

# A BRIEF INVESTIGATION OF EXAM QUESTIONS POSTED TO TUTORING WEBSITES: A DARKER SIDE OF MODERN CHE EDUCATION

JAVIER HUAYTA<sup>1</sup>, ZACHARY S. CAMPBELL<sup>1</sup>, AND MATTHEW E. COOPER

North Carolina State University • Raleigh, NC 27695

## INTRODUCTION

Digitalization and the internet have effected many changes in education. One key development in technical education is the rise of tutoring websites such as Chegg<sup>®</sup> and Course Hero<sup>®</sup>, which proclaim that their mission includes helping students save time and money by providing a platform to reconnect learning and earning opportunities<sup>[1]</sup> and creating a framework to enable students to access and create their own library of course materials and support resources.<sup>[2]</sup> Nevertheless, these websites also generate an internal economy of students and tutors that can result in cheating. Streseman indicates that using tutoring websites to upload and find answers to problems can be a form of cheating since students present ideas that they have not produced themselves, including a process to pay to cheat by way of a monthly subscription.<sup>[3]</sup> Similarly, Seeland concludes that these websites provide “online shopping” for “contract cheating,” defined as the outsourcing of student work to third parties.<sup>[4]</sup>

The avenues of interaction between students and these websites are by either submitting problems or acting as a tutor to other students. In the first case Chegg claims to be able to provide answers to posted problems as fast as 30 minutes (15 minutes for Course Hero). This requires students to take a picture or scan their problems for consultation with an “expert” or to access their extensive homework solutions library (21 million solutions for Chegg).<sup>[5, 6]</sup> This process is further simplified through the use of the Chegg app, which enables students to take pictures of problems using a cell phone and quickly upload the images to the website. For the latter, Course Hero offers the opportunity for users to serve as a tutor to help students solve problems online with an average pay of US \$500 per week.<sup>[7]</sup> Chegg is not currently accepting new tutors but still offers on-demand problem solving services for a fee.<sup>[8]</sup>

Chegg indicates in its tutor terms of service that they only serve as a platform that facilitates the provision of lesson

services by user request, in this case students.<sup>[9]</sup> Chegg considers these tutors as independent contractors who are expected to follow an honor code. Chegg’s honor code states that “Tutors shall not take tests nor complete any graded assignments for students. Tutors may not knowingly help a student cheat, plagiarize, or engage in any action that violates the academic honor code of the class or the school.”<sup>[10]</sup>



**Javier Huayta** received his BS in Chemical Engineering from National University of San Marcos (UNMSM), located in Lima, Peru. He completed an MS in Chemical Engineering at NC State. Currently, he is a Chemical Engineering PhD candidate at NC State, working with Dr. Adriana San Miguel on elucidating the interplay between environmental factors and genetic pathways that extend lifespan in the nematode *C. elegans*. ORCID: 0000-0001-9857-6080

**Zachary S. Campbell** is currently a Chemical Engineering PhD candidate at NC State University focusing on the synthesis and application of metal oxide microparticles with Dr. Milad Abolhasani. He received a BS in Chemical Engineering from the Georgia Institute of Technology, an MS in Chemical Engineering from NC State University, and was a visiting researcher with the Institut de Chimie de la Matière Condensée de Bordeaux (ICMCB). ORCID: 0000-0003-1684-8316



**Matthew E. Cooper** is a Teaching Associate Professor in the Department of Chemical and Biomolecular Engineering at NC State. After receiving a PhD in Chemical Engineering from Ohio University, he served as a researcher at RTI International before joining the NC State faculty in 2011. Dr. Cooper’s research interests include effective teaching, process safety decision-making skills, and best practices for online education. He also hosts the In The (Fume) Hood chemical engineering education podcast. ORCID: 0000-0003-1060-4628

<sup>1</sup> - Huayta and Campbell contributed equally to this work.

