Student experiences with the online learning environment during COVID

Maartje E. D. Van Den Bogaard (Research Fellow)

Maartje Van den Bogaard holds a MSc. in Education Science from the University of Groningen and a Ph.D. from TU Delft, both in the Netherlands. She studied student success using linear and complex models and was awarded the Outstanding Dissertation Award by the International Society for Educational Planning. Maartje worked as a senior consultant in curriculum and instruction at Leiden University and served as head of program at the TU Delft STEM Education and Communication graduate program. Maartje has extensive experience in STEM, medical and teacher education. Currently she is a research fellow at Iowa State University.

David Reeping (Assistant Professor)

Dr. David Reeping is an Assistant Professor in the Department of Engineering Education at the University of Cincinnati. He earned his Ph.D. in Engineering Education from Virginia Tech and was a National Science Foundation Graduate Research Fellow. He received his B.S. in Engineering Education with a Mathematics minor from Ohio Northern University. His main research interests include curricular complexity, transfer student pathways, threshold concepts, and advancing quantitative and fully integrated mixed methods.

Cynthia Finelli

Dr. Cynthia Finelli is Professor of Electrical Engineering & Computer Science, Professor of Education, and Director of Engineering Education Research at University of Michigan. In her research she focuses on increasing faculty adoption of evidence-based instruction, promoting students' sociotechnical skills and abilities, and supporting the success of neurodiverse engineering students and faculty. Dr. Finelli is a Fellow of the American Society of Engineering Education (ASEE) and the Institute for Electrical and Electronics Engineers (IEEE), co-chair for the ASEE Committee on Scholarly Publications, and member of the Governing Board of the Research in Engineering Education Network. She is currently associate editor of the European Journal of Engineering, and she has previously served as deputy editor for the Journal of Engineering Education, associate editor for the IEEE Transactions on Engineering, and member of the Steering Committee for the IEEE/ASEE Frontiers in Education Conference. She founded the Center for Research on Learning and Teaching in Engineering at University of Michigan in 2003 and served as its Director for 12 years. Dr. Finelli earned the B.S.E., M.S.E., and Ph.D. degrees in Electrical Engineering from University of Michigan.

Student experiences with the online learning environment during COVID-19

1 - Introduction

In this work-in-progress paper, we report on focus groups conducted as part of a larger mixed methods study about student experiences with online education during the COVID-19 pandemic and their socialization processes during the 2020-21 academic years at the University of Michigan. As most education and assessment quickly transitioned to an online setting, COVID-19 substantially changed elements of the educational experience, including teaching and learning activities and interactions between students and their instructors. We found that remote education freed up time spent commuting and created more flexibility in how students organized their time. Yet, the pandemic also curbed students' opportunities to interact with their learning environment, specifically making connections with professors and peers. Here, we focus on how students adapted to online education and their perceptions of the teaching and learning activities employed in online courses. In particular, we report on student experiences pertaining to: (1) office hours, (2) synchronous online lectures, and (3) asynchronous recorded lectures.

2 - Theoretical framework

This study is grounded in Weidman's socialization model. Weidman posed a process model that asserts a student's engagement with their learning environment leads to various degrees of integration into the existing culture. To elaborate, he writes, "*there is a pervasive consensus on norms and expectation for students in higher education that is driven by faculty expectations and pretty much independent of individual student orientations.*" [1, p. 14] The model incorporates the normative contexts present in institutions, such as the curriculum, and formal and informal socialization processes, such as interactions between students and faculty, within these contexts. This study operationalizes teaching and learning activities in an emergency online curriculum as the normative context and analyzes students' experiences with interaction, integration, and learning.

3 – Research Design

Our data are drawn from the qualitative phase of an explanatory sequential mixed methods design [2] in which we explored students' online learning experiences during COVID-19. We first administered a survey based on earlier work [3], and then we organized student focus groups to contextualize the initial findings. In total, we organized nine focus groups with 40 undergraduate engineering students. The demographics are given in Table 1. The interview protocol was designed by creating prompts related to the constructs measured in the survey, which consisted of questions about how students framed their experiences with the online learning environment and how they dealt with the resulting challenges. For example, these three prompts were posed to all focus groups.
- "How have your experiences in the classroom this past academic year affected your learning?"

- "Given the circumstances of the pandemic, would you describe this academic year as a challenge or an opportunity for you? Why?"
- "What have you not been able to engage with in your classes that you missed this year?"

The qualitative study is positioned in the interpretive epistemology, which '*focuses on social life interactions and the meaning of these interactions as perceived by individuals*' and posits that '*the existing social order and its institutions are legitimate, necessary, and not problematic*' [4, p. 53]. This focus on the existing social order is also central to the socialization model by Weidman [1]. The data were analyzed using thematic analysis, as described by Braun and Clark [5]. First, the data were coded inductively by one of the authors of this paper, keeping an open mind towards the data as much as possible by making memos and notes on codes and coded segments [6]. The team discussed the emergent codebook to establish face validity, and three transcripts were coded by a second team member who had not been involved in coding before. After which, the team established that the codes accurately represented the data.

