

STEM Faculty's Support of Togetherness During Mandated Separation: Accommodations, Caring, Crisis Management, and Powerlessness

The poster is a digital presentation of a research study. It features a dark blue header with the title and authors. Below the header are three main sections: 'Background', 'Methods / Results', and 'Significance'. Each section contains text and diagrams. The 'Background' section includes a 'Purpose' diagram with three arrows: 'Autonomy', 'Change for better', and 'Relationships', all pointing to 'Motivation & Behavior'. The 'Methods / Results' section includes a 'Methods' diagram with three arrows: 'Autonomy', 'Change for better', and 'Relationships', all pointing to 'Motivation & Behavior'. The 'Significance' section includes a 'Family' diagram with three arrows: 'Autonomy', 'Change for better', and 'Relationships', all pointing to 'Motivation & Behavior'. The footer contains links for 'DEVELOPER', 'ABSTRACT', 'REFERENCES', 'CONTACT AUTHOR', 'PREV', and 'NEXT PRESENTATION'.

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BACKGROUND

Purpose

The purpose of this study was to identify online teaching practices that undergraduate STEM instructors employed after the mandated transition to online instruction, and specific strategies and approaches they employed to support classroom community and relatedness.

Theoretical Framework

We drew from the literature on belonging from Self-Determination Theory. Self-Determination Theory proposes that students are more likely to engage and learn if they feel competent to meet the challenges of their schoolwork, autonomous in that their actions stem from their own interests and values, and if they feel a sense of social belonging and relatedness in the classroom and academic community. Students must meet these needs to internalize that their academic performance stems from an internal locus of causality, take ownership of their learning, view academic behaviors as stemming from their own volition, and develop intrinsic motivation and engagement (Ryan & Deci, 2000).



The Need to Belong

Of the three fundamental needs in SDT, the need for relatedness is central to this study. Relatedness is the need to feel connected with others, including with instructors and other students (Baumeister & Leary, 1995; Pickett et al., 2004; Ryan & Deci, 2000; Strayhorn, 2012). Feelings of belonging and academic engagement can be supported from multiple sources, including teacher-student relationships (Froiland et al., 2019; Roorda et al., 2011; Thacker et al., 2022), student-student relationships (Ryan, 2010; Thacker et al., 2022), and student-parent relationships (Pomerantz et al., 2012).

Instructors can play a critical role in facilitating these relationships as a community organizer that develops feelings of efficacy, belonging to one's institution, and classroom community, which is a key factor that motivates students to pursue and persist through undergraduate STEM programs and is associated with achievement and motivational outcomes (Anderman, 2002; Strayhorn, 2012; Goodenow, 1993; Goodenow & Grady, 1993; Gutman & Midgley, 2000; Putney & Broughton, 2011; Roeser et al., 1996; Walton & Cohen, 2011). However, STEM instructors faced unprecedented challenges in their ability to establish and maintain community during the pandemic and mandated transition to online learning. We therefore asked:

1. **How did STEM faculty adapt instruction and communication with students to accommodate the mandated transition to virtual instruction?**
2. **What were STEM faculty's approaches to accommodating students during the virtual transition to support classroom community and relatedness?**

METHODS

We conducted 25 interviews with STEM faculty at a large Hispanic Serving Institution in the southwestern United States during the onset of the COVID-19 pandemic.

Participants

One-on-one interviews were conducted with 25 STEM faculty (both lecturers and tenured/tenure line). Faculty were mostly men (73%) and from the school of science (61%) or engineering (39%). Faculty identified as White (62%), Asian (27%), Black/African American (8%), or another race (4%), and 12% indicated that their ethnicity was Hispanic. Participating faculty were compensated \$50 (funding on their on-campus account) for participation.

Faculty Interviews

STEM faculty were interviewed via Zoom from May 11–May 21 of 2020, during the week immediately following the end of the semester. Faculty were asked 10 questions and follow-up questions and probes about how they were coping with the pandemic.