Students are likely aware of the unethical nature of using tutoring websites for “cheating” purposes, but unethical uses of tutoring websites are also codified by university codes of student conduct. For instance, as established in one university’s Code of Student Conduct, posting test problems in Chegg and/or receiving help from a tutor constitutes academic misconduct under the following definitions:<sup>[11]</sup>

- 8.2. *Cheating (c): Using materials, equipment, or assistance in connection with an assignment, examination, or other academic exercise which have not been authorized by the faculty member, including but not limited to, notes, calculator, or other technology.*
- 8.4. *Plagiarism (a): Representing the work of others as his or her own.*

Despite knowing that the use of tutoring websites for the purpose of solving exams and homework is unethical, it is possible that students cheat in this fashion due to time pressures or feeling as though they do not grasp the material well enough to succeed. An insidious factor of this behavior is that the cheating individual may still find a way to “explain” their behavior to themselves in such a fashion that they can still view themselves as ethical, e.g., “I just need to cheat once on this important exam; I’m still an ethical person.” This phenomenon falls under the category of *prediction / reflection errors* as described by ethicists Bazerman and Tenbrunsel in their book *Blind Spots*, which focuses on behavioral ethics.<sup>[12]</sup> Bazerman and Tenbrunsel argue that humans inherently do not want to view themselves as unethical and so will often erroneously forecast how they will behave when posed with an ethical dilemma; likewise, humans tend to have cognitive errors when reflecting on their behavior or choices in an ethical situation.<sup>[12]</sup>

Similarly, tutors employed by tutoring websites face a set of competing incentives and disincentives. The tutors employed by tutoring websites appear to be available for consultation at any time of the day, indicating that these tutors are likely located all over the world.<sup>[13]</sup> A search for online tutors in Chegg reveals their origins to be quite varied, including the promise of 24/7 tutor availability.<sup>[14]</sup> A website called PaperDueNow, a paper writing service, indicates that their writers are from English-speaking countries such as the US, United Kingdom, Canada, and Australia.<sup>[15]</sup> Tutoring websites experience competition from local tutors and corporations that provide tutoring services, but possess the advantage of offering their service online at any moment.<sup>[16]</sup>

Enabling cheating by others is an unethical practice, but even if tutors know this is occurring they may justify their decision to enable cheating by focusing on incentives or disincentives outside of the ethical decision, e.g., “I’m only doing this because I really need the money; I’m still an ethical person.” Bazerman and Tenbrunsel describe this behavior as “*ethical fading*”, where the ethical portions of a decision fade into the background in favor of focusing on non-ethical considerations.<sup>[12]</sup> Tutors may also absolve themselves

of any responsibility by assuming they are not helping a student cheat; for example, a question could be transcribed (no indication of student malfeasance), cropped to exclude any distinctive markings indicating it is part of an exam (no indication of student malfeasance), or a “straightforward” exam problem (assumption it is a practice exam). Even if a tutor suspects a student may be attempting to cheat, the tutor may assign ethical responsibility to the students who utilize these resources, theoretically absolving themselves of any wrongdoing while still enabling students to participate in behaviors that constitute academic misconduct.

Academic misconduct through unethical use of tutoring websites is likely made more pervasive by the websites offering incentives to students to upload their class notes, homework solutions, and exam study guides. Chegg mentions that it allows students to upload and sell course documents if they commit to respect copyrights.<sup>[17]</sup> Course Hero provides a more specific rewards system where uploading study documents enables students to unlock access to more questions solved by their tutors.<sup>[18]</sup> OneClass™, another paper writing service, provides subscription-based access to notes, study guides, and past exams by “top university students that have taken or may be currently taking the same courses as you,” reminding students that “many teachers don’t change their syllabus and continue to teach the same material, year after year.”<sup>[19]</sup> Uploading documents and getting paid (or obtaining other benefits) by these websites are made easier by the current prevalence of college classes having a dedicated course website. Here, students can download solutions for exams and homework posted by the instructor. This behavior is another demonstration of ethical fading,<sup>[12]</sup> where the student posting materials without regard for copyright ignores the ethical part of their decisions, instead focusing on the financial or academic incentive.