Table 1. Demographic distribution of focus group participants

	Gender				Race/ethnicity		Total
Class level	Female	Male	Asian	Hispanic	Not Indic	White	
Middle and Senior years	11	14	12	1	1	11	25
First-year	9	6	8	1	0	6	15
Total	20	20	20	2	1	17	40

4 – Results

Three teaching and learning activities emerged as central experiences that impacted the students during COVID-19. In total, we coded 132 segments (out of 830 that comprised the focus group transcripts) with one of these three codes: office hours (n=48), synchronous online lectures (n=61), and asynchronous recorded lectures (n=23).

4.1 Office hours

Office hours had 48 coded segments. The segments clustered on the format and timing regarding how the online format drew in students who did previously not attend office hours, their interactions with instructors, and the importance of proper hardware.

4.1.1 Office hour format and timing

When office hours moved online, instructors came up with a range of different formats: from short time slots that individual students could sign up for to open Zoom meeting rooms where all were welcome. The timing of office hours also became more flexible. In some courses, office hours were moved to the evenings, with one student sharing an approach in which office hours

provided the opportunity to ask questions within the next 24 hours. The open Zoom meeting room concept was greatly appreciated because it did not require a lot of planning by students. The open format allowed students only to be present and learn from other students' questions. A student mentioned that they would start working on problems with a group of friends a few hours before office hours, so they could all jump in with their questions and get answers quickly.

Individual office hour appointments were less successful. One student described struggling with an Excel sheet, and the instructor told this student "they would look at it later and provide feedback" because the instructor had many students in their queue and preferred to eliminate the queue rather than sit down with the student to help figure out the Excel problem. Issues with queues and new types of interactions with instructors are topics that came up multiple times and will be discussed in more detail below.

4.1.2 New attendees and wait times

Because virtual office hours no longer required commuting, students who previously would not have attended could now do so. Some of these students had previously been unaware of the option of office hours or the potential benefits. The queues could get very long depending on the office hours and the course format. Sometimes queues were so long that students would not have an opportunity to ask questions at all in the time allotted. However, one student remarked that the benefit of being in a virtual queue is that one can still use that time for something else, rather than waiting in line in front of the professor's office.

4.1.3 Interaction with instructors

While having more people attend office hours can be seen as a positive development, not all students agreed with this. One student who had been a frequent visitor of in-person office hours remarked that office hours quickly led to a personal relationship with the professor in pre-COVID times, which led to a more personal classroom experience. Few people made an effort to come to office hours before the pandemic, leaving time for those relationships to develop. With the larger number of students attending, this student experienced that online office hours did not yield the pre-COVID personal experience. Other students mentioned that the online format felt like a limitation to getting to know their instructors; they thought the online space was inappropriate for socializing with their instructor. Other students mentioned signing up for a 10-minute slot with short questions; one student mentioned feeling awkward about what to do with the remainder of the time, not wanting to waste the professor's time. Yet, another was happy to make conversation in the time that remained and learn about things that came up.

4.1.4 Hardware required to participate

A common activity during office hours involved the student and instructor working collaboratively on a problem. However, sharing work online was challenging as writing or sketching on a screen with a mouse is difficult, and so is sharing work with a flip camera while discussing with a teaching assistant. Students mentioned the importance of having a pad and a

stylus to draw diagrams, write out equations or share code; yet, many students reported not owning such hardware and having to improvise.

4.2 Synchronous, online lectures

Some students never attended synchronous sessions and preferred to watch the lecture recordings afterward, while others made sure they attended as many synchronous classes as possible. From the 61 segments on online lectures, three main topics emerged: interaction, the use of cameras, and breakout rooms.

4.2.1 Interaction

Some students mentioned they found it harder to interact and ask questions in online lectures or that the instructor would misunderstand their questions. In contrast, others recognized the benefits of the Zoom chat, which allowed students and the instructor to collaborate toward a solution. However, some instructors used chat only for announcements. Moreover, interaction before and after a lecture was not easily implemented in Zoom: a class starts when the instructor opens the meeting and ends when they close it. In in-person education, students can meet and chat in the hallway before the lecture and can stick around after the class to ask questions. Two topics that were mentioned in conjunction with the lack of interaction were the reality of 'zoom fatigue' and hardware: not all professors had optimal equipment to teach online.

