Routledge
Taylor & Francis Group

Journal of Research on Technology in Education

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/ujrt20

Supporting new online instructors and engaging remote learners during COVID-19: a distributed team teaching approach

Vanessa P. Dennen, Lauren M. Bagdy, Ömer Arslan, Hajeen Choi & Zhichun Liu

To cite this article: Vanessa P. Dennen, Lauren M. Bagdy, Ömer Arslan, Hajeen Choi & Zhichun Liu (2021): Supporting new online instructors and engaging remote learners during COVID-19: a distributed team teaching approach, Journal of Research on Technology in Education, DOI: 10.1080/15391523.2021.1924093

To link to this article: https://doi.org/10.1080/15391523.2021.1924093

Published online: 23 Jun 2021.

JOURNAL OF RESEARCH ON TECHNOLOGY IN EDUCATION
https://doi.org/10.1080/15391523.2021.1924093

Supporting new online instructors and engaging remote learners during COVID-19: a distributed team teaching approach

Vanessa P. Dennen, Lauren M. Bagdy, Ömer Arslan, Hajeen Choi and Zhichun Liu

Instructional Systems & Learning Technologies, Florida State University, Tallahassee, FL, USA

ABSTRACT

As the COVID-19 pandemic began, universities swiftly moved to remote teaching, posing challenges to students and instructors alike. This case study discusses how a distributed team approach was used to support instructors teaching four sections of a technology class for preservice teachers. Students struggled with stress, technology, and in some instances, meeting basic needs as the pandemic began. Starting with a common syllabus and assignments, the instructors and their mentor swiftly redesigned the course to be flexible and engaging without compromising academics. Collaborative course development and teaching helped minimize pedagogical and technological tasks so instructors could focus on meeting the unique needs of students in their course sections. This approach may be useful for promoting professional development and maximizing student engagement in non-pandemic times, too.

ARTICLE HISTORY
Received 17 September 2020
Revised 19 April 2021
Accepted 26 April 2021

KEYWORDS
COVID-19; online learning; remote learning; student engagement; team teaching

Introduction

During Spring 2020, the COVID-19 pandemic led many US universities to shift from campus-based courses to a remote – and often largely online – learning modality mid-semester. Neither instructors nor students had anticipated this at the start of the term, and many found themselves in the position of teaching or learning online for the first time. Although online learning has been referred to as a panacea in the midst of the crisis (Dhawan, 2020), surveys conducted during Spring 2020 suggest that students had a range of needs to be met before they could focus on remote learning (Betancourt, 2020), and ultimately found that their need for community and engagement was lacking (Garcia & Felix, 2020). These findings are not surprising. Online learning can be highly engaging, but some instructors are reluctant to try it (e.g., Hurst, 2015) and students can struggle with low self-efficacy and self-regulation in the online environment (Cho et al., 2017; Prior et al., 2016). Mentoring programs have been found to be effective for preparing faculty to teach online, but require time and planning (Hixon et al., 2012), neither of which were an option for instructors who had a week or less to redesign classes. For those individuals, a forced experience with online learning may lead to unsatisfactory results and reluctance to teach online in the future.

Team teaching is one approach that can help instructors acclimate to a new approach or course, and it was adopted in this study to support novice online instructors as they swiftly redesigned a college-level course and shifted their modality from campus to online for the second half of the Spring 2020 term. In the most basic of senses, team teaching refers to two

CONTACT Vanessa P. Dennen vdennen@fsu.edu Instructional Systems & Learning Technologies, Florida State University, Tallahassee, FL, USA.

or more individuals responsible for the instruction of a course. However, there are varied definitions of team teaching in the literature, demonstrating different ways that instructors might work together. Common approaches are co-teaching, participant-observation, or parallel approaches within a single class, with specific definitions and implementation being context-dependent (Minett-Smith & Davis, 2020). These approaches delineate who is present and active in the classroom. Some definitions are broader, and consider course design a component of team teaching (Easterby-Smith & Olve, 1984). The rationale for team teaching is another factor that yields variants of the definition (Härkki et al., 2021). For this reason, Anderson and Speck (1998) suggest that focusing on a specific definition of team teaching may not be the most useful way to approach the practice. Instead, they recommend examining team teaching from a different perspective: the pedagogical options that it opens up and the resulting benefits that it yields for students.

There are many potential benefits of team teaching. It makes new teaching experience more comfortable and helps both parties achieve more than they might alone (Strohschen & Heaney, 2000). The result is improved learner support as well as instructor professional development (Laverick, 2016; Vesikivi et al., 2019). Of course, team teaching is not always a viable option, and it may not increase student achievement (Carpenter et al., 2007). One study reported more positive benefits for teachers who self-selected into the practice and the team (Krammer et al., 2018), and although students overall respond favorably to team teaching in higher education, when done poorly they report struggling with inefficiency and confusion (Simons et al., 2020).

For newer instructors, team teaching can help them hone their practice. Preservice teachers reported that team teaching brought additional expertise and perspectives into the classroom, increased available resources and knowledge, and made the teaching space friendly and supportive (Crawford & Jenkins, 2018). For graduate student instructors, team teaching provides peer models and mentors (Broeckelman-Post & Ruiz-Mesa, 2018). However, successful team teaching experiences require structure and support (Howlett & Nguyen, 2020), as well as clarity in terms of distribution of responsibilities and expertise (McKenzie et al., 2020). At the university level, team teaching raises issues such as course ownership, power hierarchies, and institutional support (Morelock et al., 2017). Thus, while team teaching can benefit both instructors and students, in order to be successful, it requires thoughtful implementation that enhances the specific educational context.

In this study we report a distributed team teaching approach in which instructors teaching different sections of the same course work together to redesign the course, share lessons and materials, and in some instances unite or assist students across course sections. We use the term "distributed" to encompass shared labor across multiple classes of students, each with its own instructor of record. This approach fits somewhere between what Cruz and Geist (2019) called alternative team teaching and blended team teaching. The former was used to refer to alternating responsibility for content coverage based on expertise and the latter to shared curricular – but not individual classroom – responsibilities across multiple sections of the same course. However, our distributed approach differs from these forms of team teaching and others described in the literature because the teaming is not situated in a single class where the instructor of record role is shared. Instead, the teamwork is distributed across multiple class sections. Although course design work is shared and different instructors may step in to provide pedagogical, technological, and social support to students enrolled in any course section, the administrative instructor of record duties are not shared among team members.

This distributed team teaching approach was used to shift a multiple-section undergraduate technology course to remote delivery during the Spring 2020 semester. In this case remote means online, a modality that was widely adopted when the university campus closed, and for which the instructors and students were unprepared. Course instructors were encouraged to use Zoom and hold synchronous sessions because courses were already planned for synchronous learning, but asynchronous activities were also permitted. Through this case, we demonstrate how a distributed team approach provides structure and support for instructors while simultaneously

increasing opportunities for meeting students' pedagogical, social, technological, and psychological needs during a difficult period. The case shows how this approach might be replicated, whether for future emergency preparedness or to maximize the ability to meet the diverse engagement and learning needs of students under normal conditions.

Frameworks

This study draws upon two frameworks, the four roles of the online instructor and the disaster management cycle. Both frameworks were used to structure the data analysis process. The first framework, the four roles of the online instructor (Berge, 1995; Bonk et al., 2001) suggests that instructors are not only responsible for their students' pedagogical needs, but also are responsible for meeting learners' social needs, which may include a sense of community and belonging in class (Rovai, 2002), and serve as the initial contacts for administrative and technological needs of online learners. This framework pushes instructors to think of their job as one that requires a knowledge and skill base that extends beyond disciplinary content and pedagogical expertise. Instructors offer structure to a class, set the rules, social climate and tone, and are the first point of contact for many students as they navigate institutional resources.