Course instructors encounter many frustrations caused by this “economy of cheating”<sup>[20]</sup> facilitated by various tutoring websites. First, these homework and exam problems and solutions are typically copyrighted and are thus the instructor’s property for use in their course.<sup>[21]</sup> Additionally, the instructor has invested time and resources in creating these course materials, so students uploading them are profiting from work they have not done, sometimes even being paid for these documents. Furthermore, if the instructor wishes to help their students by posting educational resources (such as solution keys) to a course website, the instructor is forced to produce new exams and/or homework questions every semester to curb cheating by students using Chegg or Course Hero. The process of writing these new problems often requires strategies more intensive than simply changing numbers or wording since search engines make it straightforward to locate previous course resources and view posted solutions – students can merely modify the numbers or variables in the posted solution to arrive at an answer. Finally, students are often unaware of what constitutes copyrighted property,<sup>[22]</sup> and therefore may not fully grasp the meaning of copyright notices present in the course syllabus.

Thus far, few studies have specifically explored the rate of appearance of exam problems, particularly instructor-generated problems, on websites like Chegg and Course Hero. However, numerous articles have discussed the prevalence of cheating through use of tutoring websites, ranging from availability of textbook problem sets,<sup>[23]</sup> weekly homework assignments,<sup>[24]</sup> and anecdotal reports of exam problems appearing on such sites during or shortly after exams.<sup>[25-27]</sup> In particular, the rapid transition from in-person courses and testing to online instruction due to the COVID-19 pandemic has resulted in enhanced scrutiny regarding the role that tutoring websites have played in cheating perpetrated in university-level education. Several articles have emphasized the role that tutoring websites have played in academic dishonesty when converting in-person courses to an online format. Donovan reported the posting of exam problems on the tutoring website Chegg as well as student use of Chegg during exams, resulting in a large number of similar incorrect answers being submitted due to a typo present in the modified exam administered after the course transitioned online.<sup>[28]</sup> Similarly, Raje *et al.* found that numerous problems from an asynchronously delivered make-up exam, including free-response and several multiple choice questions, were uploaded to Chegg following the exam and were easily searchable online.<sup>[27]</sup> Some instructors, upon discovery that their exam problems or previously-uploaded exam problems were reviewed on Chegg during the testing period, attempted to mitigate academic misconduct during exams by drastically shortening the exam time frames. Despite allowing a 90-minute midterm exam period and a 210-minute final exam period, the instructors still discovered problems were uploaded to Chegg for all exams in addition to unethical student collaboration.<sup>[25]</sup> However, while the transition from in-person to online coursework in response to the COVID-19 pandemic has certainly resulted in additional concern regarding the use of tutoring websites for take-home or online exams,<sup>[29]</sup> student use of these websites to cheat during in-person exams has also been reported. Manteufel *et al.* reported numerous instances of students taking pictures of in-person exam problems using smartphones and posting them to tutoring websites.<sup>[13]</sup> The posted problems were promptly solved, and the solutions were copied by the students taking the exams. Students who cheated were often caught when their photographs contained distinguishing markings or work that was relatively easily matched to the individual(s) who uploaded the images.<sup>[13]</sup>

Such concerns prompted exploration of two research questions regarding the prevalence and accessibility of resources that enable or encourage cheating behavior on written exams utilizing custom (instructor-generated) problem sets:

- How many custom instructor-generated problems may now be found online, particularly on tutoring websites?
- Are custom exam problems more frequently posted by students taking in-person or online courses?

