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ENGINEERING STUDENT PERCEPTIONS OF ACADEMIC CHEATING
IN ONLINE AND RESIDENTIAL ENGINEERING COURSES

A Thesis in
Educational Psychology

by
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ABSTRACT

As online courses thrive due to the ease and availability of technology, cheating on tests is becoming a serious problem. With an increased need for enhancing test security, researchers are studying academic cheating from many angles, including what cheating is, who cheats, why students cheat, what methods they use to cheat, factors affecting cheating, and what can be done to prevent cheating. Cheating is a complex issue with a wide range of types, causes and behaviors, including the motivation for test-takers to continuously devise new ways to cheat. Along with this general atmosphere, engineering, as a discipline is new to online education is at the stage of building up new online learning courses including online assessments. Most engineering courses consist of professional terminology and concepts that are unfamiliar and therefore require an arduous workload for students. Given this difficult situation, students take cheating as one of the reasonable strategies to employ throughout their coursework.

The purpose of the study is to examine engineering students’ perceptions about cheating in order to construct online courses that minimizes cheating. Cheating can thwart test scores, or against the purpose of assessment, and to hamper the ability to provide students with diagnostic instruction rich in information. This study asks students whether they regard particular actions as cheating in online and in-person testing. It aims to provide information about cheating perceptions so that cheating can be prevented and academic achievements can be accurately measured.

In order to apply students’ perceptions about cheating to design a course secure from cheating, McNemar tests with Bonferroni adjustment were applied to all 17 questions; the questions analyzed students’ responses and compared their perceptions on cheating between online and in-person testing settings. Implications of the results showed in which setting it was easiest to cheat, which specific behavior was easiest to recognize as cheating, and which aspects
of testing should be most carefully constructed when designing a dual-setting course that includes both online and in-class lectures and assessments.
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Chapter 1

Introduction

Is it a human nature to cheat during assessments? Several researchers revealed that students do cheat while they are taking tests, and it is now a multicultural problem, even though the percentage of students who cheat may vary from study to study (Davis, Grover, Becker, & McGregor, 1992; McCabe & Trevino, 1997; Murdock & Anderman, 2006; Thakkar & Weisfeld-Spolter, 2012). Weiss (2000) reported that 68% of college students responded that they were engaged in certain types of cheating in an anonymous survey. Studies by Brown and Emmett (2001) found that upwards of 80% of undergraduate students reported that they have engaged in at least one type of cheating behavior during their college years. In addition, Williams (2016) also found that one out of seven students among roughly 200 survey respondents reported that they had plagiarized another student’s work, and recognized that as cheating behavior.

The ramifications of student cheating in educational settings include obvious educational and moral components: most of universities and colleges in U.S. have missions to lead their students develop their sense of citizenship, characteristics, and leadership regarding morality (Wei, Chesnut, Barnard-Brak, & Schmidt, 2014; King & Mayhew, 2002; Whitley & Keith-Spiegel, 2002). Even though the effect of morality and honesty was not significant on students’ cheating behavior, students who were engaged in cheating behavior were more likely to self-report their engagement in cheating dishonestly, compared to those who cheated less. In 2004, West, Ravenscroft, and Shrader’s study found no significant relationship between students’ morality and honesty. But, they did find that students who were engaged in higher levels of
cheating behavior less honestly self-reported their engagement in cheating compared to those who showed lower engagement in cheating (West et al., 2004). Therefore, it is possible to say that students’ cheating engagement can reflect their honesty level to some extent.

In this situation, given that an instructor assigned take-home assessment to these students, it is difficult to see whether they cheated or not. As a result, it may become more difficult to figure out whether the test reflects students’ true academic achievement. In addition, cheating during assessments can threaten the validity of assessment results. Once a student cheats, their score, which is meant to represent achievement and mastery of course material, will not reflect their actual knowledge. Moreover, after cheating, a student would not receive meaningful informative feedback about what they need to do to improve. Academic dishonesty diminishes not only the initial purpose of assessment, but also its function as a future instruction tool for teachers (Murdock & Anderman, 2006).

There are more practical negative ramifications of cheating for students: When a student, is caught cheating, he/she will earn a poor grade for the course such as an F. Some schools may impose more severe disciplinary action beyond a failing grade. For a professional in academia caught cheating, he/she will fail to receive tenure or worse, and for an employee who plagiarizes a report without appropriate citation, the employee can be dismissed from employment (Kiviniemi, 2015). Student cheating hinders students from feeling a sense of triumph on their academic achievement, when they are prized by their good work, when the prize was originally for another student (Reddiford, 1998). Although they may gain a sense of triumph for beating the proctoring system, but it is not likely for them to feel a sense of success on their academic tasks.

Even though the consequences of cheating, such as not acquiring the expected knowledge from the course, do not seem critical in a short-term, this result of cheating can later seriously affect their later life (Colnerud & Rosander, 2009).
Cheating also impacts the students who did not cheat. Some courses are graded using a norm-referenced approach, in which a student’s assessment score is compared to that of other students’ before a grade is assigned (Bond, 1996). In this case, if other students cheat, the honest students might be penalized since they might rank lower than those who cheated (Sisson & Todd-Mancillas, 1984).

Academic integrity and cheating has been studied in a variety of settings, including in high schools (Murdock, Miller, & Kohlhardt, 2004), colleges (Griffin, Bolkan, & Goodboy, 2015; Moten, Fitterer, Brazier, Leonard, & Brown, 2013; Wei et al., 2014; West et al., 2004), in high stakes testing such as national placement exams like the ACT and SAT (Berger, 2012; Solnik, 2011), and in higher education (Cole & Swartz, 2013; Josien & Broderick, 2013). However, many of these studies are limited by the types of disciplines that are investigated. Many studies focus on program-based disciplines suggesting diverse instructional delivery methods to instructors (Mott, 2010; O’Neill & Pfeiffer, 2012; J. Styron & Styron, 2010) or foci such as educating students about the Honor Code (O’Neill & Pfeiffer, 2012), developing teaching strategies (Stogner, Miller, & Marcum, 2013) and providing classroom instructional support (Lathrop & Foss, 2005) such as providing assessment instructions or clarify course rules regarding academic cheating to students.

Cheating poses a serious problem to educational assessment, not only in face-to-face residential settings (Bowers, 1964; Hawley, 1984; Schab, 1991), but also more recently in online courses. As Cole and Swartz (2013) noted, students regard cheating as easier to perpetrate in online courses due to the accessibility to a wide variety of resources and looser assessment settings (e.g. open-book tests). With the advent of modern technology and the ease of accessing the internet, the ways in which students can cheat has greatly increased (Moten et al., 2013). Now that online courses have proliferated in a variety of learning settings such as universities, adult education programs, and so-called Massive Open Online Courses (MOOCs), students often
learn on their own, away from traditional classroom settings. Cole and Swartz (2013) suggested that cheating becomes easier when the course design allows students to stay off-site without being proctored, and with numerous sources easily available to the students during assessments, such as books, the Internet, and other people.

Although online education has the ability to reach diverse students, pedagogy and assessment have not kept pace with delivery mechanisms. For example, dual-setting courses have two different groups of students enrolled in the same course: resident students taking the course in-person, and online students taking the course at a distance. In these situations, online students may not have anyone monitoring their assessments, even when they are taking tests. While there may be some settings to prevent cheating and to achieve fairness in testing such as setting a limit of testing time and assigning different test questions to different students (Cizek, 1999; Harpp & Hogan 1993), students might still feel tempted to cheat when they are assessed asynchronously without a proctor. To combat this, most researchers assert that the most effective way to minimize cheating is to reflect on both the students’ concept of cheating behavior, and to try to anticipate what the most probable methods of cheating will be when designing the course and assessments.