More recently, researchers have found additional roles that might be considered integral to the instructor's skill set, such as course designer (Gómez-Rey et al., 2018; Li et al., 2017). Traditional instructional designers are at least one step removed from the classroom and thus the four roles Berge (1995) initially outlined, whereas teachers as designers must consider pedagogy, content, and technology in an integrative sense (Koehler et al., 2007) while also accounting for learner needs (Martin et al., 2019). For simplicity, in this study we adopted Berge's (1995) framework, which is widely known and cited, and integrates micro-level design (e.g., developing learning activities) as a pedagogical task undertaken by instructors. The shift to remote learning was not only a pedagogical (including micro-level course design) and technological change, but also had social and administrative implications for instructors.

The second framework used in this study is the disaster management cycle (Alexander, 2002), which is widely used by government and nonprofit agencies. It was used during data analysis to situate course activities within different points of the COVID-19 pandemic. This cycle, summarized in Figure 1, provides guidance to emergency planners and responders. When

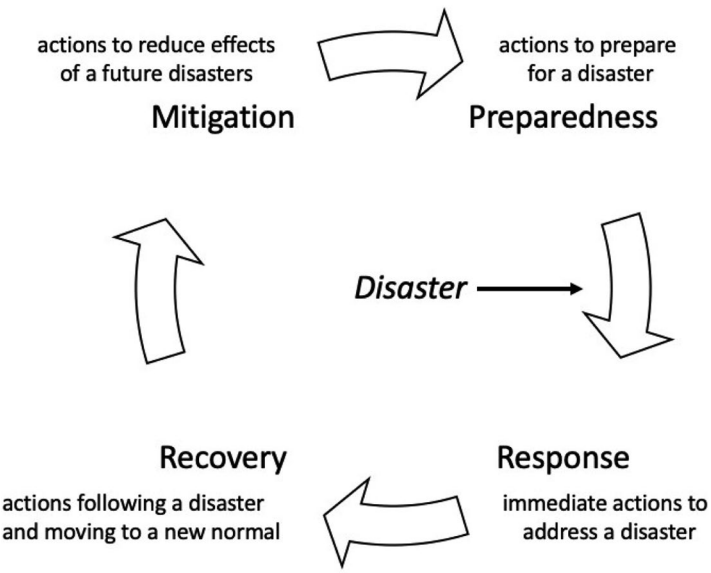

Figure 1. Disaster management cycle.

a disaster strikes, the response phase begins. During this phase, the goal is to react to the disaster and develop solutions that will protect people from further threat. To some extent, the response phase is reactive to the disaster, but it is also reliant on actions conducted during prior mitigation and preparedness phases. The recovery phase, as the name implies, focuses on solutions that will return life to normal. During Spring 2020, educators were firmly situated in the response phase when courses in progress made rapid changes amid great uncertainty to keep people safe. Subsequent terms of the pandemic have been part of the recovery phase. What is learned in the midst of response and recovery informs future mitigation and preparedness actions.

The COVID-19 pandemic has challenged the cycle by showing how widespread and persistent a disaster can be, and how ineffective mitigation and preparedness actions can be during global events (Sawalha, 2020). In the school context, emergency preparedness has focused heavily on safeguarding life (Philpott, 2019), which is a response action. In many situations, the disaster itself happens quickly and then during response and recovery the focus on schools is alternately about rebuilding (Whittle et al., 2012) or serving as community support hubs (Mutch, 2015). During COVID-19, the situation differed because the pandemic did not destroy buildings or infrastructure. Instead, it draws parallels to the polio epidemic in the United States in 1916, which delayed school openings, displaced the support typically offered by schools, and awaited a public health solution (Meyers & Thomasson, 2021). However, contemporary technology led many institutions to shift modality and soldier on through the end of the term.

These two frameworks work together in this case study, where we share the story of how a course was re-designed using a distributed team-teaching approach. The four instructor roles not only guided instructor decisions within the course, but also shed light on areas where student needs existed. The disaster management cycle was used to situate student needs and instructor actions temporally within the pandemic, as well as to consider broader implications of the lessons learned early in the pandemic. For example, a preexisting common course design was an unanticipated form of preparedness for shifting to a distributed team teaching approach that provided support during the response phase. The case itself tells the story of the response phase, with implications for teaching during the recovery phase (subsequent terms until the pandemic passes and a new normal is established) and then comes full circle with ideas for future mitigation and preparedness.

Purpose and research questions

The purpose of this case study is to explore how a distributed team teaching approach was implemented to support students and instructors during the pivot to remote learning that occurred during Spring 2020, at the beginning of the COVID-19 pandemic. The research questions addressed by this study are:

1. What needs did the EME2040 students and instructors have as the response phase of the pandemic began?
2. How did the team teaching approach help instructors redesign and implement course changes during the response phase to address student needs?
3. How effectively did the team teaching approach meet learner needs?
4. How did the team teaching approach during the response phase inform plans for subsequent recovery, mitigation, and preparedness phases?

This case study reports on a context where a preexisting shared course design at the macro level (e.g., syllabus, assignments, and textbook) led the way for instructors to engage in team teaching and design and share course materials at the micro level (e.g., video lectures, lessons,

and tutorials). This study has implications for how multiple-section courses are designed and taught, and how graduate student instructors can be supported by both their teaching mentor and their peers. It also demonstrates how distributing labor across course sections can simultaneously meet student needs while easing instructor workload.

Method

Study design and context

This descriptive case study uses a mixed method approach to report how the instructor team of a multiple-section undergraduate course shifted to remote delivery and fostered students' engagement during the Spring 2020 semester. Although case studies are not generalizable, through rich description of the study context, readers of a case study may find relevant implications that may transfer to their own similar contexts (Stake, 1995).

EME2040 is an undergraduate-level technology course for preservice teachers. The course fulfills both a College of Education degree requirement and the university's general education computing requirement. Prior to the pandemic, course sections met three times a week on a Monday-Wednesday-Friday schedule or twice a week on a Tuesday-Thursday schedule. All course meetings were held in a small computer lab, and all of the sections followed the same course syllabus. The Canvas learning management system was used as the course content hub, hosting the syllabus, assignments, and the open course textbook, which was developed by members of the instructional team (see (Dennen and Bagdy, 2019a, 2019b)). Additionally, Canvas functioned as the course administrative hub, where assignments were uploaded, grades were recorded and through which announcements and course messages flowed. Students could complete course assignments on their personal computers or use the lab computers for their coursework.

The course used a specifications grading approach (Nilson, 2015), with assessment based on demonstrated achievement of competencies. In this course, the competencies were related to technology integration knowledge and technology and design skills. Students received competency lists and thresholds for a pass or high pass for each assignment, and assignments were graded on a satisfactory or unsatisfactory basis. A token economy was set up to allow students to revise earlier work, submit late work, or excuse themselves from missed in-class assignments (see Dennen and Bagdy, 2020 for a more extensive description of how this system works).

Participants

The participants in this case study were four graduate student instructors, each of whom was the instructor of record (IOR) for a course section, their supervising instructor, and the students enrolled in their four course sections. Of the 70 undergraduate students enrolled in the course, 66 participated in the survey. An additional five students participated in a voluntary interview about their course experience. Table 1 presents the breakdown of students by gender and class standing.

The course instructors were graduate students who had completed at least 18 graduate credit hours in the field of instructional design and technology. All instructors had completed a two-day university workshop to prepare graduate student instructors, and course-specific training at the program level. Additionally, the international student instructors had passed a test to certify their English language speaking abilities. At the time of the study, the most experienced instructor was in her 5th year of teaching the course; the least experienced was in his second semester.