## METHODS

In this study a set of exams delivered between 2011 and 2020, including both in-person and online courses spanning sophomore-to-senior-level undergraduate chemical engineering courses as well as a graduate-level online bridging course, was evaluated for whether the problems appeared on tutoring websites. In-person undergraduate courses spanned from Spring 2011 – Spring 2020, while the online graduate courses spanned from Fall 2018 – Summer 2020. One of the authors (MC) taught each of these courses and constructed custom problems for each exam in each course; these problems were “homegrown”, i.e., not taken from any other source (whether textbook, website, etc.) and were not shared with colleagues or used in other classes. These exam problems were collected in a digital format, totaling 122 exams containing 507 problems. In order to determine whether one of these exam problems was available online, a section of text (approximately 5-15 words) from the problem was copied. This copied text was then entered into the Google® web search engine in quotation marks – this would return search results only for those pages that contained the section of text verbatim. Often a small number of results (<5) was returned. If a much larger number of results was returned, the search was performed again with a longer excerpt from the exam problem. If no results were returned, then a different section of text from the problem was selected for the search process; if this second search returned no results, then the problem was deemed to not appear online. All returned search results were examined to determine if the webpage in question contained the exam problem. If the webpage contained the exam problem, then the problem was deemed to appear online and the URL for the webpage was recorded in a spreadsheet. It should be noted that the strategy of using quotation marks around the problem text to return only verbatim matches (rather than searching for the text without quotations) was decided upon because searches without quotations were found to return large numbers of extraneous results for websites sharing common keywords (e.g., a pump manufacturer website would be returned as a result when searching text from an exam problem related to pumps, diluting the pool of results). It should be made clear that with these research procedures in mind, this study was conducted using only publicly-available online records; no human subjects were involved in this study.

Once all collected exam problems were examined in this fashion, a spreadsheet was produced showing a yes/no signifier for whether the problem appeared online for each examined problem, as well as a URL if the problem appeared online. Problems that appeared online violating copyright but did not appear to be involved in a violation of student conduct rules were brought to the attention of the company on whose tutoring website the problem appeared. This task was completed by following the website’s Digital Millennium Copyright Act (DMCA) procedures to request takedown

of the exam problem, which vary somewhat by website whether it is Chegg,<sup>[30]</sup> Course Hero,<sup>[31]</sup> etc. However, in all cases it was required that the URLs of offending problems be provided along with brief explanations of their intended use (e.g., exam problems) and answers to questions related to DMCA, such as a statement of ownership of the intellectual property and an affirmation of good faith belief that the property's use by the website is unauthorized.

Tutoring websites have published honor codes<sup>[32, 33]</sup> that explicitly forbid use of their services for cheating or otherwise breaking student conduct policies. For problems that appeared to involve a violation of student conduct policies, the relevant website was contacted to discuss the path forward. This procedure varied greatly depending on the website; e.g., Chegg has a page regarding student conduct investigation assistance,<sup>[34]</sup> while other websites may not have such a page and must be contacted through their published standard methods of contacting the company. Similarly, there may be differences in the level of cooperation between the website and a university's Office of Student Conduct.

It should be noted that the decision on whether or not to penalize students through the Office of Student Conduct, particularly for those students who have already graduated, has ethical considerations for the instructor. Questions that may be considered include:

1. Is it ever correct to choose not to enforce the university's stated Code of Student Conduct?
2. What if the resulting penalty jeopardizes the student's degree or career?
3. Should an instructor have different policies for a student who cheated two years ago and was only discovered now versus a student currently in their class who is caught cheating?

These are questions the reader (and faculty member) must ask themselves regarding their own course policy, with the ultimate goal of uniform, fair enforcement. As these issues are commonly covered in detail by university Codes of Student Conduct, it is likely most equitable to work within the existing framework of the institution's Office of Student Conduct to determine penalties for tutoring website-related violations. In cases that are not explicitly covered, it may be desirable to propose revisions to the Code of

Student Conduct and disseminate these changes to the student body. In this manner, the instructor can mitigate ethical concerns associated with the uneven application of penalties, both in their courses and at a university level.

## RESULTS AND DISCUSSION

The set of exam questions examined in this study was evaluated for whether the problems appeared on tutoring websites using the procedures described in the previous section. Following data collection for the provided exam problems, the aggregated data was analyzed for trends, specifically comparing the rate of online discovery for in-person versus online courses and graduate versus undergraduate courses, as well as the frequency of posting in relation to various actions designed to curb such behavior.