Students often have differing concepts of cheating, due to cultural background (Swaidan & Mujtaba, 2013) or personal views on academic integrity (Newstead, Franklyn-Stokes, & Armstead, 1996; Blum, 2009). For instance, students perceived plagiarism differently according to their personal values and belief systems (Wilkinson, 2009). As Bichler-Robertson, Potchak, and Tibbetts (2003) concluded, because cheating is often situation- and opportunity-dependent, it is better to study students’ perceptions about cheating rather than to study the effectiveness of particular proctoring or cheating prevention methods. Conducting a study on students’ behaviors and perceptions on cheating, as well as on the methods they are most likely to use to cheat, could be of great help to instructors in the prevention of cheating.
The purpose of this study is to investigate engineering students’ perceptions about academic cheating in order to better customize course design, and to be of fundamental help in the construction of online courses. Considering the history of engineering education, courses are designed in traditional lecture formats, with quizzes and tests as assignments. However, with pedagogical change in general course design, many in engineering education are now willing to adopt online-provided courses and encourage students to take online assessments. Because the online course format is a newly developing venue, studies about cheating that specifically apply to engineering education are scarce. Therefore, examining students’ perceptions about cheating, particularly from engineering students, should be worthwhile.
Chapter 2

Literature Review

Definition of Cheating

To appreciate the purpose of the study, it is important to understand what the term “cheating” means. Defining academic cheating has been a controversial issue among scholars, and therefore there is no exact convergent definition of cheating. However, there is an agreed upon idea among many scholars that cheating consists of “any action that violates the rules for administering a test, any behavior that gives an examinee an unfair advantage over other examinees, or any action on the part of an examinee or test administrator that decreases the accuracy of the intended inferences arising from the examinee’s test score or performance” (Cizek, 2003, p. 3-4).

Given that idea, cheating is a concept that encompasses diverse behaviors such as plagiarism, buying/selling a paper, having someone take a test for you, unauthorized possession of a test, submitting previously used work without permission, unauthorized collaboration with other students, and fabrication of citations. In fact, there are too many types of cheating to outline them all (Rowe, 2004). Among other terms, cheating, within an academic setting, is often called academic dishonesty, academic misconduct, and violation of academic integrity. Instructors often establish a code of conduct to fairly regulate the course and grade students.

These definitions of academic cheating are typically set by the faculty and educators who are responsible for educating students, rather than defined by the students themselves. Although most institutions require academic integrity training and have consequences for violating ethical codes of conduct, the definitions of cheating may have a wide “grey area” from the students’
point of view, depending upon their personal beliefs, the educational setting, and even the course they are taking.

**Background**

Cheating has been an unceasing problem in academic settings. Magnus, Polterovich, Danilov, and Savvateev (2002) pointed out that academic misconduct is rampant in education, which could misrepresent students’ assessment outcomes and could also be harmful to nationwide educational systems. Cheating has varied and serious impacts on student assessment, and affects students’ ability to learn and master skills. Cheating impacts not only the students who are engaged in cheating behavior, but also the students who are not engaged in cheating behavior at all, particularly when assessments are graded through norm-referenced assessment (Sisson & Todd-Mancillas, 1984). In addition, cheating behavior creates errors in assessment outcomes which results in the depreciation of an instructor’s ability to produce, interpret, inform, or make use of those test results (Cizek, 1999). This breakdown in assessment integrity impacts educators’ ability to interpret test scores, and to revise their courses and teaching methods to help students improve.

Online settings offer new challenges to cheating prevention and cheating research. When students take online tests or complete online academic assignments, there are often no people or systems to proctor those students, which makes accessing unapproved resources during exams or completing assignments easy and tempting. Arnold (2016) concluded that those who cheat in online formative tests sacrifice what they learn from the course and receive good grades without any endeavors. This is because obtaining an answer without studying reduces true learning. Arnold (2016) also found that cheating was more prevalent in courses without a proctoring system than in courses with a proctoring system. The ability to easily cheat resulted in lower
motivation for students to study. Similarly, in Mott’s (2010) study on detection of cheating, it was found that during an assessment without any proctoring system, students could use various sources from textbooks and class notes, as well as have another person take the test for them. It is almost impossible for course instructors to prevent or detect student cheating during an assessment in an un-proctored setting.

As technology develops, online courses are flourishing in a variety of settings with many different levels of coursework. Universities and other educational facilities and programs are in the process of creating online classes and courses to attract students from undergraduate and graduate schools, as well as learners from other adult education systems. Some of these courses are open Massive Open Online Courses (MOOCs), such as those offered through the “Open Learning Initiative” of Carnegie Mellon University, “OpenCourseWare” of the Massachusetts Institute of Technology, as well as the “Kahn Academy” (McDermott, 2013).

Another setting for online learning can be considered dual-setting courses or classes, which include both resident and online students enrolled in the same class. In addition, there are courses that provide lectures only through Internet. Learners who wish to take the course need to register for the website and then take the course online. Learners must complete assessments online in those courses, for both formative and summative work.

Online courses are also available in other venues. Universities and colleges are actively providing regular online classes to their students who are non-residents. For instance, the Pennsylvania State University offers online courses to Penn State World Campus students who are located off campus, many at quite a distance. Another form of online course is that called, “flipped classes”. A definition of flipped classes includes that students’ activities from classroom and home environment are inverted (Rodriguez, 2016, p. 6) such that students learn class contents via online instruction, but do their ‘homework’ in a traditional brick-and-mortar classroom by participating in instructor-led discussions or projects.
Many studies seek to define what academic cheating is, as an overarching term, and under the many circumstances in which behaviors could be considered academic cheating (Cizek, 1999; Molnar, 2015). With the intention of generalizing the definition of academic cheating, those studies came up with several general behaviors that could be considered cheating, such as copying another student’s answer, looking up unauthorized resources, hiring someone to take an exam, and plagiarism (Cizek, 1999; Lang, 2013). Studies that define cheating behaviors may not be the best way to understanding cheating, because regardless of how cheating is defined in a given study, students are always able to devise new technologies or strategies to get past test proctors, take shortcuts on assessments, or violate academic integrity.

Although several researchers have conducted studies on the definition of cheating, the concept itself is very controversial and situation-dependent. Cheating behaviors vary in different academic situations and may look different depending upon the setting. For example, if students were taking an online assessment or test, there would be no administrator, and at best, only a webcam on their computer to monitor them. In cases such as these when there is no proctor to monitor the assessment, students can consult Internet sources or even arrange to have someone nearby who can help them take the test. Students taking an in-class test, on the other hand, may have a more difficult time looking up relevant information through the Internet or arranging to get help from another person. The question then remains: “What is cheating?”

In addition to the definition of cheating, there is another important question: “How does one know that cheating indeed took place?” This inquiry deals with the methods and process of research in this topic and generalization of the research results. Surveys and interview research methodologies, which are most common, use self-reported data. However, Josien and Broderick (2013) point out that students’ responses to questions that asked if they had cheated varied with students’ perceptions on cheating, whether they had received any definition of cheating throughout the course, and students’ personal characteristics. It is therefore important to study
whether students consider differently about same behaviors under two different settings, and which behaviors students do consider as cheating behaviors in which setting. Then, based on the study results, it may be possible to provide suggestions to general online– and dual-setting courses.