4.2.2 Cameras on or off

Many instructors allowed students to leave their cameras off, which was appreciated for various reasons. Some students felt self-conscious being on camera in an online lecture, and students felt extra visible because the online lectures were recorded and posted online. One student mentioned they have issues sitting still for longer periods of time and could focus better by walking around their room during the lecture. Three students appreciated being able to eat or drink during lunchtime lectures. One student mentioned how they loved the anonymity that online lectures provided; yet, they realized they are at a disadvantage regarding placements, internships and reference letters because they did not build personal relationships with their professors. One student mentioned that the anonymity of having their camera off also made it easier to ask questions during the lecture. Yet, overall, the large number of cameras that were off gave students a feeling that interaction was harder in general.

4.2.3 Breakout rooms and other media

The experiences with breakout rooms were mixed, and much depended on the course. Students who shared positive experiences talked about small, upper-level courses or courses that required in-depth communication, e.g., to practice conversation skills in foreign language courses. In large lectures, many students kept their cameras off in the breakout rooms, making it harder to communicate – sometimes it was unclear if they were present. Some instructors created other opportunities to interact, such as Piazza. Students interacted a lot on messaging apps, such as WhatsApp – usually organized around courses.

4.3 Asynchronous recorded lectures

The asynchronous recorded lectures had 23 coded segments. These segments were surprisingly similar to the synchronous lecture codes: the recorded lectures allowed students to rewind sections of the lecture they did not understand and improve their notes, and the asynchronous lectures allowed for more flexibility. This flexibility proved to be a challenge for some students, as they would get behind and binge-watch the lectures. Yet, other students reported being able to study at their own time and pace.

5 Recommendations and next steps

We observe in these findings that the teaching and learning activities that were incepted impromptu when the universities closed led to a lot of creativity in instructors to provide high-quality education. Some of these new formats were highly appreciated by the students as they offered more flexibility. Many students coveted this flexibility as they benefited from being able to organize their days around their own rhythm and preferences. Many students mentioned in the focus groups they would like to see a continuation of more online options for office hours and the recording of lectures. Lecture recordings have become the norm as the benefits for inclusion and quality of learning outweigh downsides such as potential lower attendance. Going forward to in-person education, we recommend that:

- instructors consider ways to implement more flexibility for their students and create opportunities for students to actively engage with their learning environment (e.g. through social media) and interact with their instructors.
- Record and post their lectures. The benefits of flexibility and inclusion outweigh the downsides. However, students do not automatically know how to put recordings to their best use and need help to learn to do so [7], [8].
- Plan office hours at times students can attend and consider different modes.

When we look at Weidman's socialization model, we see that the normative contexts of office hours and online and recorded lectures brought varied outcomes for interaction, integration, and learning. In terms of interaction, office hours created most opportunities for interaction, yet less so for integration because office hours became a less personal experience for the students who had been going to office hours pre-COVID. The online lectures created fewer opportunities for students to interact with each other and their instructor; in particular, leaving the cameras off deterred relationship building. In some cases, the chat feature created new options for interaction. The online and recorded lectures allowed students to learn, e.g., by being active during a lecture, or by improving notes by rewatching lectures.

The next steps in this research are to study students' actual behaviors in relation to their experiences in the normative and social contexts to shed more light on how students learn to socialize in remote settings. This will help create more understanding of how students' social and emotional experiences shaped their college experience, and help inform policies to support students who have gone through the pandemic better in the future.

References

[1]   J. C. Weidman, "Conceptualizing Student Socialization in Higher Education: An Intellectual Journey," in *Socialization in Higher Education and the Early Career. Theory, Research and Application*, J. C. Weidman and L. DeAngelo, Eds. Springer, 2020.

[2]   J. . Creswell and V. L. Plano Clark, *Designing and conducting mixed methods research*, 3rd ed. Sage Publications, 2018.

[3]   J. M. Millunchick, E. Brennan-Wydra, T. Henderson, A. Johnson, and C. J. Finelli, "The role of college knowledge and proactive behavior on participation in cocurricular activities," *J. Eng. Educ.*, vol. 110, no. 1, pp. 114–142, 2021, doi: 10.1002/jee.20380.

[4]   C. A. Capper, *Interpretivist Epistomology*. New York City NY: Routledge, 2018.

[5]   V. Braun and V. Clarke, "Using thematic analysis in psychology," *Qual. Res. Psychol.*, vol. 3, no. 2, pp. 77–101, 2006.

[6]   K. Charmaz, *Constructing grounded theory*. SAGE Publications, 2006.

[7]   E. Nordmann, C. E. Küepper-Tetzel, L. Robson, S. Phillipson, G. I. Lipan, and P. McGeorge, "Lecture capture: Practical recommendations for students and instructors.," *Scholarsh. Teach. Learn. Psychol.*, 2020, doi: 10.1037/stl0000190.

[8]   M. E. D. Van den Bogaard and G. Agresar, "Lecture capture: A meaningful resource for learning," *From the CRLT Blog*, 2021. https://crlt.umich.edu/blog/lecture-capture-meaningful-resource-learning (accessed Dec. 05, 2022).