Table 1. Student gender and class standing.

Gender	Freshman	Sophomore	Junior	Senior	Other	Total
Female	14	16	11	11	1	53
Male	1	4	6	6	0	17
Total	15	20	17	17	1	70

Instruments

Two instruments were developed to collect data for this study, a survey and an interview. The first was a survey developed and deployed by the instructional team during March 2020. The original purpose of this survey was to better understand student needs before redesigning the course and to identify students who might need extra assistance. The survey consisted of five questions about students' wellbeing, six questions about technology access, three questions about remote learning comfort, three questions about time constraints, one question about progress on an assignment that students were working on, and four open items asking about student concerns and needs.

The interview consisted of five blocks of questions. The first collected background information about the student, and the second asked how the student was personally affected by COVID-19. The final three questions blocks asked specifically about the student's course experience, covering pre-remote learning, the remote transition (e.g., the two weeks, inclusive of spring break, when instructors conducted the survey and were making rapid redesign plans for the course), and the remote learning experience of the final six weeks of the course.

Data collection

Most data sources for this study were extant and a part of the natural teaching and learning process. The data sources include a student survey conducted by course instructors during March 2020 using Qualtrics, course redesign notes kept by the instructional team (e.g., meeting minutes, emails, and Slack communications), teaching reflections written by each instructional team member, student participation and completion data during the remote period, and course redesign artifacts. Additionally, five interviews with students were conducted after the course ended. The interviews lasted approximately 30 minutes and used Zoom to maintain social distancing. This study was approved by the researchers' Institutional Review Board, and participants provided informed consent prior to interviews. A waiver of consent was allowed for accessing aggregate data from the course, including surveys conducted for instructional purposes.

Data analysis

We used our notes, emails, Slack channel messages, and other course artifacts to reconstruct the course redesign events and decisions. Responses to the student survey were aggregated and frequency counts were calculated using SPSS. Instructor records and reflections and student interview data were used to assess student engagement with course materials, instructors, and peers, and also to identify how instructors distributed their efforts across the four instructional roles. Student interviews were transcribed and coded thematically by their experience in the course pre-COVID, during the transition into remote learning (immediate response phase), and later during the remote period (late response phase, leading into recovery for educational institutions) and by their needs (personal and educational). Finally, to evaluate the effectiveness of the course redesign and the team teaching approach, we considered the course grade distribution, student feedback, and instructor reflections.

Findings

Student needs

The instructional team knew that students were worried when the university announced it would be closing campus due to the pandemic. Students in all four course sections had one last class meeting prior to the shift to remote. Attendance was low during those meetings; several students did not attend due to health concerns or because they were packing up and traveling home. At that time, students expressed to their instructors that they were uncertain and worried about what would happen next and asked their instructors about how they would proceed in the course.

A student check-in survey was used to formally assess student needs and ability to successfully complete the semester. Instructors sent the online survey to their own course sections and responded to each student as their individual situations warranted. We received 66 student responses to the survey, one of which was partially incomplete. Only three of the students who had been actively attending the class when the pandemic hit did not complete the survey.

Basic needs

The survey began with questions about the students' living conditions because university housing closed down and many students returned to their hometowns or other locations, depending on personal circumstances. These areas fall beyond the typical scope of instructor responsibility, but we were concerned that some students might not have safe housing or a secure food supply. Almost all students reported that they were in a safe and stable place with sufficient access to food (see Table 2), and we invoked the administrative role to work individually with students in need, directing them to appropriate resources that could assist with food and housing.

When asked about their learning situation, only two-thirds of the students reported that they felt they were in a situation where they were able to learn. Others were uncertain about their situations at this time (27.7%) or felt that they would not be able to learn at this time (9%), with living conditions and life circumstances that varied. For example, some students had returned to households that were noisy or heavily trafficked, and others found themselves struggling with financial problems. These data points helped us identify the need for flexibility for the remainder of the term.

Student stress

We knew that even students with stable living situations might have added stress due to change and uncertainty about the future. We were stressed, too. Students were asked to compare their stress levels during the immediate response to typical conditions. Approximately two-thirds reported that their stress was higher or much higher than usual (see Table 3). We also asked students to share specific concerns. Some students indicated that they were stressed about being successful in an online course format: *I am not a student that does well taking online classes. I am an in-class student. I never skip or miss class just to miss. I am always there. So this adjustment is a little bit harder for me.* Other students struggled to manage their emotions: *I wasn't very happy. But at the same time, I was internally panicking. I wasn't going out buying a bunch of toilet paper. But I was just internally like … it just kind of hit me [Interview 2].* And for graduating seniors, who would not return to campus, the experience took away their expected celebrations and closure: *I am in a place that is not under heavy isolation rules yet. But I am really mentally/emotionally struggling with my senior year being over.* These comments show how the switch in course modality and closing of campus affected students even when they were not struggling to have basic needs met.

Table 2. Student basic needs.

	Yes	No	Unsure
Are you currently in a safe and stable place?	64 (96.97%)	0 (0.00%)	2 (3.03%)
Do you have enough food?	61 (92.42%)	2 (3.03%)	3 (4.55%)
Are you in a situation where you feel able to learn?	42 (63.64%)	6 (9.09%)	18 (27.27%)

Note. $n = 66$.

Table 3. Student stress levels.

	Much higher than usual	Higher than usual	Typical	Lower than usual	Much lower than usual
How is your stress level?	16 (24.24%)	28 (42.42%)	19 (28.79%)	3 (4.55%)	0 (0.00%)

Note. $n = 66$.

Table 4. Student technology access.

	Yes	No
Do you have access to a computer (laptop, desktop, etc.) sufficient for completing the remaining coursework?	64 (96.97%)	2 (3.03%)
Do you have access to MS Office programs (Word, PowerPoint, and Excel) to complete assignments?	59 (89.39%)	7 (10.61%)
Do you have sufficient Internet access to participate in a synchronous class session?	59 (89.39%)	7 (10.61%)
Do you have sufficient Internet access to use Canvas?	65 (98.48%)	1 (1.52%)
Do you have sufficient Internet access to watch videos?	60 (90.91%)	6 (9.09%)
Do you have sufficient access to email on a regular basis?	65 (98.48%)	1 (1.52%)

Note. $n = 66$.

Table 5. Comfort with online learning.

Activity	Students Comfortable with Activity
Synchronous video session (e.g., Zoom video meeting)	32 (49.23%)
Synchronous text-based communication (e.g., text chats)	42 (64.62%)
Asynchronous video lecture (e.g., YouTube videos, narrated PowerPoints)	52 (80.00%)
Video-based tutorials	38 (58.46%)
Written tutorials with screen shots	52 (80.00%)
Text-based lectures & readings	43 (66.15%)

Note. $n = 65$.

Technology access

Technology access was an important part of EME2040, even before the pandemic, and we needed to know what access students had to sufficiently enact our technological role as instructors. The course made heavy use of the LMS, and students needed the Microsoft Office Suite and Internet access in order to complete their assignments. At the beginning of the term, we polled students about what resources they would use to complete their coursework and 38 (54.29%) anticipated making use of university lab computers at some point. Five students (7.14%) indicated that they did not have access to a personal computer for completing course work. We knew from informal conversations with students that in some instances the personal computers that they used were not their own, but instead belonged to roommates or friends.

As living situations changed, so did technology access. Almost all of our students indicated that they had sufficient access to a computer, email, and the learning management system (see Table 4). However, some students reported that they did not have access to Microsoft Office programs (Word, PowerPoint, and Excel), which they needed to complete assignments. Some students also reported that they lacked sufficient Internet access to participate in synchronous course sessions or watch course videos.