**Factors that Affect Cheating Behavior**

Academic cheating has been studied in a variety of venues. Student cheating is related to diverse factors such as academic motivation, gender, Grade Point Average (GPA), school environments, and perceptions about cheating. Those factors are related to academic cheating either positively or negatively. Since students make a choice of whether they are to cheat or not, and once they decide to cheat, students then consider how to cheat in order to be successful in cheating. Therefore, it is essential to understand which factors can impact academic cheating.

*Student Motivation*

Several researchers have been studied the relationship between students’ academic motivation and cheating. Those studies found positive relationship between academic cheating and student motivation based on several perspectives of motivation (Davy, Kincaid, Smith, & Trawick, 2007; Murdock & Anderman, 2006; Murdock, Hale, & Weber, 2001). Among those studies based on motivation theories, one particular theory of motivation, which is also called the Self-Determination Theory (SDT) by Deci and Ryan (1985; 1991) was found to be relevant to the education context (Baker, 2004, p. 189; Davy et al., 2007; Deci & Ryan, 2000). Self-Determination Theory postulates that students’ behaviors could be amotivated, extrinsically
motivated, or intrinsically motivated; and can be measured on a continuum scale (Deci & Ryan, 1985; 1991).

In this respect, Lang (2013) found that students who are interested in seeking their intrinsic goal, such as feelings of accomplishment, true learning, mastery learning, and achieving inner goals, tend not to be tempted to cheat or violate academic integrity policies. Therefore, seeking intrinsic goals may help students to be satisfied simply by participating in the tasks (Deci, 1975; Deci & Ryan, 1985). Students who have high intrinsic motivation are likely to achieve better grades than those who do not. Intrinsic motivation is correlated to students’ high grades (Garcia & Pintrich, 1991), active commitment in class activities, high level of self-efficacy, and lower engagement in cheating.

Compared to those who are intrinsically motivated, students who are extrinsically motivated to get better grades as a means of getting better jobs, awards, or because of parents’ pressure tend to be more motivated to cheat. Among students with a higher tendency toward extrinsic motivation, students who simply considered grades as their highest priority cheated less than those who received parental pressure to achieve good grades (Lang, 2013). The very nature of the U.S. education system, however, promotes high levels of extrinsic motivation. Kohn (1993) found that students’ tendency to want to achieve better grades often operates as representative of extrinsic motivation; this, along with reward, is the dominant critical concept in the traditional education system. The study from Rettinger and Kramer (2009) also revealed that students engage in cheating behavior when they are extrinsically motivated. In that study, students rationalized their cheating behaviors by adopting neutralization. Here, neutralization means that students’ tendency to justify their cheating behavior when they believe that the given situation allows them exceptions (Nonis & Swift, 2001). Students rationalize their cheating behaviors to avoid moral conflicts and eliminate a sense of guilt (Daniel, Blount, & Ferrell, 1991; Haines, Diekhoff, LaBeff, & Clark, 1986; Nonis & Swift, 2001). On the other hand, Geddes (2011) found
that neutralization was not a significant factor for student cheating, but that the desire to keep a high GPA, the pressure of a high workload, and peer pressure were. Students are able to recognize that they are involved in cheating and that cheating constitutes unacceptable behaviors in testing.

Amotivation is the third type of motivation, in which people perceive discrepancies between expected results and their actual behaviors (Vallerand et al., 1992). When people are amotivated they act passively, and question why they have particular behaviors and why they are completing tasks that are regulated by outside forces. Therefore, it is viewed as similar in concept to learned helplessness (Fortier, Vallerand, & Guay, 1995). Moreover, they believe that the tasks and activities that they are given are beyond their control. They often feel that they are being forced to participate in tasks and activities by other people or forces outside of their control. High levels of amotivation often indirectly but meaningfully correlate with cheating behavior. As Orosz, Farkas, and Roland-Levy (2013) concluded in their study on motivation and academic cheating, amotivation is positively related to students’ cheating engagement.

**Gender**

In several studies, gender is considered an important factor that affects students’ perceived cheating behavior, and shows that female students believe cheating to be less acceptable than their male peers (Elias, 2009; McCabe & Trevino 1997; 2001; Rakovski and Levy, 2007; Smyth, Davis, & Kroncke, 2009; Tibbetts, 1999). In 2004, a study conducted by Simon et al. concluded that gender was the strongest factor in predicting students’ self-report about cheating. Their study proved that female students were significantly more likely to report cheating behavior than did male students (Simon et al., 2004). Moreover, Smith, Ryan, and Diggins (1972) and Tibbetts (1997) found significant gender difference on academic cheating.
They found that female students reported a stronger sense of shame and guilt after having cheated compared to male students (Smith et al., 1972; Tibbetts, 1997).

**Grade Point Average (GPA)**

GPA as a predictor of cheating has been a controversial topic, with the debate centering around whether students with high academic achievement or GPA are more likely to cheat to achieve better grades, or whether those with lower achievement or GPA tend to cheat due to their poor academic performance. In a study conducted by Roig (1997), undergraduate students with low GPAs were shown to cheat more often because they were less able than their higher achieving peers to understand the nuances of plagiarism. Even though the relationship between GPA and academic cheating is unclear, several studies found that cheating behavior is more often positively related to students with low GPAs (Bunn, Caudill, & Gropper, 1992; Crown & Spiller, 1998; Kerkvliet & Sigmund, 1999; Jackson, Levine, Furnham, & Burr, 2002; Burrus, McGoldrick & Schumann, 2007). A study conducted by Schuhmann, Burrus, Barber, Graham, and Elikai (2013) posits that a student’s GPA and their likelihood of cheating is negatively related, in that students with higher GPAs would need to take higher risks on their scores. Nevertheless, Choong and Brown (2007) found no differences in the frequency of cheating between students with higher GPAs and those with lower GPAs. Saulsbury, Ulysses, Heyliger, and Beale (2011) also found no differences in cheating frequency in relation to students’ GPAs.

**Student Self-Efficacy**

When students believe in themselves they actively engage and participate in what they are about to do. In the words of Albert Bandura, whose scholarship developed self-efficacy
theory, “[p]erceived self-efficacy refers to beliefs in one’s capabilities to organize and execute the courses of action required to produce given attainments” (Bandura, 1997, p.3). Students make judgments about their personal capabilities, and their self-efficacy plays an essential role in their academic performances. Self-efficacy is a task/domain-specific concept; a student may be confident about their skills in mathematics, and at the same time doubt the strength of their writing skills.

According to Bandura (1997, p. 19), students’ self-efficacy affects almost every aspect of their thought process, motivation, feeling, and behaviors about a given subject. Therefore, students who are skeptical about their capabilities in a specific task or domain are rarely able to motivate themselves in that subject. As a result, those students are likely to question themselves, put in less effort, and eventually drop out of those tasks when they face difficulties, which may result in those students having low levels of commitment to achieving their goals (Bandura, 1997, p.39). Once students have a set level of belief in their ability in a particular area or domain, it has a direct effect on their success in the task. Multiple researchers have found self-efficacy positively linked with better achievement (Kula, 2016; Siriparp, 2015). In addition, several studies found that self-efficacy is inversely correlated to student cheating (Cizek, 1999; Finn & Frone, 2004; Murdock et al., 2001; Umaru, 2013). Taking this into account, it is probable that students with low self-efficacy in a particular area may seek alternative ways to achieve their goals. Also, Elias (2009) found that students with low self-efficacy were least likely to perceive cheating behavior as unethical, which may lead to cheating behaviors.

