



Exploring Mechanical Engineering Student Perspectives of Academic Integrity During COVID-19

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ABSTRACT

CONTEXT

The COVID-19 pandemic has significantly impacted the world and all aspects of higher education, as evidenced by rapidly shifting curriculum plans, remote lectures, and even online labs (Kapilan et al., 2021; Park et al., 2020). In a culture associated with quantification, definitions, and measurable reality (Godfrey & Parker, 2010), testing is paramount in undergraduate engineering education. Thus, when major disruptions arose due to the virus, assessment structures suffered and drew major attention (Khan & Abid, 2021; Montenegro-Rueda et al., 2021). This study focuses on these changes to testing, specifically highlighting student perspectives on academic integrity. With students learning remotely from home, instructors no longer had the option of in-person, supervised assessments, and the remote nature of these tests sparked instructors' concerns about cheating.

PURPOSE

The purpose of this paper is to investigate concerns about academic integrity during the COVID-19 pandemic in mechanical engineering education from the perspective of undergraduate students. Specifically, this paper aims to answer the following research question: How did students perceive and describe concerns about academic integrity during the COVID-19 pandemic?

METHODS

This paper draws on qualitative interview data collected from mechanical engineering students at two sites – one in the U.S. and one in South Africa – about their experiences taking courses online during the COVID-19 pandemic. Interviews were conducted between September and November 2020 with students who were enrolled in second- or third-year mechanical engineering courses during March 2020. Data were analysed using thematic analysis.

OUTCOMES

This paper adds students' perceptions of academic integrity during the early pandemic at two universities to the ongoing conversation about academic integrity and assessment in online learning.

CONCLUSIONS

This paper finds that students had varied perspectives on what counts as cheating and faced increased stress due to cheating prevention measures implemented by instructors.

KEYWORDS

Academic integrity, cheating, COVID-19

Introduction

The COVID-19 pandemic halted all normal operations in higher education, rapidly shifting courses online and sending students home to learn remotely (UNESCO, 2021). This significantly disrupted assessment structures in particular (King et al., 2021; Wenceslao & Felisa, 2021), largely because quantitative, rigorous, and high-stakes testing is pervasive in engineering education culture and serves as the main marker for student development (Godfrey & Parker, 2010). With students learning remotely from home, instructors no longer had the option of in-person, supervised assessments and had to resort to online options despite known issues with cheating and plagiarism in online settings (Anderman & Koenka, 2017; Srikanth & Asmatulu, 2014).

This remote nature of assessment sparked new concerns about academic integrity in the literature (McCarthy, 2021; Siddhpura & Siddhpura, 2020), including findings such as steps for curbing cheating on assessments, changing test formats, and using new ironclad assessment software (Karimi et al., 2021; Wang et al., 2021). However, this data comes largely from instructors and not students themselves, and often focuses on quantitative data like honour code violation numbers instead of the voices of those involved (Asgari et al., 2021; Broemer & Recktenwald, 2021; Khan & Abid, 2021; Verhoef & Coetser, 2021). It is important to consider student experiences and voices regarding online assessment structures and academic integrity (Grodzki et al., 2021; Hill et al., 2021). Whether the cheating concerns of instructors were echoed by or warranted by students is an important question for further investigation. Understanding how students perceive academic integrity in the remote learning environment can inform future assessment design and academic integrity measures for online learning.

In order to add to this area of inquiry, the purpose of this paper is to investigate concerns about cheating during the COVID-19 pandemic in mechanical engineering education from the perspective of undergraduate students. Specifically, this paper aims to answer the following research question:

How did students perceive and describe concerns about academic integrity during the COVID-19 pandemic?

While researchers have described different categories of academic integrity (Pavela, 1997), in this paper, we focus specifically on cheating, which we define as “the use or attempted use of unauthorized assistance or materials in academic work” (Tatum & Schwartz, 2017, p. 130).

Methods

This paper describes a thematic analysis conducted on qualitative interview data that was collected as part of a larger comparative case study (Deters, 2022).

Data Collection

Data were collected from mechanical engineering students at two sites – one in the U.S. (referred to here as LP-US) and one in South Africa (referred to here as LP-SA) – between September and November 2020. In order to meet inclusion criteria, participants were enrolled in second- or third-year mechanical engineering courses during March 2020. These criteria ensured that students were taking courses that were discipline-specific, which are most-often housed in the middle-years of the engineering curriculum (Lord & Chen, 2014). A total of 21 students were interviewed across both sites; all of these interviews were analysed for this paper. Table 1 shows the demographic information of the sample; this information is provided for context and transferability. Note that participants were asked to self-identify their gender and race / ethnicity. A full description of both sites and the sample can be found in (Deters, 2022).