Comfort with online learning

We also used the student survey to learn about how comfortable students were with various facets of online learning. Feedback in this area was critical to enacting our pedagogical role as instructors. Students reported that they were most comfortable with asynchronous video lecture (e.g., YouTube videos, narrated PowerPoints) and written tutorials with screen shots (See Table 5). Students reported that they were least comfortable with synchronous video sessions (e.g., Zoom video meetings).

Time zones and time constraints

Time was an administrative issue for redesigning the course. Students were no longer reliably in the same time zone after the campus closed. Many students left the university prior to spring break and would not return to town until the summer or fall. We knew different time zones could impact participation in possible synchronous activities, especially for students in

substantially different time zones. Almost all our students (58; 89.23%) remained in the same time zone. Of the rest, all but one was in an adjacent time zone.

Our university had suggested that instructors could continue to use the same class meeting times and hold synchronous sessions, but in practice that would not work for students whose schedules had been affected by the pandemic. Some students (12; 18.46%) indicated that they would be unable to meet online during their regularly scheduled class time. They elaborated to share that they had either started a new job or took on additional shifts at work.

Instructor support

Students were asked to suggest ways that their instructors could best offer support in an open-ended item. They shared that they would appreciate frequent communication, including emails and assignment reminders. They also expressed their appreciation for checking on them. One student stated: *The fact that you care so much is huge to me. I'd say checking in on us from time to time, whether that'd be through email or another survey like this one.* This comment highlights the importance of the social instructor role. Students also requested that we eliminate some of the course assignments, particularly the participation-based assignments they completed during class time. They also asked for continued patience and flexibility as they figured out how remote learning would work and adjusted to their new living situations.

Instructor needs

The four course instructors were all well equipped to support students through the administrative, technological, social, and pedagogical roles prior to the pandemic, and their instructor training had prepared them for dealing with individual students in need of accommodation. The course itself had adopted a common course syllabus which served a variety of purposes, including disaster preparedness; the common syllabus meant that only one syllabus and course design needed to be reworked in the event of a disaster, not four.

The instructors were not new to online learning, but they were new to online teaching. None had taught or designed their own online course previously, although they had served as teaching assistants for online courses and used online course activities in lieu of course meetings when attending conferences. They were already familiar with using the LMS to host course materials and for grading, and in their capacity as online teaching assistants they had experience with tasks like grading online discussions. However, designing multiple weeks of online learning activities and managing synchronous meetings was new to them, and they had never taught students in the midst of a disaster, either.

The course materials, as they existed, were not sufficient for online teaching. During course meetings on campus, the instructors would typically present new information, provide software demonstrations, engage students in discussions, and provide opportunities for students to practice their technology and design skills while getting instructor support and feedback. The course design incorporated several brief assignments, some of which were intended to be completed during class sessions. The instructors would need to do a lot of work in order to prepare the course for remote delivery. If they followed the campus version of syllabus, they would need to develop and lead tightly planned synchronous sessions during every scheduled course meeting time and find new ways to support student practice. They typically gave students project work time toward the end of class sessions and wandered around the room to see what students were doing. However, synchronous teaching with Zoom would not allow instructors to monitor individual progress and offer moments of assistance to individual students.

Redesigning their courses alone would have been labor-intensive. One instructor wrote in their notes, "*I started worrying about how to teach skills to finish students' remaining assignments … I thought I had to manage my section by myself. It was a bit burdensome.*" After meeting with the instructors and considering the course design and their individual backgrounds, it was apparent that they would benefit from support with remote teaching. The course coordinator,

an experienced online instructor and course designer, had previous experience reworking courses and accommodating individual student needs during the response and recovery phases other disasters (e.g., major weather events). She could help the instructors navigate university requirements (administrative role), rework the course for remote delivery (pedagogical and technological role) and provide the social connection to the course and campus that students might be needing (social role).

Course redesign process

When the university shifted to remote instruction, the course coordinator called an instructor meeting on Zoom to check in with everyone and to determine next steps. The university decision to close campus was made immediately prior to spring break, leaving instructors with one week – a week previously designated as a break – to plan their approach. During this initial meeting, a few challenges became apparent.

First, it would be difficult to plan without knowing more about student technology access. We did not know if the students owned computers that would be sufficient to complete the remaining course assignments, or if they had decent wifi access. For example, one instructor remembered a student who needed to use a public library to use the Internet on weekends when they went home. That would clearly not be an option during the pandemic.

Second, the course as designed had many moving parts. In addition to six major assignments and a final group project, students completed graded in-class assignments and skill check quizzes during class sessions. As part of their homework, students also maintained blogs with required weekly posts based on prompts.

Third, the existing course materials alone were deemed insufficient to help students learn the necessary skills to complete the remaining assignments. Typically, during class meetings the instructors would show the target product, then demonstrate related skills for the students, and finally cue students through trying the same skills on their own computers. Because class attendance was expected, course materials did not include technology skill tutorials that could be used in lieu of this demonstration and guided practice. Additionally, this approach does not transfer well to a synchronous video setting. Although each instructor could demonstrate the skills using a screen share, students would not be able to easily follow along on their own computers concurrently.

Based on these challenges, two decisions were made. First, we surveyed the students, as described above, so we could better understand their needs. Second, we decided to work as a team moving forward, sharing the course redesign process and, to the extent possible, teaching for the remainder of the term.

The team approach

As a team, we used a Slack channel to communicate with each other. We had previously used Slack to communicate about course preparation toward the beginning of each semester, but were not heavily reliant on it in the midst of the semester. We decided to use Slack as our primary means of team communication because it allows for quick responses, broadcasts messages to the whole team, and archives our decisions. Additionally, we set a weekly team Zoom meeting time for lengthier discussions of upcoming course tasks and needs and determining a workflow for the week ahead. Between meeting times, we executed our plans for the week, which typically included facilitating class sessions and developing course materials.

We discussed how a team approach could help us best help our students, anchoring our discussion around the four roles of the online instructor (see Figure 2 for an explanation of specific tasks related to roles). In terms of administration, we recognized that our students were best served by their own instructor of record. At no point did instructors see each other's course rosters or enter each other's Canvas shells. The preexisting Canvas development site for the

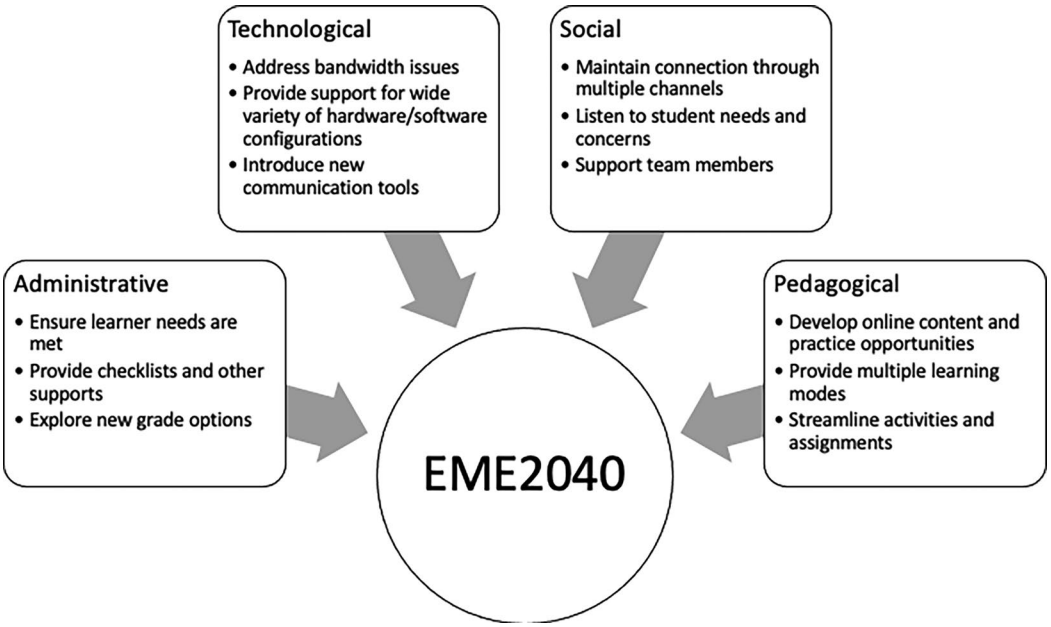

Figure 2. Course activities for each instructional role.