Students’ Academic Major

Students’ perceptions about cheating may vary by their academic majors. McCabe (1997) conducted a two-year study of more than 4000 students from 31 different campuses studying
cheating awareness. His study suggested that engineering students reported the highest level of cheating compared to those from other majors including Business, Natural Sciences, Social and Sciences. Engineering students’ justification for cheating was centered on the combination of an overwhelming workload and the necessity of taking non-engineering courses to fulfill general education requirements for graduation (McCabe, 1997). A study conducted by Smyth and Davis (2003) is in line with McCabe’s study (1997). They found that students reported their cheating behavior differently from major to major where business major students cheated more than students from other disciplines (Smyth & Davis, 2003). In addition to that, it is plausible that students who wish to study in competitive majors may cheat more in order to receive better grades with less demanding effort.

*Internet experience*

There could be a difference in students’ recognition about cheating behavior based on Internet exposure. Molnar and Kletke (2012) posit that students who are exposed to the Internet for less than 10 hours a week were less willing to cheat compared to those who spent more than 10 hours a week on the Internet. Their study indicates that students highly exposed to the Internet may feel more at ease in researching outside sources for information related to test topics and may consider cheating more acceptable because of the ease of Internet access, low probability of getting caught by course instructors, and the likelihood that students would not regard it as a violation of academic integrity. Another study done by Underwood and Szabo (2003) on UK students produced a significant result showing that ninety-four percent of students were adept at Internet usage and had a permissive attitude toward cheating, typically in the form of plagiarism, but also including other viable ways to achieve academic goals. In educational assessment
settings, students’ usage of the Internet may result in a pervasiveness of cheating occurrence along with students’ dependency on technology.

*Atmosphere of Academic Settings*

Peer pressure within a group, class or school plays an important role in the atmosphere of academic settings. Often, students who are caught cheating have been forced to engage in cheating behavior due to peer pressure. For example, in a study conducted on university students, McCabe and Trevino (1997) found that when students are forced to take a test for other students who asked them to do so, they often choose to cheat rather than be isolated from the fraternity, sorority or group. Factors related to peer relationships, including peer pressure, are often a greater impact on students’ cheating behavior than other individual factors such as age, gender, and GPA. This impact is due to the disproportionately high importance that students place on peer relationships and disapproval within a fraternity, sorority or other group. (Burrus et al., 2007; McCabe & Trevino, 1997; Molnar & Kletke, 2012).

Similarly, the stakes involved in a given assessment and academic setting can have a high impact on cheating behavior. For example, students taking the Scholastic Aptitude Test (SAT) to get into a college of their choice may feel more urge to engage in different cheating behaviors than they usually would due to the pressure to perform well. Moreover, if students do not feel prepared enough for taking the assessments, cheating may become a students’ rational and reasonable alternative strategy to meet their desired goals.

University attitudes and the ways in which they communicate expectations to students may also be important to cheating. Molnar and Kletke (2012) found that if a university communicated well with students in discussing ethical expectations, students were less likely to commit behaviors of academic dishonesty. Moreover, the students also prevented their peers from
cheating, which resulting in an overall reduced acceptance of cheating (Molnar & Kletke, 2012). Smaller universities may also note lower cheating behaviors because of the connectedness that students feel with the university, instructors, and their smaller classes. Taking this into account, they concluded that smaller, private, and religious institutions are likely to have students who view cheating as less tolerable, whereas students from larger and public institutions view cheating as more acceptable (Molnar & Kletke, 2012).

**Prior Research in Cheating in Engineering Courses**

Studies have found that cheating in engineering courses is a serious problem. In a study conducted by McCabe in 1997, the rate of engineering undergraduate students’ engagement in academic cheating was significantly higher than those in other majors such as business, social sciences, and others, in a self-reported survey. Another research study reported a similar result, finding that after business students (91%), engineering students are most likely to cheat, at rate of 82 percent (Anonymous, 2004; Huband, 2009; McCabe, 1997). These studies show that student cheating in engineering education is a serious problem. Seriousness of cheating problem in engineering education was examined by Harding, Finelli, Carpenter, and Mayhew (2006). The result of their study was consistent with others’ suggesting that engineering students’ cheating rate, indeed, was higher than that of students from other disciplines (Harding, Finelli, Carpenter, & Mayhew, 2006). Therefore, student cheating in engineering education has been regarded as being widespread (Sisson & Todd-Mancillas, 1984), and it still remains as a serious problem.

In light of the high rate of undergraduate students’ cheating in engineering education, a change in course format that includes online courses and online assessments is among the primary concerns in engineering education (Kelley & Dooley, 2014). Now that the classroom experience has been redefined, students are not only able to take lectures online but also take assessments online. Because of the nature of testing, cheating can be rampant if assessments are not secured
under proper test administration such as having proctors in the same place where students take assessments, and the implementation of a remote proctoring system that can successfully prevent cheating. Unfortunately, online courses are just beginning to be developed in engineering education, and it is therefore possible for engineering education to be at risk of frequent cheating by the advanced use of technology (Anonymous, 2004; Huband, 2009; McCabe, 1997; Srikanth & Asmatulu, 2014) and cultural changes such as students carrying smart phones instead of bringing crib notes (Anonymous, 2004), as well as dissonant perceptions about defining what is and is not cheating (Carpenter, Harding, Finelli, Montgomery, & Passow, 2006).

Students’ intention to cheat may be influenced by their differing conceptions and attitude toward cheating behavior, building up subjective morality norms (Harding, Finelli, Carpenter, & Mayhew, 2006). Several individual sources related to students’ morality, such as attitude, subjective norm, moral obligation, and past behavior were found to be crucial in the study by Harding, Finelli, Carpenter, and Mayhew (2006). Also, Moyer (2016) suggested that factors such as ethics code for engineers, in-class discussion activities about ethics, and students’ pre-college experiences in school could contribute to shaping students’ attitudes and preconceptions about academic cheating. McCabe (2005) suggested that: students’ cheating behaviors are highly depending on situational factors such as school atmosphere; the extent of emphasis on informing about the seriousness of academic dishonesty to students, and faculty members’ perspectives on cheating regarding its seriousness.

In addition to the aforementioned important reasons to cheat, there are multiple factors that influence engineering students to engage in cheating behaviors: their extreme workload with the difficulty of achieving an engineering degree (Lopez-Fernandez, Alarcon, & Tovar, 2015; McCabe, 1997), vocation– and grade-oriented approach of discipline (Harding, Finelli, & Carpenter, 2006), and poor teaching instruction (Anonymous, 2004).
Due to the combination of those characteristics, cheating hinders engineering students from access to learning opportunities that could improve their understanding of course material and important concepts (Carpenter, Harding, Finelli, & Passow, 2004). If cheating is pervasive, then assessments would no longer remain as an accurate method of measuring students’ academic achievement, but would also serve as a means of measuring students’ cheating skills. Universities and colleges, morality of students and faculty members, and the dignity of institution may be harmed by pervasive cheating (Whitley & Keith-Spiegel, 2002). Furthermore, the problem of cheating in engineering could then extend into the professional world as well as into society at large, due to the vocation-oriented characteristic of engineering education (Choi, 2009). It is important to consider that several studies showed that academic cheating in undergraduate level was significantly related to that of high school level (Finelli, Harding, & Carpenter, 2007; Harding, Finelli, & Carpenter, 2006; Harding, Finelli, Carpenter, & Mayhew, 2006). As Nonis and Swift (2001) noted, students who previously cheated in their college years were more likely to be engaged in unethical behavior in their later life at the workplace. In this respect, researchers from engineering are concerning about the long term adverse effect of academic cheating on the eventual professional lives of engineers (Srikanth & Asmatulu, 2014).

