at our university do you think you may have copied, even if inadvertently, words, ideas, or material from the Internet for an assignment and turned it in as your own work without crediting that source?

<table>
<thead>
<tr>
<th>Very often</th>
<th>Often</th>
<th>Occasionally</th>
<th>Seldom</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>3%</td>
<td>4%</td>
<td>18%</td>
<td>29%</td>
<td>46%</td>
</tr>
</tbody>
</table>

How often during your graduate studies at our university do you think you may have been asked for your work by another student, so they could use it to complete an assignment to be turned in?

Table 5—Personal experience with using or assisting in uncredited work
Faculty Survey

A confidential survey was also sent out to all faculty in the case study university’s college of engineering, including tenured, tenured-track, non-tenured, and adjunct faculty. The survey consisted of 12 multiple choice questions about their knowledge, experience with, and views of plagiarism as an issue, as well as one open answer question, and four demographic questions. Three questions asked about their familiarity with academic integrity policies and three about how they inform their class of the academic integrity policies. Three questions asked about their experience with plagiarism in class and if they reported it, and if not, why not. The final questions asked about use of plagiarism detection software and their view of plagiarism being an issue of concern. From the 264 the surveys sent, 202 (77%) opened one of the messages with the survey link, 157 (59% of the total and 78% of those who opened the message) started the survey, and 148 (56% of those sent, 94% of those open, and 73% of those started) completed the survey. Twenty per cent (20%) of the faculty thought that graduate students using the work of others and turning it in as their own was a serious issue while only 7% thought it was not an issue at all. Other significant findings concerning the experience with suspected plagiarism and reporting it were discussed earlier.

Recommendations/ Solutions

In McKeachie’s Teaching Tips: Strategies, Research, and Theory for College and University Teachers, a well-known and respected resource for college and university teachers, the authors explained that “it is far easier to prevent plagiarism than to handle it after the fact.” While on the surface this seems obvious and may well be true. Unfortunately, there does not appear to be a simple or universal method that will easily eliminate or drastically reduce incidents of academic dishonesty or plagiarism. The challenge is multifaceted and complex, and as a result, solutions must also be multifaceted and complex. Enforcement and punishment alone are not a
complete solution. As Zimmerman explains, “Even students who have been caught plagiarizing will, after dealing with the initial consequences, probably plagiarize again and again.”[18]

Providing resources to combat academic integrity issues for international students was shown not to be completely effective either. One source found that even when students were identified, reported, and given information on getting assistance, students did not seek out the assistance and the weaker students tried to avoid it, even when referred. Often those referred students would set up appointments then not show, and simply did not reschedule or answer follow ups.[10]

The author believes that well planned, multiple interventions will have an impact on plagiarism with an international graduate student population. It also makes sense, as formerly cited research suggested, that academic integrity is clearly something that “cannot be imposed on students; it must be accepted by them.”[21] The question then remains how to best accomplish this acceptance. There seems to be two distinct approaches shown to have a positive effect on academic integrity. One is to focus on the students though the structure of the assignments, courses, and education on the topic. The other is through the faculty and university efforts and policies. It appears that a combination of strategies from both perspectives is required.

In a study involving a management course with a high number of international students in Australia, teachers emphasized referencing and spelled it out in assignments making it an explicit requirement. After the course, the researchers surveyed the students and selected some to participate in a focus group. While in the course they achieved the result of zero plagiarism cases, many students, however, reported, “referencing is too difficult, or my English writing skills are too bad.” Even after this course, “Forty-five per cent of the students surveyed indicated they still did not believe they could write a good essay and manage referencing correctly.”[10] This matches others’ research findings as well, after familiarization “with the definition of plagiarism, internationals students were generally able to recognize source material. They were often not competent, however, at taking the source material and either paraphrasing or attributing this correctly.”[2]

Student-focused Solutions

Duff, Rogers, and Harris noted that five to seven hours of workshops and discussion sessions in a course helped eliminate problems of plagiarism. In this research, nearly all students were non-native English speakers and the workshops set the context for plagiarism as well as provided skills on referencing. In addition, the sessions allowed students to practice and provided them with feedback.[17] It would appear that these types of solutions would require a serious commitment of time and resources. It is also unlikely that faculty teaching any single engineering course could be expected to have sufficient time available to include these types of interventions, without additional support. At the University of Illinois, Urbana-Champaign, which has the largest number of Chinese students in the US, Umberto Ravaioli, assistant dean and director of undergraduate student affairs in the engineering college noted the challenges of having such a large number of international students.
Probably the things we are paying the most attention to are academic integrity issues. The standards for plagiarism or collaboration on an assignment may be different in other countries. We have put a lot of emphasis on needing to educate this influx of international students that academic integrity is very important here.\[26\]

Several studies conducted in the 1990’s pointed to academic dishonesty and cheating being on the rise, but found that courses in ethics could reduce the students’ propensity to engage in unethical academic or business practices.\[21\] All of these solutions, which were focused on students, would probably not be able to be put in place by a single instructor or in one course, but rather need to be addressed, supported and administered on a larger scale, at the university or college level.