course continued to be used to share common course materials, which individual instructors could then copy into their course sites for their students. However, we were able to support each other with administrative troubleshooting. In our pedagogical roles, we opted to take a cooperative approach, identifying our respective strengths and offering to lead the instruction in that area. In other words, instead of all four instructors creating learning materials and conducting a Zoom session or recording a tutorial, one instructor could do it and share with the rest. Similarly, the technological role could be distributed across instructors, who could troubleshoot problems for students collaboratively. Finally, the social role was an unknown at the time that we began redesigning the course. We all felt the isolation of staying at home and assumed students would as well. We anticipated that students would want to have regular human contact, but that it would vary by individual. We wanted to find a way to be as available as possible to students, meeting their pedagogical, technological, and social needs as best we could without wearing ourselves out.

Once we settled on the team approach, we branded ourselves "Team2040" (based on the course number) and used a hashtag, #2040strong to further communicate our team identity to students. We scripted and recorded a brief video for our students, with all five members of our team discussing different parts of our redesigned course approach. We reassured students that we had a plan, and we were going to be successful with remote learning. We concluded the video with a restatement of our commitment to our students, and to being #2040strong. This video was distributed to students upon the return from spring break along with a message that we were taking an additional week to fully regroup. That week allowed us to be one week ahead of the students in our development process.

Design and development decisions

Based on the student survey findings, we focused on flexibility, availability, and scope of work in our redesign process. We decided to provide flexible learning options to accommodate a number of temporal and technological needs, distributing technological and pedagogical tasks across the instructors. We envisioned students who would want to attend live synchronous sessions with their instructors and have their hands held through each week's materials, and students who would want to work more independently and asynchronously. It was most

expedient to address topics in brief video lectures held live on Zoom for all who cared to attend, recording the lectures for anyone who wanted to watch later. Instructors distributed the remaining course topics among themselves, and each specialized in specific topics. A calendar of weekly Zoom lectures was given to students in all class sections, and they were free to attend any lecture they wanted. All lecture slides also were shared, and lecture transcripts were made available. The instructors shared responsibilities for recording brief video tutorials for teaching new skills, and also developed low-tech, paper-based versions of these materials. Weekly checklists were created to help students identify the relevant learning materials and activities for each week as well as assignments that were due.

We maximized available student contact hours and modes of communication while minimizing required contact. This provided students with more opportunities for receiving pedagogical, technological, and social support. First, the team chose to hold collective office hours, increasing overall availability to students. Office hours were held during regular class meeting times, and students were welcome to attend any instructor's office hours. That meant that there was at least one office hour held on every weekday. Second, we set up a Slack channel explicitly for student assistance. Students were told they could join the optional Slack channel and use it to get quick responses to non-personal questions. Third, we set up asynchronous discussion boards in each Canvas shell where students could engage with classmates and their instructor about course-related topics.

We reduced the overall scope of work and adjusted assignments to help students attain the course learning outcomes without over-burdening them. Graded in-class assignments and skill-check tests were removed. Although they work well as practice activities with feedback during in-person class sessions, they would complicate the streamlined, online version of the course. These were steps on the way to demonstrating mastery of knowledge and skills through larger assignments. In other words, we could just as readily assess students without these assignments. For the same reason, we removed the remaining blog posts. Only a few were left during the term, and students had already demonstrated their technological capability related to blogging. We re-allocated the points and the topical discussion to the asynchronous discussions.

Additional changes were made in recognition of the diverse student situations. Instructors worked individually with students struggling due to technology access issues (e.g., they could not record and upload a video or they did not have access to necessary software) to make accommodations without compromising on course competencies. The final project was changed from a group assignment to an individual one, and the presentations were recorded and presented on Flipgrid instead of in class. The use of Flipgrid allowed the instructors to organize the assignments topically, like conference tracks.

We also found an opportunity in the curriculum to model what we were teaching. Two topics that were covered during the remote period were distance learning and open educational resources (OER). We were open about the approaches we were now using to facilitate class when we focused on distance learning, and we invited a graduate level class focused on OER to present brief webinars and the OER they were developing to our students. Neither of these authentic learning opportunities would have likely happened in the absence of the course redesign.

Implementation

Student engagement in the course varied by circumstances and needs. Attendance at Zoom lectures was small but steady, with 5-12 students attending each live session. Video analytics show a much greater number of students watched each recording. Attendance was not tied to course registration, and students attended sessions across instructors. At the end of the lectures, students who attended in person regularly asked questions. During office hours, instructors mostly saw students from their own course sections, which was not surprising because of the time (regularly scheduled class meeting) and familiarity. Still, a few students visited with other instructors and some showed up just to talk.

The instructors realized that they were providing social support to their students just as much as they were providing pedagogical and technological assistance. For example, a handful of students communicated with their instructors multiple times while traveling to homes far from campus. The students needed that connection while they made their way home. Another student frequently visited office hours with all four course instructors just to talk. One instructor shared, "*I had a couple of individual meetings with students where they spent a portion of the time just venting. Grief over canceled events and anxiety about the future.*" The instructors also saw their students struggling at times because of other classes and their overall workload. As one instructor observed in their reflective notes, "*Every class had its own remote learning format and different assignments.*" The EME2040 instructors tried to help students navigate those challenges, too.

The class Twitter hashtag had regular communication across the EME2040 community. Twitter was used more heavily for peer communication than instructor communication. One student commented:

> *Twitter allowed us to interact with other students who weren't in our section. So with the hashtag you could respond to other students that tweeted. I think I interacted with more people not in my class through Twitter than people that were actually my class. That's cool. [Interview 2; Female Freshman]*

On the hashtag, we watched students discuss their remote learning experiences, make social connections, and even share about helping a parent who was an inservice teacher shift to remote learning with the skills learned in EME2040.

Not surprisingly, technology problems arose and required flexibility. Students struggled with poor internet connections, and shared workspaces and computers with family members. One student could only complete coursework in the evenings when a family member returned home with a phone that could function as a hotspot.

A common thread in the instructor reflections was how important and challenging communication had been, and how by collaborating on course design and delivery they could focus on individual student needs instead.

> *I had to (a) respond to emails and inquiries more promptly than usual (not saying I don't respond to emails while I was teaching f2f, but some questions I could wait a little bit and resolve in person) and (b) be very clear about each step of the instructions. Sometimes it was much easier to show people things in real-time f2f. Thanks to this amazing team, I did not have many challenges in terms of course delivery.*

> *It took me more time to communicate with them to make sure they know what to do and how to do. However, thanks to team teaching, I could spend more time taking care of my students than developing tons of new online materials. My team was available whenever I needed them and I could manage the emergency distance learning period well.*

> *Before spring break, I took class time to talk to my students about the shift to remote learning. While some felt confident moving forward with remote learning, others expressed anxiety about completing this course and their other courses. The students let me know that frequent communication, particularly announcements and assignment reminders would put them at ease. I spent a lot of time communicating with my students, and a lot of my other responsibilities (particularly writing) got pushed aside.*

Team teaching helped the instructors allocate their time to student communication, which in turn helped keep students engaged in the course and provided a way to identify and meet specific administrative, technological, and social needs.