The overall trend of cheating in online education affects assessments in engineering education, and can lead students to cheat on a variety of assessment types. Therefore, with an eye toward the increasing need to improve test security, this study is focusing on examining undergraduate engineering students’ perceptions about cheating in order to adopt appropriate cheating prevention systems and instructions.
Chapter 3
Design of the Study

Research Setting

The setting of this research is at a large public, research-intensive university in the northeastern United States. The purpose of the study is to understand the perceptions of cheating from engineering students as it relates to the type of assessment and the educational setting (e.g. online or residential).

Along with online-provided education with online lectures, courses, and degrees, online distance learning is fast-growing and becoming ubiquitous (Viswanathan & Wyne, 2013). The growth of online courses is an essential element to the success of engineering in higher education (Allen & Seaman, 2003). Given this context, people can now study engineering education at any time, with courses available to learners regardless of their physical locations as long as they can access the internet (Bourne, Harris, & Mayadas, 2005). For those reasons, it is important to the growth of engineering education to develop and improve their online course design.

Now that STEM fields in the U.S. need an increasing number of professional students (Lufkin, 2008; National Science Foundation [NSF], 2004; Terrell, 2007), it is critical to enrich access trajectories to STEM areas and provide viable assistance to learners who are to complete STEM online courses (Mooney & Foley, 2011).

A number of studies showed that engineering students report considerably higher percentage of cheating engagement for two major reasons: first, they have about twice the number of tests and assignments compared to students in other majors (Harding, Finelli, Carpenter, & Mayhew, 2006; Harding, Mayhew, Finelli, & Carpenter, 2007). The heavy
workload can facilitate students cheating behavior to avoid being overwhelmed and to maintain their course grades.

Second, some engineering classes are offered in a dual setting, which restructures a traditional engineering class to a dual site or hybrid course to reduce the amount of time students spend in class (Enjeti, 2009) and to enhance the effectiveness of delivering content knowledge to students in engineering (Branoff & Weibe, 2009). Few studies have been conducted and examined the effects of this newly developing online engineering education on student cheating.

All these aspects of engineering education encourage researchers to conduct more studies on the formats and types of engineering education including face-to-face, online, and dual setting. There is a significant need to understand students’ perceptions and understanding of cheating behavior and how it differs between online and residential contexts.

**Theoretical Framework**

There are two theories guiding this study under the conceptions of cheating: Theory of Opportunity and Theory of Stakes.

*Theory of Opportunity (Test administration)*

The theory of opportunity (Cohen & Felson, 1979) indicates that when people feel there is more room, chance, or opportunity to cheat, their engagement in unethical behaviors increases. In case of academic cheating, students cheat when they think there is more opportunity (Bichler-Robertson et al., 2003). And as a result of cheating, students lose their actual learning opportunities (Arnold, 2016) with lack of deeper understanding of content knowledge (Carpenter et al., 2004). According to opportunity theory, given the same opportunist environment,
students who find their perceived self-efficacy and self-control to be low are less cautious about cheating and find cheating behavior to be more acceptable. Stogner et al. (2013) concluded that students who think of their surroundings enable them to cheat, such as having access to Internet, and those who have low self-control are more likely to cheat. This is because students who show high self-control are less likely to be engaged in cheating and academic dishonesty, even when they perceive that there is an opportunity to engage in cheating behavior (Stogner et al., 2013).

Maramark and Maline (1993) posit that academic cheating is most strongly correlated with students’ surroundings and environments. Based on several studies about academic cheating, researchers found that students cheat more when they feel that they have an opportunity to cheat (Bichler-Robertson et al., 2003). For example, when students see that the test administrator is not fully focusing on test administration, or when a proctoring system is flexible (e.g. in an online context), students feel that they have more room to cheat and that getting caught is unlikely (Wachenheim, 2009). Therefore, opportunity theory posits that students cheat primarily due to reasons that are dependent upon the situation.

Overall, based on The Theory of Opportunity, study results lead to a conclusion that, when there is more opportunity, students are more likely to cheat. That is, more opportunity leads to more cheating. With more opportunities to cheat, more behaviors are not perceived as cheating, and therefore, cheating behaviors become more acceptable and tolerable.

**Theory of Stakes**

Opportunity theory can be complimented by the Theory of Stakes. The Theory of Stakes posits that in higher stakes assessments, students are more likely to cheat due to the possible ramifications of poor performance (Lang, 2013, p. 43; Suen & Yu, 2006). “Low stakes” assessments are typically thought of as course assessments that are not worth a high percentage of
the students’ grades and therefore result in lower pressure situations. Summative assessments, however, are usually worth higher percentages of the overall grades and can be considered “high stakes” testing. Similarly, national placement exams, such as the SAT and ACT are considered “high stakes” since the pressure to perform well can be overwhelming. When students feel more pressure under high-stakes testing, they are more likely to cheat (Lang, 2013).

High-stakes assessments sometimes result in unintentional side effects, such as an increase in cheating and a decreased focus on learning resulting in serious consequences (Cizek, 2003, p. 33; Suen & Yu, 2006; Lang, 2013, p. 43). Students that focus only on performing well on those high-stakes tests may argue that their behaviors are reasonable given the setting and the importance of the assessment. The higher the stakes, the more tempted students are to cheat, because students wish to succeed using whatever means necessary (Lang, 2013). Moreover, under the Theory of Stakes, several contextual factors also affect the frequency of cheating occurrence. For example, when students have high expectations on their coursework but have low self-efficacy on the task, students tend to cheat more often because of the high pressure placed on them. It may seem natural or justifiable for students to cheat during exams if they feel that they are not competent enough for the task (Lang, 2013) or feel that the task requires too high of a workload for students (Carpenter, Harding, Finelli, Montgomery, & Passow, 2006). Students that are under too much pressure and feel overworked may tend to cheat because they do not want to fail.

As a result, the more and the higher the stakes are, the more students will consider the heavier consequences of behavior that may deter them from cheating. Indeed, students will likely find it less acceptable and tolerable to cheating behaviors. With lower-stakes of testing, however, such as quizzes, more behaviors are not perceived as cheating, and therefore, cheating behaviors become more acceptable and tolerable.
For online quizzes that are taken at home without a proctoring system, there is more opportunity to cheat. Also, quizzes given throughout a course generally account for less percentage of the total grade for a course. Therefore, quizzes are low-stakes testing compared to in-class mid-term or final exams. Combining both more opportunity to cheat and low-stakes of testing, quizzes will likely lead students to consider cheating behaviors to be more acceptable and tolerable.

On the contrary, mid-term or final exams are taken at in class with test administrators or proctors in the same classroom. That is, exams give less opportunity to cheat. Moreover, since mid-term and final exams generally account for more percentage of the total grade for a course, these exams can be regarded as relatively high-stakes tests. In this respect, combining both less opportunity to cheat and high-stakes of testing, in-class exams will likely lead students to consider cheating behaviors to be less acceptable and tolerable.

By the combination of those two situations (opportunity to cheat and stakes of testing), that online with low-stakes testing, and in-class with high-stakes testing, it is reasonable to expect students’ perceptions about cheating when taking online quizzes versus in-class exams to be different. Hence it can be hypothesized that there is a difference between students’ perceptions about cheating in online, low-stakes quizzes and in in-class, high-stakes exams.

To empirically test whether there is any difference on cheating perceptions between students taking online courses and students taking in-class courses, the author surveyed engineering undergraduates at a large public research-intensive university on their opinions of what behaviors constitute cheating in online versus residential settings.
Design to Test Hypothesis

Methods

Participants

Data for this study were collected via a survey of undergraduate students in the College of Engineering at a major public university in the Northeastern United States. A link to an online survey was distributed to Undergraduate Academic Coordinators in all engineering disciplines, asking them to forward it to their undergraduate lists. Because of this method of recruitment, there is no ability to calculate a response rate for the survey. Participants were given the opportunity to have their name entered into a drawing for a $5 Starbucks gift card to incentivize participation.

