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Mathematics Teaching Assistants' Community-Building Activities During Remote Instruction

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Introduction

Learning in community has been an important goal of mathematics education over the last few decades, and this has led to a growing body of work on pedagogical practices that foster community in classrooms (e.g., Jaworski, 2008). However, research on community-building efforts in undergraduate mathematics – particularly how teaching assistants (TAs) build community – is limited. Mathematics TAs generally lead supplemental sections and host office hours that students attend in addition to the course lectures. As a result, TAs are often able to interact with students beyond what the instructors of record can do, yet their specific community-building efforts are still largely under-researched. In 2020, the need to build social and learning communities was exacerbated by the COVID-19 pandemic, prompting TAs to engage in pandemic-sensemaking (Christianson & Barton, 2020) and attend to the challenges of the sudden shift in instruction. In the present study, we examined how mathematics TAs engaged in pandemic-sensemaking to adapt their community-building efforts for an online learning environment. We aim to contribute to the literature on the intersections of instructional practices, community, and undergraduate mathematics education to inform future professional development for opportunities TAs. Our research question was: How did mathematics TAs engage in pandemic-sensemaking to adapt their community-building efforts for remote instruction?

Framework

We drew on community-building activities (Luehmann, 2008) and pandemic-sensemaking (Christianson & Barton, 2020) to examine mathematics TAs' efforts in creating community during a dynamically uncertain period. Luehmann (2008) identified five main

community-building activities that instructors utilize in an online platform: (1) *Resource Sharing*, or providing students access to various resources; (2) *Mentoring*, or offering details about particular aspects of their professional work; (3) *Dialoguing*, or attempting to engage students in conversation; (4) *Connecting*, or introducing students to another individual; and (5) *Encouraging,* or offering support and encouragement. We used these activities to identify and describe TAs' community-building efforts and drew on pandemic-sensemaking (Christianson & Barton, 2020) to understand how their efforts were influenced by COVID-19. Pandemic-sensemaking describes how individuals notice the cues resulting from extreme unexpected events, how they make meaning from emergent information, and how they respond and take action. As we examined the TAs' community-building efforts, we focused on how, if at all, they engaged in pandemic-sensemakin*g* to make sense of and adapt their activities during remote instruction.

Method

This study was conducted as part of a larger project examining the experiences of transfer mathematics students at a Minority-Serving research university in California. Purposive sampling (Miles et al., 2020) was used to recruit five PhD students in the mathematics department who served as TAs for an introductory proof course in Fall 2020. We conducted semi-structured interviews (Rubin & Rubin, 2011) to learn about the participants' experiences with executing their roles in a remote environment. We qualitatively analyzed the TAs' responses by watching videos of the interviews, creating content logs (Jordan & Henderson, 1999), and writing memos. A priori coding (Miles et al., 2020) was used to identify instances of the five community-building activities, and as a research team, we discussed how pandemic-sensemaking guided their community-building efforts.

<div align="center">**Findings**</div>

We identify some of the TAs' community-building activities and describe how pandemic-sensemaking played a role in the planning, implementation, and adaptation of their efforts.

Community-Building Activities During Remote Instruction

We found instances of all community-building activities (Luehmann, 2008) in the TAs' reflections of their efforts. TAs exhibited *Resource Sharing* by providing students with online resources that supplemented the material they saw in lectures. Moreover, several TAs uploaded their notes and materials from section for students to access online. *Mentoring* and *Encouraging* primarily occurred during office hours, where the interactions between TAs and students went beyond the mathematics content. Lisa and Kaitlyn (pseudonyms are used for all proper nouns), described talking to students about their own personal undergraduate experiences, offering advice regarding courses to take in subsequent quarters, and providing emotional support for the students. During section, TAs attempted to create environments conducive for *Dialoguing* and *Connecting* amongst students by introducing students to each other and encouraging them to socialize and build community. Several TAs mentioned utilizing features of Zoom, such as breakout rooms and polls at the beginning of section to foster interaction and engagement.

Pandemic-Sensemaking: Identifying and Attending to the Challenges of Remote Instruction

The TAs engaged in pandemic-sensemaking to identify and understand the challenges that their students faced and to adapt their community-building efforts. They mentioned that fostering community, providing opportunities to interact, and encouraging participation were the most difficult challenges of remote instruction. Across the quarter, the TAs continually engaged

in pandemic-sensemaking to modify their community-building efforts. For example, Kaitlyn adapted her *Resource Sharing* by attending to students' various time zones and offering alternative sections and office hours where she could explain what happened during her regularly assigned hours. Additionally, Wyatt, described how he adapted his *Dialoguing* efforts in the latter half of the quarter, because students no longer initiated questions, noting: "I have to be the inquisitive student as well as the instructor." Wyatt explained that he conversed with students differently during section and office hours as a result. TAs made sense of students' challenges and demonstrated conscious efforts to build community differently because of the pandemic.

Discussion & Conclusion

As TAs navigated the dynamically uncertain period brought upon by COVID-19, they engaged in pandemic-sensemaking and continually made efforts to build community. They demonstrated an understanding of students' challenges (e.g., various time zones, inability to turn on cameras due to home life circumstances, etc.), attended to these challenges, and built community through interactions afforded by the course structure (i.e., in sections, in office hours). Despite receiving limited training on remote community-building activities and instructional practices, the TAs drew on their existing pedagogical knowledge, own experiences as students, and knowledge of technological resources to build community with the students. This present study contributes to the limited body of literature on undergraduate mathematics TAs and their pedagogical practices. Further research should more closely examine the community-building practices taught to and implemented by TAs in post-secondary mathematics contexts. As we transition back to in-person instruction, it is imperative that undergraduate mathematics educators, including TAs and instructors, are equipped with community-building practices that are flexible across various teaching platforms.

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