Faculty reported:

- Specific changes they made to their courses as a result of the pandemic.
- Challenges and successes during the transition.
- How students' sense of belonging has changed as a result of the pandemic.

Qualitative Analytic Strategy

All interviews were recorded through Zoom, transcribed, open coded, and analytical memos were constructed (Creswell & Poth, 2007; Saldaña, 2013). Through iterative coding and reflection (Glaser & Strauss, 1967), a number of themes emerged highlighting dimensions of classroom accommodations made by faculty and their feelings of connectedness and belonging. Codes were created, compared, and consolidated and used to create a codebook before it was used by two undergraduate research assistants who independently coded all transcripts (interrater agreement greater than 95% at the sentence-level).

RESULTS

How Did STEM Faculty Adapt Instruction to Accommodate the Virtual Transition? (RQ1)

To answer our first research question, we present frequency counts of codes from faculty interviews (Table 1). Results show that instructors used a variety of synchronous and asynchronous teaching modes and methods to keep in contact with students, with the most frequent mode of instruction being asynchronous pre-recorded lecture, followed by student-teacher interaction during whole-class discussion.

Table 1.

Teaching Practices and Approaches Reported by Faculty During Interviews (N = 25)

Variable	%
<i>Accommodations (RQ1)</i>	
Asynchronous Use of Pre-Recorded Lecture	96%
Student-Teacher Interactions During Whole-class Discussion	92%
Communication with Students via Email	72%
Email	72%
Student-Student Interactions During Whole-Class Discussion	56%
Synchronous Office Hours	52%
Asynchronous Discussion Boards	28%
Breakout Groups for Formal Interaction	12%
Survey Distributed to Class	12%
Texting with Students	8%
Breakout Groups for Informal Interaction	4%
<i>Approaches to Support Classroom Community (RQ2)</i>	
Caring for Students	100%
Crisis Management	100%
Powerlessness	32%

What were faculty approaches to accommodating students during the virtual transition to support classroom community and relatedness? (RQ2)

A theme that emerged from STEM faculty interviews regarded their approaches to supporting students during the transition to online learning (see Table 1 for a summary). All faculty (100%) interviewed expressed that they cared for their students and took action to manage crises and solve problems. Some faculty (32%) also expressed powerlessness over some student challenges. To illustrate these codes, we present excerpts from interviews:

- **Caring for students:** “I will simply say [in class], ‘Hey, guys, how are you doing? Hopefully, everybody is safe. Hopefully everybody is staying home. Hopefully everybody is practicing safety guidelines. Hopefully everybody’s family and friends are safe’”
- **Crisis Management:** “I’ve been doing most of my lectures from the closet because it’s the room that has a door on it and keeps the toddler out”
- **Powerlessness:** “I think the participation in my classes is fairly low... attendance itself in my live online lectures has also dropped... It’s really hard to keep these students engaged in this remote setting”

CASE STUDY

Terry's Synchronous Physics Course

To illustrate the themes and codes related to STEM faculty's accommodations and approaches during the virtual transition, we present the case (Stake, 2005, Yin, 2012) of Terry, a STEM faculty member who accommodated emerging crises with flexibility and caring. Terry was an adjunct instructor of physics and taught several synchronous introductory physics courses. Terry was in good spirits during the interview. When asked how their life was impacted by the pandemic, Terry said, "I don't mind not driving everywhere," expressing relief that their six-hour commute between multiple universities was eliminated due to the transition to virtual learning.