Table 1: Demographic Profile of Sample

Site	Gender		Race / Ethnicity			Total
	Male	Female	White	Black	South Asian	
LP-US	9	2	9	0	2	11
LP-SA	4	6	2	8	0	10

Data Analysis

While the interviews focused on many facets of students' experiences taking courses online during the early stages of the COVID-19 pandemic (i.e., March through November 2020), the data analysed for this paper focus specifically on students' descriptions of academic integrity and cheating. Data were identified for this study based on a priori and in vivo coding completed for the larger study (Deters, 2022). All excerpts given the sub code "cheating" or "assessment" during the initial analysis were selected for inclusion in this study and formed the data set analysed here. These data were then analysed using thematic analysis in order to identify themes that capture how students perceived and described concerns about academic integrity during the pandemic.

Positionality Statement

The research team for this study consists of one tenure-track faculty member in Mechanical and Materials Engineering (Deters), one PhD candidate in Engineering Education (Menon), and one PhD student in Engineering Education (Webb). All researchers are located in the United States and are trained as engineering education researchers.

Limitations

This work has several limitations that should be considered when transferring the findings to other contexts. First, when issues of cheating are being discussed in data collection, there are issues of social desirability. Students are less likely to admit to a practice that is not socially desirable, like cheating, especially in the face of power differentials between interviewer and interviewee. Students were much more likely to discuss cheating that they noticed amongst their peers than cheating that they engaged in themselves. Second, while there were interview questions that asked students about cheating and assessment, the original intent of the larger study was not to look at cheating specifically. Lastly, this study is not intended to be generalizable or draw causal links between COVID-19 and cheating behaviours.

Results

An overarching theme in our results is students' awareness and acceptance that cheating would occur. While students largely shared that they had not cheated themselves, they were aware of cheating occurring amongst their peers. Participants discussed two logistical elements of cheating - 1) ways of cheating and 2) prevention measures - along with their perspectives on what constitutes cheating and what it means to cheat. Cheating prevention measures were not consistent for all courses and varied with instructors and their perspectives of cheating. We also discuss how students perceived these methods and how they worked around them. Finally, we describe the mixed perceptions of what is considered cheating, and what it means to cheat. The themes identified through the analysis process emerged in a similar manner across both sites, so this paper does not include an explicit comparison between the two country contexts.

Ways of Cheating

Online tools, such as Chegg.com, or contract cheating, were commonly reported by students as a means to get answers to assignment or exam questions. Participants who discussed Chegg.com often did so while expressing frustration about their peers cheating. One participant from LP-SA

described sending an anonymous email to report to their lecturer that the answers to an assignment were on Chegg.com. Another participant from LP-US noticed that cheating had increased with the shift to online learning:

But I mean, like I said, I know people who are basically Chegging their way through everything right now. Like, if there's a will to cheat, there's a way. I mean, that's true if you're taking tests in person. But I mean, it's definitely more true now.

Another common tactic discussed by students was googling answers, especially with the use of an additional monitor or device. As one LP-US student described:

I have two monitors. What would be stopping me from like OneNoting a page of notes and putting it on my second monitor? Or even the one monitor? Or taping on- I mean, I have a window behind my desk. But if you had a wall, what's to stop you from taking notes all over your wall.

In addition to their discussions of how their peers cheated during remote COVID learning, students discussed measures taken by their professors and universities to curb that cheating.

Prevention Measures

Students reported several different strategies that their instructors used to prevent cheating. These strategies varied depending on instructors and the format of assignments and exams. For example, some professors simply stressed on the honour code, and left it to the students to act accordingly. One LP-SA student described:

There are faculties with lecturers who have gone into depth to make sure that we are genuine about what we are putting in ink on the paper. But my lecturers were like, "If you're going to cheat, then it's you, it's going to bite you in the ass in the long run," You know, they weren't concerned about blocking us from web sites or anything like that.

However, most professors took further measures to prevent or manage cheating attempts. Having different values for each student on engineering or math problems was one approach faculty used. As a result, students could not discuss or share their solutions with each other, but instead had to solve the problem and were graded for the work shown. Open book exams, where students were allowed to refer to external resources, was another common approach. This approach assumed that students would use the assistance or materials in academic work in an online testing environment and accounted for it by making questions harder. Here, the expectation was that students would work on their own by referring to their lecture notes or textbook. One LP-US student said:

I mean most of my professors were I guess – well besides the [subject] professor who made it basically impossible to cheat. They were just like yeah, honor code still applies. Just, you know, be honest and then, you know, take this quiz. So I'm actually taking like a take-home test like this week. So for cheating, he basically said like it's open note, open book, just don't talk to like other students in the class. So I think that's kind of reasonable. 'Cause honestly like it's – all the answers I need are in the notes. They're all there, the topics and, and the help I need is in the notes and in the lectures.