Team teaching effectiveness

Student grades are one way of assessing the effectiveness of a course. They most directly reflect the pedagogical role, but student learning success can also falter if administrative, technological, and social needs go unsatisfied. At the start of the term, all EME2040 students indicated that

Table 6. Final course grades.

Grade	Students	Percent
A/A-	45	64.29%
B +/-	13	18.57%
C +/-	3	4.29%
D	0	0.00%
F	2	2.86%
S	6	8.57%
U	0	0.00%
TOTAL	69	98.57%

Note. Does not include student who stopped attending after Week 2.

they hoped to earn an A or A- in the course, but only two-thirds achieved this grade. Still, the grades suggest students learned the course content effectively. Table 6 shows the overall grade distribution, which is fairly typical for this course. Instructors reported that the students who failed stopped attending at the start of the term (1) or when the pandemic shutdown began (2). Students who were doing well in the course when the pandemic hit continued to excel, and all students who continued to do coursework during the pandemic earned at least a C, which was a sufficient grade for counting the course toward their general education requirement.

The university allowed students to switch their grading option from a letter grade to satisfactory/unsatisfactory (S/U) due to the pandemic, but only six students did. Additionally, two students failed the class. One student explained why she exercised the S/U option:

> *We had that satisfactory and satisfactory option. And I opted for that because I was just like, I don't want to do the last project right now. Um, so luckily, I passed the class with a satisfactory grade and was able to like just save my time from like doing the rest of it because I just didn't have the energy to finish it. [Interview 1; Female Junior]*

However, this was likely not a widely used option because students were already performing well in the course and needed a letter grade to count the course toward their university computing requirement.

Course grades are only one metric of success, and during a difficult term such as this one, student feedback provides another helpful means of evaluating a course. Table 7 provides a summary of the student experience during the semester based on interview data. Pre-pandemic, students reported a regular routine. The routine was disrupted when they had to return home and course modality shifted. The teamwork and structure that we implemented in EME2040 was noticed and appreciated by students.

Within EME2040, students felt supported by their instructors across the administrative, technological, social, and pedagogical roles. From the beginning of the remote period, they knew the instructors had a plan and could accommodate their needs. One instructor reported that, "*Many students expressed their gratitude for support (in the) transfer from on campus to online mode. They were also grateful about the communication and support made through emails.*" Similarly, a student shared:

> *It's also great to know that my professors are looking out for me and not going to say that I can't participate if I didn't have Wi Fi or if something was going on. So that was nice to feel like taken care of and that if something were to happen, they would have a plan as well. I can tell you that a lot of my other teachers did not do that. Pretty much every single class did this remote transition a completely different way. [Interview 5; Female Senior]*

Students used the course checklists to help keep them on track, and commented on how the flexible approach was deliberate and me their needs:

> *This class was definitely felt like the most prepared and had the most options in terms of what we would do and what we need to turn in every week, which is nice. [Interview 5; Female Senior]*

Table 7. Summary of student interview findings.

	Personal	Educational	EME2040
Pre-pandemic (Jan-Feb)	Living on campus	Attending all or most classes in person	Generally happy
	Working on campus or in university city		Interacted with classmates in person
Initial response (mid March)	Feeling anxiety	Uncertainty about class expectations	Video made students feel like they belonged to a group
	Upset about change	Many classes shifted to Zoom	Students were confident that their instructor were in charge
	Traveling home during the pandemic increased anxiety	Some instructors did not know how to use technology	
	Being home required adjustment		
Recovery (late March -April)	Being home was distracting	Hesitant to contact professors who were also stressed	Support and organization in EME2040 was perceived as stronger than in other classes
	Workspaces and computers were often shared	Questions often went unanswered	Instructors were accessible
	Looking for or taking on new work	Keeping to prior school schedule (days/times) was helpful	Expanded office hours were helpful
	Continued disappointment over loss of planned events (e.g., graduation)	Satisfactory/unsatisfactory option was helpful	Streamlining of assignments was appreciated
			Would have liked more class time for Q&A and walk-through on some assignments
			Learning technology remotely was more challenging than in the classroom

Students also reported that their instructors were available to them:

> *If I ever had a question she would always answer within 24 hours and be super helpful. If I had a question about an assignment, she would make sure to answer super quickly so I could be sure to complete the assignment on time … The support in this course was great compared to other courses. [Interview 4; Female Junior]*

> *The fact that there are more instructors available, like throughout the week, I think that was really good. And I also liked how different lessons were taught by different instructors. Because in the classroom setting we only hear obviously from our teacher, so to see kind of the parallels between, like, what (different instructors were) teaching. I think that was also very beneficial. [Interview 3; Female Freshman]*

The combination of course design and instructor communication appeared to provide students with both social and pedagogical support.

One student commented on the self-reflexive nature of the experience, remembering that technology access and the digital divide was a course topic during one of the earlier, on-campus weeks of the term and noticing how the EME2040 team adjusted their technological and pedagogical role during the pandemic:

> *We talked about this in class, that it's important for teachers to be aware of their students' technological access. I thought that was just literally done in real life (in this class), and making sure we had access … and making accommodations if we didn't. So I thought that was perfect that it was literally what we had talked about in class. It was very like work at your own pace while still being structured, which was like good for what was happening. [Interview 5; Female Freshman]*

Student reflections such as this one, along with the aforementioned student who tweeted about helping her parent teach are good indicators that the course instructors satisfied the

pedagogical role. Perhaps the highest compliment we received was from the new graduate who now has a remote classroom of her own:

> *I took lots of notes on what worked some classes on what didn't work and found out two weeks before graduating that I'd be a teacher. And so I was taking lots of things down. I definitely felt like this class showed me things that would be successful in my own classroom moving forward into being a teacher, as well as communication wise, not just schoolwork wise. [Interview 5; Female Senior]*

In this sense, we not only taught the required curriculum, but also prepared these teachers for future teaching situations.

Although we had always considered ourselves a collaborative group of instructors, this new collective identity as Team2040 took our interdependence to a new level. Students also noticed that we were working as a team:

> *This was the only class that a team came together and where all the teachers worked together to instruct and I think that honestly was so easy on everybody because I could tell that my teachers were getting stressed because it was just them and they had to figure it out kind of on their own. So I think working as a team helps the instructors a lot, like they weren't they weren't getting as many emails, they weren't getting as many like requests or whatever. [Interview 3; Female Freshman]*

> *I thought that was really nice that you guys made a video for everyone. And it was helpful because you tried to show a sense of community between everyone taking the course. And I really liked it. [Interview 4; Female Junior]*

After working together closely in this manner, and receiving confirmation of its effectiveness in the form of student learning outcomes, course evaluations, student feedback and our own debrief of the experience, we concluded that distributed team teaching was an effective approach for streamlining labor, supporting learner needs, and supporting instructor success and professional development.

Team teaching across the disaster management cycle

The strongest indicator of the success of teamwork was the decision at the end of the term to continue with the distributed team teaching approach. During the Fall 2020 and Spring 2021 terms, when the university was still using a remote instruction approach, three of these instructors along with a new colleague continued to work as an instructional team. Although the pandemic was firmly in the response phase during these terms, and most individuals had settled into a new lifestyle and set of expectations while awaiting a full return to campus life, the use of distributed labor to create online learning materials and the communal office hours and Slack channel remained. Figure 3 depicts our reflection of how we have moved through the phases of this disaster and will prepare for future disasters. Common course design and a collaborative approach will help mitigate issues when one instructor needs to substitute for another and also helps when we train new instructors. The multiple channels of communication and communal office hours expands the types of immediate support students can access at any time, which we think will be helpful when responding to the weather-related disasters that certainly loom again in our future. Finally, one instructor recorded in their notes that this experience served as both professional development and a model for how to mentor graduate student instructors in the future. The Team2040 identity remains strong, and our team has enjoyed the instructional camaraderie during this time of social isolation.