Survey Protocols

Basic demographic data was requested from survey participants including gender, discipline within engineering, and their year in school. The year in school was asked because at the university in which the data was collected, engineering students are accepted into their major during their junior year based upon their grades. Because of this extrinsic motivator for good grades, year in school may impact motivation to cheat on assessments to attain better grades.

To understand how students view cheating behavior, the survey consisted of two parts. The survey protocol is provided in the Appendix A. The first set of questions contain items that ask students how they define cheating behavior. The second part of the survey probes students’ attitudes toward cheating behaviors according to different levels of stakes in assessments (quizzes...
versus exams). Survey questions were the same for online and in-class settings to generate a better comparison.

The survey consisted of 17 questions with behaviors that described situations possibly construed as cheating. The survey was provided to the participants of this study and they were asked to indicate if they considered a behavior to be cheating. In the survey, participants were given a chart with statements of behaviors in two columns concerning two different assessment situations: quizzes and midterm/final exams. For example, participants were asked whether they thought of “Taking an assessment for another student” as cheating under the quizzes category and also under the midterm/final exam category. Participants then needed to check the box under each category if they considered the behavior to be cheating in both contexts, or leave one or both boxes blank if they did not consider the behavior to be cheating in that context.

Dependent Variable

The dependent variable in this study was defined dichotomously regarding whether a student viewed the particular statement or behavior as cheating behavior. The overarching dependent variable in this study was students’ perceptions of cheating in different testing settings, online and resident. Under this overarching dependent variable, there were 17 statements that indicated different behaviors that could possibly be regarded as cheating under each of the two conditions. These 17 items were designed independently from any existing surveys, however, survey is similar to those found in other academic cheating literatures (Bichler-Robertson et al., 2003; Carpenter, Harding, & Finelli, 2006; 2010; Carpenter, Harding, Finelli, Montgomery, & Passow, 2006; Harding, Finelli, & Carpenter, 2006; Kelley & Dooley, 2014; Moyer, 2016; Newstead, Franklyn-Stokes, & Armstead, 1996; Nonis & Swift, 2001; Rowe, 2004; Smyth et al., 2009). Also, they were customized in order to fit into the type of online engineering course often
offered at the university. As such, some of the items refer to the specific course ENGR 201, so that when the context of the study was specified, respondents could better understand the study situation and answer questions without confusion or misunderstanding. All statements were related to each other to some extent, in that they dealt with similar situations: working together for quizzes/exams, hiring someone else to take quizzes/exams, uncovering their answers to let others cheat off of them, using unauthorized materials without permission, looking up unauthorized sources without permission, and referencing others’ work without appropriate citation. See Appendix A for a detailed listing of all 17 statements and the behaviors they represent.

Independent Variable

There are two independent variables in this study that are dichotomous and are applied to the study’s hypothesis: opportunity to cheat in online vs. resident settings, (assuming that the resident setting has a lower opportunity to cheat); and the degree of the stakes of the assessment (assuming that quizzes are low stakes and exams are high stakes). The study was designed to probe the perceptions of the students in considering an engineering class in which the quizzes (low stakes) were taken online and the exams (high-stakes) were taken in-person with a proctor.

However, within the context of this study, online assessment tasks (i.e., high opportunity) were quizzes (i.e., low stakes) while the in-class exams (i.e., low opportunity) were exams and tests (i.e., high stakes). Therefore, given the design of this study, it was not possible to separate the two independent variables. The result is a single dichotomous independent variable of high-opportunity/low-stakes vs. low-opportunity/high-stakes.
Data Analysis

McNemar tests were applied to determine whether responses to each of the questions regarding the 17 potential cheating behaviors were statistically significant between online quizzes and in-class exams/tests. The dependent variable (students’ perceptions about cheating on 17 different behaviors) in the study was a dichotomous variable; engineering students had to make a choice about whether each behavior constituted cheating. In the study, 17 individual McNemar tests were used to examine whether students who agreed that a given behavior was cheating in online testing were consistent in their beliefs or changed their minds to select that the same behavior was not cheating in an in-class/resident testing setting. In other words, students’ responses about online testing with high-opportunity, low-stakes, and resident testing with low-opportunity, high-stakes were compared by analyzing if they had changed their minds between categories.

Data was cleaned for incomplete responses. Of the remaining 115 responses, there was no missing data and all participants responded to every question. A total sample size of 115 undergraduate engineering students’ responses were analyzed by McNemar tests in SPSS 24. Because, 17 questions were identical to both online and resident settings, but context of testing was different, each question under the two settings was paired as a set. Therefore, 17 pairs of responses were analyzed individually. In order to deal with significance tests for multiple times, McNemar tests were applied (Koletsi & Pandis, 2017). For example, question 1 was “Taking an assessment for another student”, and was identically phrased for both online testing and resident setting. Accordingly, “Taking an assessment for another student in online testing” and “Taking an assessment for another student in in-class testing” were among 17 pairs of questions that students were asked to answer. Responses regarding both settings were provided and analyzed. They
provided information about whether students’ perceptions about cheating had changed from an online setting to a resident setting.
Chapter 4

Results

Demographic Information

The participants of this study were current undergraduate students attending classes in the engineering department at The Pennsylvania State University. A total number of 115 students participated in the survey. Out of 115 students, 58 students were women (50.43%), 54 students were men (46.96%), and 3 students (2.61%) elected not to answer this question. 103 students were domestic (89.57%) and 12 students were international (10.43%). Those 12 international students were from the following countries: Brazil, China, India, Malaysia, Mexico, and South Korea. Participants consisted of one freshman (0.87%), 16 sophomores (13.91%), 46 junior students (40%), 40 seniors (34.78%), and 12 students who had attended school for more than 4 years (10.43%). Students’ majors also varied. Figure 4.1 shows the composition of academic majors of respondents. Additionally, students were asked if they had taken ENGR201: An Introductory Thermal Science Course. The purpose of this question was to take into account their understanding of the study setting, because the instruction in the survey asked participants to envision themselves taking ENGR201, a course structured like all tests are in person and quizzes are online, while they were answering questions about possible behaviors regarding academic dishonesty. Only 4.35% (5) of students answered that they had taken this course, which means that they knew how this course was designed and the format and settings of the course’s quizzes and exams. 95.65% (110) of students responded that they had not taken the course; these
participants were encouraged to imagine the settings of the assessments in which quizzes were provided online and exams were delivered in-class.

**Analyses Results**

Overall evaluation by the McNemar tests with Bonferroni adjustment of $\alpha = .05/17$ ($=.002941$) was applied to data analyses to deal with the multiple comparison tests on a single group of study participants (Sedgwick, 2012). Seventeen test questions were given in the survey regarding online and resident contexts. The overall hypothesis that “there is a difference between students' perceptions about cheating in online, low-stakes quizzes and in in-class, high-stakes exams” was tested for each of the 17 behaviors individually. The results are reported in Table 4.1.
Detailed item-by-item cross tabulations of frequencies of ‘yes’ (coded as ‘1’) and ‘no’ (coded as ‘0’) for online quizzes and in-class exams are provided in Appendix B.