Another series of interventions to combat academic dishonesty is suggested by Dan Airely, behavioral economist, in his Ted Talk called “Our buggy moral code.” The research conducted by Airely and collaborators such as Mazar and Amir is focused on cheating and dishonest acts in general, rather than plagiarism in particular, but the author believes these strategies could apply. They have found that “in part the decision to be honest is based on internal rewards. Psychologists show that as part of socialization, people internalize norms and values of their society, which serve as an internal benchmark against which a person compares his or her behavior.”\[27-30\] In experiments, they discovered that simply reminding people of an ethical standard could reduce dishonesty. As the researchers noted, “on the face of it, the idea that any reminder can decrease dishonesty seems strange; after all people should know that it is wrong to be dishonest, even without reminders.” In their experiments they found that a simple reminder of a moral code, the Ten Commandments or a school honor code for example, reduced the level of cheating and dishonesty completely, even if the participants could not recall the Ten Commandments, were atheists, or their school did not actually have an honor code.\[27, 28\] As a strategy, the researchers have noted this plays on peoples’ internal system of rewards and how they view themselves. If dishonest behavior results due to a lack of self-awareness, then providing contextual cues or reminders (“remember, the honor code still applies”) can reduce dishonest behavior.\[30\]

In another experiment, Airely et al., found that the person whom one identifies with could affect the level of honesty. For instance, in an experiment using students, researchers wanted to measure the effect that a known cheater had on other students’ willingness to cheat. They arranged for a student actor to stand up after a short period of time and announce he was done with the exam in a period of time that was universally recognized as impossible for completing the exam. The administrators of the exam then told him he could go collect his reward, thus sending a message that cheating would be tolerated to all the others in the exam room. It was found that the sweatshirt the student wore influenced the amount of cheating. For instance, if he was wearing the college sweatshirt of the university where the students taking the experimental test were from, cheating went up. When he wore a sweatshirt from the cross-town rival university, they found that cheating decreased dramatically to the lowest level in all the experiments. This finding suggested that if students identified themselves and the known cheater as being part of the same social group, they followed his example and engaged in cheating. On
the other hand, if they did not identify with the same social group as the cheater, it appeared they did not feel justified in their own cheating, and instead were extra careful not to be confused with this other not so moral social group. From this, setting a standard for the community, making sure it is identified with the community, and making sure international students feel a part of the group, would be beneficial. Others have found that, “Students have indicated that, when they feel like real members of the community, believe that faculty members are committed to ethical standards, and are aware of their institutions’ policies regarding academic dishonesty they are less likely to cheat.” At a minimum its seems that for universities “it is essential that [they] demonstrate a commitment to the enforcement of academic dishonesty policy and provide the resources to help deter cheating in the classroom.”

Faculty-focused Solutions

McKeachie’s Teaching Tips, Strategies and Theory for College and University Teachers do suggest ways that plagiarism can be prevented. The authors provides numerous suggestions such as ensuring that syllabi clarify expectations and what counts and specifying rules for collaboration. He also advises that professors and instructors encourage students to reach out in person or via email for help and explanation if they are in doubt. By asking students to check the syllabus in advance for assignments and conflicts with other courses assignments, they allow some negotiation for early submissions or due dates. Also recommended is the process of requiring writing assignments on fresh topics in an effort to eliminate the ability to plagiarize. Finally, letting students know that Internet plagiarism can be detected may also serve as a deterrent. It must be noted, that instructors must check the student work even if using plagiarism detection software as students can avoid detection by it simply by changing words. “It is much harder to detect and prove that ideas have been plagiarized than to do this for passages and sentences that convey these ideas.”

One simple strategy is to follow university procedures for reporting cases, which ensures fairness to students and will avoid students having multiple understandings or arrangements with multiple instructors. But even this is not an easy strategy to deploy. For example, “In one study 60% of faculty members observed cheating in their classrooms, but only 20% of them actually met with the students and a higher authority. Another study by Norris and Swift suggested that faculty members hesitated to deter cheating because they believe they will not be supported at the administration level.” This is a similar sentiment expressed by faculty observed in the case study university. Certainly, nonadherence to policies and procedures has consequences of their own, “if most faculty members do not report a student who cheats, that individual could cheat his or her way through school. If instructors do not follow policies set forth by the institution, they may be sending a message to students that cheating is acceptable.” In Dan Ariely’s experiments, this message was shown to increase cheating to some degree by nearly all, which is the opposite result desired. When all is said and done, “faculty members are responsible for encouraging ethical behavior among students,” and need to actively embrace this role.

In the case study course, emphasis was placed on making students aware of plagiarism (in the syllabus, during the first lesson, and throughout the course), the consequences of it, the use of
detection software and allowing students to view the results at the time of submissions, ethics and professionalism through multiple lessons, and strict adherence to university reporting procedures. In addition, the graduate engineering student orientation, required of all new students, now has a 20-minute presentation on academic integrity standards and includes a handout for each student. Despite this informational support, the number of incidents remains high and no change has been seen.

**Going forward**

This case study, the associated literature on academic integrity, and data from qualitative surveys demonstrate that plagiarism is an important topic for those associated with graduate engineering programs. There is a great need for more study that includes multi-institution surveys of engineering graduate students and faculty, assessments of strategies employed to reduce plagiarism, and an in-depth analyses of cases of academic integrity violations among graduate engineering students. Although literature on plagiarism may be found throughout the world, the majority seems to come from Australia, New Zealand, and many parts of Europe, rather than the US.\(^3\)

The goal as educators in graduate engineering programs is to nurture technical skills and competencies, while also instilling a sense of ethics for future leaders. We have long recognized the weight of the public trust placed on engineers. Initiatives such as the Order of the Engineer, a program initiated in the United States in 1970 to foster a spirit of pride and responsibility, to bridge the gap between training and experience, and to present to the public a visible symbol identifying the engineer, have grown and developed to stress that point. It is, however, not just the competence of our calculations or designs that will ensure the public’s trust, as important as that is, but also our honest and moral behaviors as professionals. As Nonis and Swift explain, “If students can be convinced not to cheat in their college classes, they may continue that pattern of behavior in the workplace and become more honest employees.”\(^21\) Eliminating cheating is certainly an aspiration for all educators, and one of primary importance for those involved with shepherding the next generation of engineers.