Discussion and conclusions

The conditions for working as a team were already in place pre-pandemic. The common course syllabus and assignments provided unanticipated preparation for shifting to a team approach. Their use in EME2040 prior to Spring 2020 does not reflect intentional mitigation or prescient

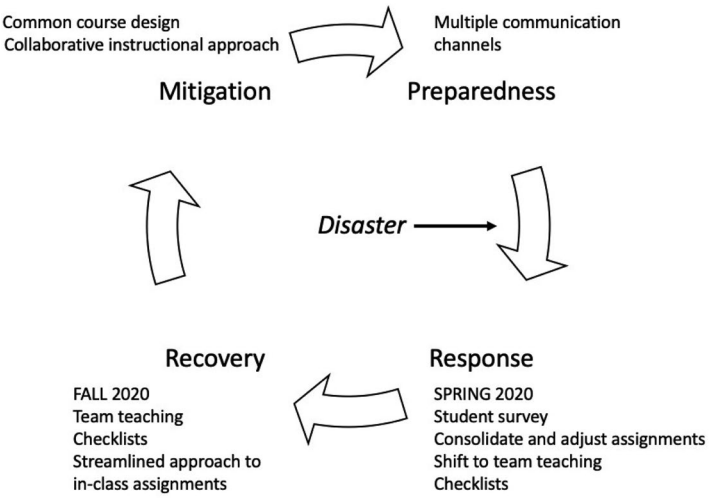

Figure 3. Team 2040's activities within the emergency management cycle.

knowledge of an impending disaster, but rather good fortune brought on by the beliefs that cross-section consistency is desirable, graduate student instructors benefit from supervisory modeling and mentoring, and graduate students are not sufficiently compensated to engage in independent course design and development. The preexisting relationships among team members also supported success, confirming earlier research that highlights the importance of a good relationship among teaching team members (Burns & Mintzberg, 2019; Morelock et al., 2017). The distributed team teaching approach that emerged reflects an organic process of figuring out what would work for this team given our context. By taking a collaborative approach on pedagogical and technological planning while supporting individual instructors as sole instructors of record, this approach helped capitalize on available knowledge, skills, labor and time while avoiding some of the pitfalls that affect instructional teams who share IOR duties (Monteblanco, 2021). For example, although the course coordinator assisted and mentored the instructors, aside from offering a lecture on her area of expertise she was not visible to the students and did not make administrative decisions for the course sections.

The distributed team approach yielded several benefits for both the instructional team and the undergraduate students enrolled in the course. The supervising instructor was able to collectively mentor the graduate student instructors, which streamlined her administrative and pedagogical support tasks while still meeting instructor needs. For graduate student instructors, peer and instructor mentoring in a team teaching context can be an important part of professional development (Laverick, 2016), and all instructors experience professional growth that would not have occurred without the collaboration. In terms of graduate student labor, the team shared the task of developing instructional materials for use by all course sections. Individual instructors formally claimed ownership over different development tasks, and everyone provided feedback. This teamwork and formal division of labor helped break down some of the power and ownership barriers described by Morelock et al. (2017) that are inherent when team members hold different positions in the institutional hierarchy.

Others have found that team teaching can be more time-intensive for the instructors (Crawford & Jenkins, 2017), but that was not our experience. All five members of the instructional team worked long hours on the EME2040 course during Spring 2020, but our efforts reflected the heavy student communication needs. We were able to share key online instruction responsibilities related to course design and subject matter expertise, and offer each other support in the other areas of responsibility as outlined by Martin et al. (2019). The IORs would likely have spent more time trying to build course materials and teach every topic independently than they spent on cooperative

course development, and the supervising instructor surely would have spent more time communicating with each IOR separately than she did working with them as a group.

The distributed pedagogical and technological labor freed the instructors to focus on student engagement and meet social and administrative needs, similar to the experience of Williams et al. (2010). Student engagement is important to online learner success (Martin & Bolliger, 2018), and frequent instructor contact is one way to ensure student engagement (Dennen et al., 2007). Students in this course noted the same advantages documented elsewhere in the team teaching literature, such as increased instructor access (Simons et al., 2020). For the undergraduates in the course, many of whom were preservice teachers, the team approach provided models of team teaching and, through interaction with four instructors, multiple perspectives on how technology might be used to support teaching. This is a common reason for using a team teaching approach (Minett-Smith & Davis, 2020; Williams et al., 2010). These soon-to-be teachers exited the course with greater awareness of this trend in K-12 instruction, which was regularly used pre-pandemic but also was found to be beneficial at the K-12 level during the pandemic (la Velle et al., 2020).

As part of the emergency response effort, team teaching was beneficial because it reduced the instructors' stress and isolation and freed up course development time for other tasks. This finding echoes the experiences of other online team teachers (Williams et al., 2010). Students in EME2040 benefited from the expertise and perspectives of multiple instructors, which is a common reason for using a team teaching approach (Minett-Smith & Davis, 2020; Williams et al., 2010). This case, however, was unique because team teaching spanned multiple course sections with different IORs. Administrative roles were not shared, and students were never required to interact with non-IORs or students from other sections to ensure that team teaching efforts did not violate their privacy rights (e.g., FERPA). Some students never looked beyond their IOR and Canvas shell. Still, they reaped the benefits of shared instructional labor.

Limitations

This study has two main limitations. First, the data collection all occurred after the class ended. We were fortunate that all course-related activities and instructor decisions and communications had been documented, through emails, personal notes, the shared Slack channel, and meeting minutes. These documents were automatically generated as part of the normal workflow. Additionally, the student needs survey was created to help support teaching, and not for research purposes. With foresight and planning, we might have asked other questions on the survey, conducted a second survey at the end of the term, and documented the course outcomes in different ways. Second, only five students agreed to be interviewed. We believe this reflects the timing of our request for participation. It occurred over the summer break, when we presume most students just wanted a break and to forget the challenging semester that just passed. Additionally, some students may not have been enrolled over summer and consequently not checking their university email account.

Implications

This study has implications for how multi-section courses are planned and taught. Although this case study reports on activities during emergency remote teaching, the benefits experienced by these instructors and students could apply to other contexts.

The major limitation is that it could inhibit innovation or restrict new instructors' opportunities to learn about course design and pedagogy. However, when combined with peer mentoring and collaborative or cooperative micro-level course design and development, innovation and professional development can easily be supported within the team environment. Teams that implement this approach should be attuned not only to the potential efficiencies of the approach, but also how it can be used to support all team members in developing new knowledge and skills.

When used during non-pandemic times this approach serves as a form of mitigation and preparedness for unexpected events that may disrupt teaching and learning practices. For example, instructors might more easily substitute for each other when an IOR must miss class due to illness or a conference. Students who miss class might make up what they missed by attending another course section for a day or two. New instructors can shadow an experienced instructor who teaches an earlier class, observing a lesson before teaching that same lesson. Instructors can share the labor of developing new course materials, and can serve as sounding boards for each other across all four instructional roles.

The global nature and extended duration of the pandemic has demonstrated how important it is to be prepared for disasters. Although educational institutions have emergency response plans, most are focused on safety and facilities, not instruction. Additionally, few instructors design their courses in ways to mitigate or prepare for disruption due to emergency situations. As much as educators and students everywhere long to return to pre-pandemic conditions and not revisit the stressful moments of the response phase, there is much to be learned by evaluating how prepared educators and students were, how readily everyone adapted to changes, and which changes were most effective. The evaluative approach used in this study has implications for how other educators might revisit how well their response and recovery actions helped them enact each of the four instructional roles to meet their students' needs. By engaging in this evaluative and reflective work, drawing upon whatever extant data still exists, instructors can identify ways to refine their own skill sets and improve course design and flexibility.