Among the 17 statements, the McNemar test results showed that 16 failed to reject the null hypothesis with various p-values, all larger than $\alpha = .002941$. There was insufficient evidence of differences in students’ perception about cheating between the two assessment settings for the behaviors described in those 16 statements. Question 3, “Working with others on an assessment”, was the only behavior that had a statistically significant change in students’ perceptions under different assessment settings, with a p-value of $<.001$ (less than the alpha level of .002941). There was a statistically significant change in students’ perceptions about “Working with others on an assessment” when taking assessments online with low-stakes testing in comparison to taking assessments in-class with high-stakes testing. Under the condition of an online, low-stakes assessment, 49% of the students considered “working with others on an assessment” as cheating; while 78% of the students considered the same behavior cheating under the condition of an in-class, high-stakes assessment. This means that, for 16 of the 17 behaviors described in the statements, there is no evidence that respondents perceive cheating differently between taking tests online, low-stakes and in-class, high-stakes testing. For these 16 behaviors, the proportions of students consider them cheating were relatively similar in both online, low-stakes and in-class, high-stakes testing.

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Online Proportion</th>
<th>Resident Proportion</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Taking an assessment for another student</td>
<td>.93</td>
<td>.89</td>
<td>.23</td>
</tr>
<tr>
<td>2 Paying someone else to take an assessment for you</td>
<td>.90</td>
<td>.86</td>
<td>.34</td>
</tr>
<tr>
<td></td>
<td>Working with others on an assessment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>------------------------------------</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>3</td>
<td>.49</td>
<td>.78</td>
<td>&lt;.001*</td>
</tr>
<tr>
<td>4</td>
<td>Studying with others for a given assessment</td>
<td>.12</td>
<td>.13</td>
</tr>
<tr>
<td>5</td>
<td>Looking at unauthorized resources during the assessment</td>
<td>.79</td>
<td>.85</td>
</tr>
<tr>
<td>6</td>
<td>Permitting another student to look at your answers during an assessment</td>
<td>.83</td>
<td>.88</td>
</tr>
<tr>
<td>7</td>
<td>Witnessing another student behaving in academically dishonest ways and not reporting it to the instructor</td>
<td>.48</td>
<td>.52</td>
</tr>
<tr>
<td>8</td>
<td>Hearing about cheating behaviors of other students and not reporting it to the instructor</td>
<td>.41</td>
<td>.44</td>
</tr>
<tr>
<td>9</td>
<td>Asking other students what questions are on the assessments before taking them</td>
<td>.58</td>
<td>.65</td>
</tr>
<tr>
<td>10</td>
<td>Having possession of assessment questions from a student who has taken the class before</td>
<td>.54</td>
<td>.56</td>
</tr>
<tr>
<td>11</td>
<td>Using a false excuse to convince the instructor to delay the assessment to allow you more time to study</td>
<td>.63</td>
<td>.72</td>
</tr>
<tr>
<td>12</td>
<td>Copying others' work and turning it in under your name</td>
<td>.88</td>
<td>.88</td>
</tr>
<tr>
<td>13</td>
<td>Storing answers to a test in a calculator or phone; accessing them during a test</td>
<td>.81</td>
<td>.86</td>
</tr>
<tr>
<td>14</td>
<td>Communicating with others during an exam</td>
<td>.77</td>
<td>.89</td>
</tr>
<tr>
<td>15</td>
<td>Purchasing answers via a textbook answer site such as Chegg</td>
<td>.44</td>
<td>.55</td>
</tr>
<tr>
<td>16</td>
<td>Reporting there was a grading mistake by the computer or the instructor when there was not</td>
<td>.77</td>
<td>.77</td>
</tr>
<tr>
<td>17</td>
<td>Looking up answers to assessment questions on the internet</td>
<td>.64</td>
<td>.78</td>
</tr>
</tbody>
</table>

Note. *Significant at p < .002941 (with Bonferroni correction applied).
Chapter 5
Conclusions and Discussion

Interpretation of Results

The behavior that showed statistically significant difference between two settings was behavior 3, “Working with others on an assessment”. For the behavior of “working with others on an assessment,” 90 students agreed that it could be a cheating behavior in an online, low-stakes assessment, whereas only 56 students agreed on that same behavior being cheating in in-class, high-stakes assessment. There was a difference of 34 students between two testing settings. By considering the statement, the result seems reasonable and to make sense. It is likely that for the majority of resident testing situations, a test administrator is present while examinees take assessments in the same room. On the contrary, online testing tends not to have test administrators in the same room with examinees while that students take the assessment because not only can students take assessments at various times, they are also in different locations. Accordingly, it is likely that students tend not to consider working together on an assessment with others cheating while they are taking online tests, but tend to think of it as cheating during in-class assessment under a test administrator’s observation.

For the remaining 16 behaviors, all failed to reject the null hypothesis. That is, there was insufficient evidence of statistically significant change in student perceptions about cheating between online testing with low-stakes, and resident testing with high-stakes. “Studying with others for a given assessment” (Question 4) had the lowest proportions. Only 14 students agreed that studying together for assessment is cheating in online low-stakes testing, and 15 students
agreed for resident high-stakes testing. The two proportions were virtually identical. This indicates that students do not think studying together for an assessment with other students is cheating, regardless of testing settings and assessment stakes.

Discussion

This study investigated students’ perceptions about cheating in two different contexts with different levels in the stakes of testing: online with low-stakes, and resident with high-stakes. The original purpose of the study was to examine whether students think differently about cheating behavior when they are situated in different testing settings and when the stakes of testing are different.

To prevent cheating behavior in either online or resident contexts, it is critical to understand plausible situations that can be considered cheating. It may be better to find out what kinds of cheating behaviors exist and take them into consideration when we build tests for either online or resident testing. However, from test to test and from context to context, students may be in different settings; they may have different administration systems and different administrators, and they may take tests alone in private rooms or they may take tests with others in the same room.

Regardless of the motivation to cheat, it is essential to ensure that instructors consider what their students regard to be cheating in any given situation when building an overall course design. It is desirable to think ahead about students’ perceptions on cheating so that courses can be constructed with more secure assessments. For instance, in online quizzes, cheating may be preventable to some extent when instructors set up and mention assessment rules or instructions that say that working with other students on quizzes is not allowed. By investigating students’
perceptions about cheating, choosing an appropriate administration can be directly and effectively applied to the overall course design.

In this study, there was one behavior (“working with others on an assessment”) that showed a significant difference in students’ perception about cheating between two contexts (online quizzes, and in-class exams). In order to appropriately deal with students’ perceptual difference under different settings, it is recommended that course instructors should explicitly announce to students that working together with others is one type of cheating and is not allowed for online quizzes as much as it is not allowed in in-class exams.

**Limitations**

*Selection of Sample*

First, participants of this survey are limited to undergraduate students majoring in Engineering at Penn State. Even though the survey was intended to be distributed to every undergraduate engineering student, there were some departments in which the survey did not get distributed to students which limited the diversity of participants and resulted in a lack of variety in the data. Additionally, participants self-selected to participate in the survey or not. Therefore, it is hard to declare that the study sample reflects overall trend of undergraduate engineering student population. Indeed, it is possible that this gender composition could have yielded different results if the study were conducted at other period of time.
Ratio of Gender

In the study, gender ratio of collected data is approximately equal: 58 were women, whereas 54 were men. This is an atypical reflection of the demographics of engineering across the undergraduate engineering in general, an overwhelming majority of undergraduate students are men (80-82%) and women make up only 18-20% of the total in 2014 (National Science Foundation [NSF], 2017). One possible explanation for over-representation of female students could have been derived from sample recruitment; students self-selected to participate in survey. Therefore, it is possible that the survey results could differ if the collected data more realistically reflected the ratio of gender in an engineering context. Even though this study excluded gender from considered variables, there are still several studies that show an impact of gender on cheating behavior, with male students more likely to cheat than female students (Tibbetts, 1999; Whitley, Nelson, & Jones, 1999). Also, in terms of reporting cheating behaviors, female students were significantly more likely to repost cheating than were male students (Simon et al., 2004). Accordingly, there is a significant possibility that study results could change along with the gender makeup of respondents.