As shown in Table 1, it was found that 23.3% of the custom instructor-generated exam problems comprising the study were found online. There also appears to be a stark difference between the frequency of exam problems posted online between traditionally-delivered (i.e., "brick and mortar" courses taking place in a physical classroom) undergraduate courses versus asynchronous online graduate courses; only 11.2% of problems given in traditionally-delivered undergraduate courses appear online, compared to a much greater frequency of 74.7% for asynchronous online graduate courses. This indication of a higher incidence of cheating in online courses was reported by Harmon *et al.*,<sup>[35]</sup> though Tolman<sup>[36]</sup> and Ladyshevsky<sup>[37]</sup> have suggested there is no such correlation.

We hypothesize a few reasons for the observed higher prevalence of exam problems appearing online in asynchronous online graduate courses versus traditionally-delivered undergraduate courses. It is possible that there is greater rapport between instructor and student in traditionally-

	<b>Total number of problems in search</b>	<b>Number of problems found online</b>	<b>% of problems found online</b>
<b>Overall</b>	507	118	23.3
<b>Undergraduate (traditional)</b>	394	44	11.2
<b>Undergraduate (hyflex initially, followed by synchronous online)</b>	14	0	0.0
<b>Graduate (asynchronous online)</b>	99	74	74.7

delivered classes since students are more likely to personally interact with the instructor, compared to online classes where the instructor is simply an image on a screen. Perhaps this difference results in online students feeling more ethically detached since the student-teacher relationship is inherently more impersonal in asynchronous online courses, making the uploading of exam problems feel less like a potential personal affront. Another possibility could be that online courses, or even in-person courses with “take home” or asynchronous exams, afford more immediate opportunities for cheating, as there may be little, if any, proctor oversight, as well as easy access to online resources (e.g., tutoring websites) and other avenues to cheat. Finally, the Chemical and Biomolecular Engineering Department at NC State has historically informed undergraduate students in their first departmental course about academic integrity issues, particularly cheating, as described in a series of works by Bullard and Melvin.<sup>[38-40]</sup> Since online graduate students have traditionally not received the same training and associated assignments as these undergraduate students, it is possible that the methods used to inform undergraduate students of academic integrity expectations have made a difference.

A limitation of this study is that a reasonable comparison cannot be drawn between undergraduate and graduate courses (or online versus traditional) because the comparison is confounded by all graduate courses tested in the study being in an online format and most of the undergraduate courses being delivered in a traditional format. However, one course that was delivered in Fall 2020 was initially an in-person senior course but transitioned to online synchronous delivery after the first two weeks due to COVID-19 concerns. Upon this transition the exams in the course were of the take-home variety, and online proctoring software was not used to monitor student cheating. While this class represents a small sample, there were no incidents of exam problems uploaded to tutoring websites. It is possible that the reduced incidence of problem uploading may be attributable to the students having interacted more closely with the instructor at the beginning of the course rather than never meeting at all. Since it was a senior course, it is also possible that senior students are less likely to upload problems to tutoring websites than students in sophomore and junior courses. Finally, this course was among the more recently-administered courses in the study, so students in this single semester had less overall time to upload materials to tutoring websites than for those courses administered further in the past.

Conversely, the nature of online graduate education may also provide an explanation for increased tutoring website posting frequency. Many students enrolled in distance learning or online graduate courses are completing coursework and exams in their spare time. These students are often employed full time and may also have other responsibilities (e.g., family) in addition to their online coursework, which has been a common factor contributing to academic misconduct reported by students who have been caught and

received sanctions.<sup>[41]</sup> Furthermore, it is not uncommon for an employer to fund graduate education, meaning the students are under additional pressure to perform well. Such external factors may play a significant role in the academic misconduct exhibited in online graduate classes.

It should be noted that while most exam questions found to be posted online in this study were from the Chegg or Course Hero websites, exam questions were also found on the tutoring websites [wyzant.com](http://wyzant.com) and [brainly.com](http://brainly.com). Golden addresses how students are able to purchase test bank questions from the internet,<sup>[42]</sup> while Burns and Madara found that test banks for nursing students are available in auction sites such as eBay®, where tracking cheating behaviors is almost impossible.<sup>[43,44]</sup> These findings indicate that there may be more as yet undiscovered incidences of unorthodox websites and other avenues being used to upload and share course materials.