When redesigning his physics courses, Terry borrowed ideas from the gaming community to improve the accessibility and quality of online instruction, and adopted a long list of educational technologies to improve the look and feel of his virtual classrooms. Terry mentioned that, during this revamping, the main focus was on getting students what they needed to know:

- I just want to get students to learn the stuff they need to be okay next semester, and not really worrying about grades.**

Terry noticed changes in student-student and student-instructor interaction as a result of the transition to virtual learning and thought it was important to create comfortable spaces for students to maintain personal connections with each other. In response to increasing feelings of isolation among students, Terry said,

- I've tried to sort of cheer everyone up. You know, I'll bring my cat in front of the camera every now and then and make a joke or tell something about my personal life at the beginning of every lecture for just a minute or two. Just try to make life and not just business. And the students seem to appreciate that.**

Another strategy Terry used to support student-student interaction was opening the course 20 minutes early to allow students to interact in the chat,

- ...sometimes students will join [the virtual classroom early], and they'll be talking to each other in the chat.**

However, there were tradeoffs that Terry experienced by opening the classroom up to student interaction. Terry had initially used Zoom to run the classroom, allowing the class to contribute to the audio and video experience of the class, but transitioned to YouTube after experiences of "Zoombombing." Terry noted that:

- [Switching from Zoom to YouTube] makes it fairly easy to block any Zoombombing, you know, as they're calling it now. There's just no way for them to add any audio or video into my stream. They're only there on the chat and then on the chat it only takes one button to hide the chat or kick the person out. So, it's fairly easy to control the environment on YouTube.**

Terry switched instructional platforms in order to limit students' means of interaction but was careful to ensure that they still had a way to interact. As with Terry, many faculty members were thrust into situations requiring crisis management and had to resolve tensions between too much and too little control over the environment.

Terry represents an instructor who cared about the students, showed substantial grading flexibility and adaptability, and responded swiftly to crises with action. Terry also seemed to have background knowledge of technologies that were transferred to the current context. Like Terry, all faculty also expressed caring for their students and made accommodations to their courses, although not all were as technology-savvy as Terry, nor as quick to respond to challenges and ever-changing circumstances. Terry's pedagogical decisions and skills seemed to effectively nurture the students' feelings of inclusion and connectedness, which we discuss in the next section.

SIGNIFICANCE

We sought to learn how faculty adapted their classrooms to accommodate the pandemic and approaches they took to supporting classroom community and relatedness. Interviews with STEM faculty unanimously revealed deep caring for their students, which was expressed as empathy, liking, respect, acceptance, or taking students seriously. This sense of caring for students was evidenced by the variety of accommodations that instructors made to their courses and teaching methods including providing increased academic support, flexibility, added effort to improve instruction, or reaching out to students personally. Such accommodations happened in both synchronous and asynchronous settings. All faculty also demonstrated strong crisis management abilities in handling unanticipated challenges as they arose. Some issues, such as persistent absences, appeared to faculty to be impossible to overcome, in which cases, faculty often took a sense of powerlessness over some student challenges.

This study has implications for college instructors and policy makers redesigning online learning environments to best support student feelings of belonging and community. First, increasing opportunities for synchronous peer-peer and student-faculty interactions may be key for helping students navigate the feelings of isolation and lack of belonging that can result from a purely virtual college experience. Interactive lectures, chat windows, synchronous office hours, and breakout rooms are standard options for online teaching, but our findings suggest that rates of instructor use of these options could be significantly increased. Moreover, our findings highlight the importance of investing in technology training for faculty and developing strategies to promote flexibility in educational delivery.

DISCLOSURES

This material is based upon work supported by the National Science Foundation under Grant DUE-1832405.

ABSTRACT

The COVID-19 outbreak spurred unplanned closures and transitions to online classes. Physical environments that once fostered social interaction and community were rendered inactive. We conducted interviews to examine how undergraduate STEM instructors' adapted instruction to accommodate the transition to virtual learning and how these accommodations supported or hindered community and belonging during the onset of the pandemic. Interviews with 25 STEM faculty revealed the wide range of accommodations they made to their classroom and how they managed communication with students. Faculty approaches to supporting students ranged from caring, to crisis management, to powerlessness. The case of a responsive and flexible instructor is presented to highlight a productive response to crisis.

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