Methodology

To investigate students’ perceptions about cheating, participants were asked to select the statements they considered to be cheating. The survey was provided online, and is based on self-reporting. Because of the characteristics of self-reporting, it is difficult to prove that their responses were 100% honest. Also, most participants in this survey had not previously taken the ENGR 201 course. Therefore, respondents could have misunderstood the context of the survey
questions, although all respondents were provided with instructions at the beginning of the survey and were encouraged to envision themselves as if they had taken ENGR 201.

Moreover, by looking at raw data, there were cases for which responses having no variance, such as responses that indicate all 17 situations are cheating both in online and resident testing context or the other way around. Because survey is applied to the study, responses may not accurately reflect respondent’s perception for possibility of lack of students’ true opinion by answering to questions without any consideration.

This study was specifically designed for one course, and survey questions focused on the possible cases and types of cheating that were plausible within this particular course. The results of this study may or may not apply to other courses with different designs.

Finally, this study did not effectively separate the variable of online vs. in-class and the variable of low-stakes vs. high-stakes. Instead, an online/low-stakes condition was compared against an in-class/high-stakes condition. Consequently, we are unable to discern whether any observed differences between the two conditions are due to the stakes or online/in-class variable.

Additionally, since those 17 questions were considered individually, there may be lower score reliability which would result in lower power. To resolve this problem, it is best to collapse similar types of questions into the same group and run a dependent t-test to compare whether there is any discrepancy in students’ perceptions about cheating between online and resident settings. This approach may produce a higher reliability with a narrower range of measurement and provide a higher power to the study. But the gain in power would have been obtained at the expense of losing granularity of information.
External Validity

External validity deals with whether this study result can be generalizable to real-world situations beyond the boundary of the study. In terms of its characteristics, this study is bounded within the design of the ENGR 201 course: quizzes are only provided online, and two exams are provided in-class only. However, in the real world, there are various other courses that have other structures, such as taking quizzes in-class and exams online, or taking both forms of assessment online or in-class. For these reasons, it is difficult to conclude that the results of this study can be generalized beyond this circumstance.

Future Directions

As the study results indicated, there were little evidence of statistically significant difference in students’ perceptions about academic cheating in the two settings. Only one behavior had a statistically significant difference between the two different situations; students may think that they are allowed to discuss an assessment or share information about an assessment, particularly when an assessment is given online compared to when given in-class.

One of the limitations of this study is that the survey did not provide rich information about the reasons behind students’ perceptions. The question still reminds as to why they hold certain attitudes and perceptions about cheating. To better understand the respondents’ stances on academic cheating, it may be appropriate to conduct follow-up interviews with some of the students who took the survey. Moreover, it may also be helpful to investigate how students of different academic majors understand cheating in a given set of situations.

In spite of those limitations, this study on cheating perceptions is meaningful due to the information it provided on various types of cheating in two different testing settings: online and
resident. The analysis results of this study can be applied to help design courses that are more secure from academic cheating behaviors, specifically dual-setting engineering courses with assessments offered in both online and resident settings.
References


http://search.proquest.com/docview/1369256980?accountid=13158


http://search.proquest.com/docview/1501695042?accountid=13158


Weiss, K. R. (2000, Feb 15). Focus on ethics can curb cheating, colleges find; Behavior: Academic dishonesty is rampant, but students will respond to higher standards of integrity, a study shows. *Los Angeles Times* Retrieved from http://search.proquest.com/docview/421641727?accountid=13158


Appendix A

Survey Protocols

Engineering Student Perceptions of Academic Integrity

I identify as a
☐ Woman
☐ Man
☐ Another ________________
☐ I prefer not to answer

What is your primary desired engineering major? (Select all that apply)
☐ Aerospace Engineering
☐ Architectural Engineering
☐ Biological Engineering
☐ Chemical Engineering
☐ Civil Engineering
☐ Computer Engineering
☐ Computer Science
☐ Data Sciences
☐ Electrical Engineering
☐ Energy Engineering
☐ Engineering Science
☐ Environmental Systems Engineering
☐ Industrial Engineering
☐ Materials Science and Engineering
☐ Mechanical Engineering
☐ Mining Engineering
☐ Nuclear Engineering
☐ Petroleum and Natural Gas Engineering
☐ Other ________________
What is your current engineering major?
- Aerospace Engineering
- Architectural Engineering
- Biological Engineering
- Chemical Engineering
- Civil Engineering
- Computer Engineering
- Computer Science
- Data Sciences
- Electrical Engineering
- Energy Engineering
- Engineering Science
- Environmental Systems Engineering
- Industrial Engineering
- Materials Science and Engineering
- Mechanical Engineering
- Mining Engineering
- Nuclear Engineering
- Petroleum and Natural Gas Engineering
- Other ____________________
In YOUR OPINION, which of these behaviors, for which type of assessment (quiz or test) constitutes cheating? Check all that apply. (For example, if you agree that item 1 is cheating for both quizzes and tests, then select both categories.) "Assessment" is a generic word for quizzes and tests. If you HAVE taken ENGR 201, please think about that class for reference. If you HAVE NOT taken ENGR 201, please envision taking a class where lectures and quizzes are online, but exams are in-person with a professor.

<table>
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<tr>
<th>Behaviors</th>
<th>Online Quizzes</th>
<th>In-person Tests</th>
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</thead>
<tbody>
<tr>
<td>Taking an assessment for another student</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Paying someone else to take an assessment for you</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Working with others on an assessment</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Studying with others for a given assessment</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Looking at unauthorized resources during the assessment</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Permitting another student to look at your answers during an assessment</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Witnessing another student behaving in academically dishonest ways and not reporting it to the instructor</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Hearing about cheating behaviors of other students and not reporting it to the instructor</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Asking other students what questions are on the assessments before taking them</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Having possession of assessment questions from a student who has taken the class before</td>
<td></td>
<td></td>
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<tr>
<td>Using a false excuse to convince the instructor to delay the assessment to allow you more time to study</td>
<td></td>
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<tr>
<td>Copying others' work and turning it in under your name</td>
<td></td>
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<tr>
<td>Storing answers to a test in a calculator or phone; accessing them during a test</td>
<td></td>
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<tr>
<td>Communicating with others during an exam</td>
<td></td>
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<tr>
<td>Purchasing answers via a textbook answer site such as Chegg</td>
<td></td>
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<tr>
<td>Reporting there was a grading mistake by the computer or the instructor when there was not</td>
<td></td>
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<td>Looking up answers to assessment questions on the internet</td>
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Appendix B
Cross Tabulations

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Permitting another student to look at your answers during an assessment

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Witnessing another student behaving in academically dishonest ways and not reporting it to the instructor

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Hearing about cheating behaviors of other students and not reporting it to the instructor

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Asking other students what questions are on the assessments before taking them

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Having possession of assessment questions from a student who has taken the class before

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Using a false excuse to convince the instructor to delay the assessment to allow you more time to study

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Copying others' work and turning it in under your name

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### Purchasing answers via a textbook answer site such as Chegg

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Looking up answers to assessment questions on the internet

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Note. 1 is coded “Cheating” and 0 is coded “Not Cheating”.