## STRATEGIES FROM LITERATURE TO AVOID STUDENT POSTING OF EXAM PROBLEMS ONLINE

Inclusion of academic integrity and academic honesty statements in the course syllabus is a staple for undergraduate and graduate university courses. Johnsson indicates that although these measures may not be sufficient to curb cheating, it signals a commitment to academic honesty on part of the instructor.<sup>[45]</sup> For clarity, it is suggested that the language in these statements specifically addresses the practice of accessing tutoring websites. Michael and Williams suggest that in addition to syllabus statements, a “syllabus quiz” explaining course policies should be completed by students before granting access to any course materials, especially for online sections.<sup>[46]</sup> In addition to communicating syllabus policies, the quiz can include questions regarding academic integrity policies, particularly use of tutoring websites; the completed quizzes can then be used to certify students’ acknowledgement of the course academic integrity policies.<sup>[47]</sup> Unfortunately, Andrews indicates that some students commit academic misconduct even with knowledge of course policies because they disagree with the definition of misconduct as presented in the syllabi.<sup>[48]</sup>

Another measure taken to curb uploading is to remind students about the course policies before an exam.<sup>[49]</sup> However, Bing found little effect on incidences of cheating when using a reminder before assignments, though they acknowledge the limitation that these results may not be generalized to other courses.<sup>[50]</sup> Shariffuddin used an approach of reminding students of regulations before examinations in a studied group that included students known to have cheated in previous incidents; in their case, the reminders did not deter students from cheating, but the authors acknowledge that these differing results could come from a need of cultural change from the administrators and instructors.<sup>[51]</sup> These re-

sults suggest that sending students reminders of academic integrity policies before tests serves to highlight these policies, but may have little practical effect.

There are software tools available for online proctoring such as Respondus<sup>®</sup>[52] and Proctorio<sup>®</sup>[53] that have been shown to be successful in reducing the incidence of online cheating.<sup>[54]</sup> These tools aim to restrict the use of the student's computer from tasks other than those related to completing the online test and/or make use of the computer's webcam to track the student's activity.<sup>[55]</sup> Alessio and Maurer observed a significant reduction in grade point average after adopting proctoring software, suggesting the presence of online cheating beforehand,<sup>[56]</sup> while Gilbert indicates that the average grade of tests taken at proctored websites differed only 1% from tests taken using an online testing program.<sup>[57]</sup> However, using these software tools presents a number of challenges such as the perception of students that online monitoring is an invasion of their privacy,<sup>[58]</sup> that it results in higher test anxiety and lower exam scores,<sup>[59]</sup> and that the software could be potentially used to obtain their private personal information.<sup>[60]</sup>

Michael and Andrews indicate that creating new or unique tests reduces the incidence of online cheating in exams,<sup>[46]</sup> with students even expecting instructors to write new questions annually.<sup>[48]</sup> This practice has the unfortunate downside of requiring instructors to generate new question banks constantly.

## CONCLUSIONS

Tutoring websites such as Chegg and Course Hero are intended to serve as a resource for students, but unfortunately they can also facilitate and incentivize students to upload course materials, enabling a cycle of academic misconduct. The prevalence of such behaviors is likely impacted by a variety of external factors and influences, including professional, familial, or financial considerations, which both students and tutors may use to absolve themselves of unethical actions. A study was completed investigating the prevalence of instructor-generated exam problems appearing online. In total 23.3% of instructor-generated exam problems appeared online. However, the frequency of exam problems appearing online was much higher for offerings of an online graduate course (74.7% of exam problems) compared to traditionally-delivered, "brick-and-mortar" undergraduate courses (11.2% of exam problems). It is speculated that traditionally-delivered courses have a lower frequency of exam problems uploaded online due to "humanization" of the instructor and a richer student/teacher relationship than in online courses, where students simply see the instructor as another image on a screen. A number of strategies presented in the literature to minimize academic misconduct are presented, though the research space is unsettled regarding their efficacy.

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