However, other methods of preventing cheating caused more stress on students. For example, approaches that involved the use of external tools or software, such as monitoring over Zoom or requiring the use of browsers that locked access to external resources during exams caused additional stress for students. Participants reported that there were several technical issues due to the use of these technologies, which added more tension to the existing exam stress. Students felt they made more mistakes under that added pressure. One LP-US student described their experience using a test-taking browser that restricted access to external resources and tracked their eye movement:

I really, really did not enjoy that experience. I'm taking a [subject] this semester, so for the first four weeks, we did [Subject A] and then we had an exam on it. And they made us use LockDown Browser with the camera on. [The] Browser was going to be tracking our eye movements, but kind of useless, because we still had math to do. It wasn't like a history test where you could just pull it out from your head. Like there's no written work you need to be looking down for and doing. So, basically, I don't know what the eye tracking was for. Because we were all just like looking up and

down and like everywhere for our exam. And then the test was already, everybody was crammed on time, 'cause they gave us 50 minutes and seven free-response or four multiple choice, and then like four free-response. And the free-response each had like 11 parts to them. And then they wanted, we had to write down our work, type into the calculator, get an answer, then type out our work in a text box, which I just, that was just, I did not like that part, because it took so much time. Then honestly, at that point.... And they ended up making a mistake, and then they couldn't even count the free response. And then [not being able to go back to other questions] just made the timing even harder on us, like, "Oh, I don't know like if I should spend more time on this question. Like is the next question I'm going to get going to be harder?" So that just was terrible.

Our findings suggest that how faculty tried to prevent cheating varied, with some methods causing more stress than others. While the honour code was mentioned across courses and faculty at each site, the measures and approaches to prevent cheating were inconsistent. This was reflected in how participants grappled with their perspectives on cheating, as we discuss in the next section.

Perspectives on Cheating

All of the participants understood the importance of academic honesty and integrity. They described that if they chose to cheat, they worried it would affect their understanding of engineering concepts and negatively impact their future career. However, they were all aware that cheating was a common practice among students. One LP-US student described this tension between upholding their own integrity while being aware that other students were not making the same decisions.

Participants had mixed responses on what counts as cheating in the virtual environment, and whether cheating is bad if learning takes place. One LP-US student grappled with this tension:

It's been definitely interesting to see the different styles of that [trying to prevent cheating]. And I, you know, I don't know how conscious [faculty] are of it or not. Yeah, that's an interesting thing about tests and quizzes and stuff in a virtual environment. Can you really give people theoretical questions and actually be testing their knowledge versus testing their ability to, you know, Control F the textbook PDF?

A LP-SA student described using their resources on an exam, which they did not consider to be cheating:

If I had to study as if I was going to the exam hall, like when I'm stuck on a question, I could get, you know, like a high mark or I could just pass knowing what I know. But obviously now I'm going to be like, I kind of want the high mark. So, I'm going to use some of my resources, which I wrote so I wasn't cheating.

Furthermore, participants expressed a concern that if a majority of students are cheating and not caught, then those who don't cheat may be at a disadvantage. In particular, one LP-US student said:

So it's kind of feels like, look, people are cheating. So if you have half our class cheating, well one, it might make me look bad as somebody who doesn't cheat, if like, I'm below average. I don't have as high of a class rank, because they're shifting these curves. And like, I can't, if I cheat on a test, I'd feel so guilty about it, like it just wouldn't be worth it. But I know not everybody has that.

The ethical aspects of cheating, what counts as cheating, and what about it makes it wrong was ambiguous to participants. While students were aware of their university's honour code, they described situations that fell into ethically grey areas. Students also expressed that because of the virtual environment, it was much easier to use additional resources and students who did not take advantage of this access to resources were penalized for it.

Concluding Discussion

Altogether, our findings suggest that concerns about cheating during remote pandemic teaching and learning were warranted based on student accounts, though findings also suggest student and faculty tactics and perspectives on cheating are varied. What counts as cheating can change depending on the professor, and students sometimes come to different conclusions about what

counts as cheating, meaning some students take more risks than others. These different perspectives on cheating create a spectrum of levels of cheating, leaving some students feeling like they were at a disadvantage when they held themselves to a higher standard than they perceived their peers did. Students found themselves in a Catch-22 in that they would get burned if they cheat, but they also would get burned if they did not. In order to provide a fair opportunity for everyone, it is necessary to create and enforce more institutional definition on online assessment academic integrity and associated structural ethics in order to mitigate these issues.

The second significant discussion point for this study's findings is the additional stress that participants experienced because of certain cheating mitigation strategies. This finding is aligned with the work of Novick et al. (2022) and suggests that students faced even more ethical complexity when their own emotional and stress-levels are heightened by the assessment structures at hand. Overall, our findings suggest that students are navigating a difficult situation when it comes to cheating in an online setting, juggling their own ethics, the complexity of the situation, and the pressure to keep up with peers and instructors' high expectations.

Future Work

Future work can expand on this study in several ways. First, future studies can examine the relationship between the pandemic and cheating in order to determine if there is a correlation between the start of the pandemic and increased rates of cheating. Second, scholars might examine definitions and perspectives of cheating and how those definitions vary within groups (e.g., gender, race). Third, future work can elucidate faculty perspectives of cheating and aim to understand what causes some faculty members to be more stringent and others to be more lenient in their definitions of cheating.

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