Future research

This case study and the distributed team teaching approach that it presents was inspired by the COVID-19 pandemic, but the implications detailed above apply to teaching more broadly. Future research in this area could explore not only the effectiveness of distributed team teaching on instructor efficiency and student learning outcomes, but also on instructor professional development and growth, particularly with graduate student instructors. If it continues to yield these outcomes in other contexts, this approach will provide an intermediary option between the simple supervision of multiple-section courses that commonly occurs in higher education settings and full team teaching with shared IOR duties, which can be administratively challenging to support. Over time, it could also be helpful to research whether this approach inhibits the influx of new ideas and pedagogical approaches or fosters innovation.

Notes on contributors

Vanessa P. Dennen is a Professor of Instructional Systems & Learning Technologies at Florida State University. Her research is situated in both formal and informal learning environments and focuses on informal learning, identity development, and knowledge management within online networks and communities of practice. Vanessa currently serves as Editor in Chief of The Internet and Higher Education. More information can be found at http://vanessadennen.com.

Lauren M. Bagdy is a doctoral candidate in the Instructional Systems and Learning Technologies program at Florida State University. Her research focuses on learning in online communities and networks. Her dissertation research explores how teenagers use affinity spaces on social media platforms for informal learning purposes.

Ömer Arslan is a doctoral candidate in Instructional Systems and Learning Technologies at Florida State University. He studies online learning and online course design in higher education contexts.

Hajeen Choi is a doctoral candidate in Instructional Systems and Learning Technologies program at Florida State University. Her research interests include motivation and engagement in online learning, belonging/othering, informal learning, and social media in education.

Zhichun Liu is a postdoctoral fellow at Kaput Center for Research and Innovation in STEM Education, University of Massachusetts Dartmouth. Dr. Liu's research focuses on designing and developing active game-based learning experiences to facilitate learners' knowledge acquisition and transferrable skill development through problem-solving.

His current work aims at promoting the development and learning transfer of computational thinking among K-12 students and teachers.

ORCID

Vanessa P. Dennen http://orcid.org/0000-0002-2076-074X
Zhichun Liu http://orcid.org/0000-0002-6402-9174

References

Alexander, D. (2002). *Principles of emergency planning and management*. Terra Publishing.
Anderson, R. S., & Speck, B. W. (1998). Oh what a difference a team makes": Why team teaching makes a difference. *Teaching and Teacher Education*, *14*(7), 671–686. https://doi.org/10.1016/S0742-051X(98)00021-3
Berge, Z. L. (1995). Facilitating computer conferencing: Recommendations from the field. *Educational Technology*, *35*(1), 22–30.
Betancourt, N. (2020, April 29). Student experiences during COVID-19 actionable insights driving institutional support for students. *Ithaka S+R*. https://sr.ithaka.org/blog/student-experiences-during-covid-19/
Bonk, C J., Kirkley, J. R., Hara, N., Dennen, V. P. (2001). Finding the instructor in post-secondary online Learning: Pedagogical, social, managerial, and technological locations. In J. Stephenson (Ed.), *Teaching and Learning Online: Pedagogies for New Technologies* (pp. 76–97). Kogan Page.
Broeckelman-Post, M. A., & Ruiz-Mesa, K. (2018). Best practices for training new communication graduate teaching assistants. *Journal of Communication Pedagogy*, *1*(1), 93–100. https://doi.org/10.31446/JCP.2018.16
Burns, V. F., & Mintzberg, S. (2019). Co-teaching as teacher training: Experiential accounts of two doctoral students. *College Teaching*, *67*(2), 94–99. https://doi.org/10.1080/87567555.2018.1558169
Carpenter, D. M., Crawford, L., & Walden, R. (2007). Testing the efficacy of team teaching. *Learning Environments Research*, *10*(1), 53–65. https://doi.org/10.1007/s10984-007-9019-y
Cho, M. H., Kim, Y., & Choi, D. (2017). The effect of self-regulated learning on college students' perceptions of community of inquiry and affective outcomes in online learning. *The Internet and Higher Education*, *34*, 10–17. https://doi.org/10.1016/j.iheduc.2017.04.001
Crawford, R., & Jenkins, L. (2017). Blended learning and team teaching: Adapting pedagogy in response to the changing digital tertiary environment. *Australasian Journal of Educational Technology. 33*(2), 51–72. https://doi.org/10.14742/ajet.2924
Crawford, R., & Jenkins, L. (2018). Making pedagogy tangible: Developing skills and knowledge using a team teaching and blended learning approach. *Australian Journal of Teacher Education*, *43*(1), 127–142. https://doi.org/10.14221/ajte.2018v43n1.8
Cruz, L., & Geist, M. J. (2019). A team teaching matrix: Asking new questions about how we teach together. *Transformative Dialogues: Teaching & Learning Journal*, *12*(1), 1–15.
Dennen, V. P., & Bagdy, L. M. (2019a). Going open: A textbook replacement design case. *International Journal for Educational Media, 13*(2), 6–16.
Dennen, V. P., & Bagdy, L. M. (2019b). From proprietary textbook to custom OER solution: Using learner feedback to guide design and development. *Online Learning*, *23*(3). https://doi.org/10.24059/olj.v23i3.2068
Dennen, V. P., & Bagdy, L. M. (2020). Shifting to specifications grading: Two design cases. In Teaching, Colleges & Community Conference (Virtual) (pp. 1–7). University of Hawaii. https://scholarspace.manoa.hawaii.edu/bitstream/10125/69146/1/2020-Dennen.pdf
Dennen, V. P., Darabi, A., & Smith, L. J. (2007). Instructor–learner interaction in online courses: The relative perceived importance of particular instructor actions on performance and satisfaction. *Distance Education*, *28*(1), 65–79. https://doi.org/10.1080/01587910701305319
Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of Educational Technology Systems*, *49*(1), 5–22. https://doi.org/10.1177/0047239520934018
Easterby-Smith, M., & Olve, N.-G. (1984). Team teaching: Making management education more student-centred?*Management Education and Development*, *15*(3), 221–236. https://doi.org/10.1177/135050768401500305
Garcia, T., & Felix, E. (2020, May 25). Taking the pulse of students during COVID-19. *Brightspot*. https://www.brightspotstrategy.com/whitepaper/student-experience-snapshot-covid-19/
Gómez-Rey, P., Barbera, E., & Fernández-Navarro, F. (2018). Students' perceptions about online teaching effectiveness: A bottom-up approach for identifying online instructors' roles. *Australasian Journal of Educational Technology*, *34*(1), 116–130. https://doi.org/10.14742/ajet.3437
Härkki, T., Vartiainen, H., Seitamaa-Hakkarainen, P., & Hakkarainen, K. (2021). Co-teaching in non-linear projects: A contextualised model of co-teaching to support educational change. *Teaching and Teacher Education*, *97*, 103188. https://doi.org/10.1016/j.tate.2020.103188

Hixon, E., Buckenmeyer, J., Barczyk, C., Feldman, L., & Zamojski, H. (2012). Beyond the early adopters of online instruction: Motivating the reluctant majority. *The Internet and Higher Education*, *15*(2), 102–107. https://doi.org/10.1016/j.iheduc.2011.11.005

Howlett, K. M., & Nguyen, H. L. (2020). Autoethnographic reflections of an international graduate teaching assistant's co-teaching experiences. *Journal of International Students*, *10*(2), 401–419. https://doi.org/10.32674/jis.v10i2.774

Hurst, B. (2015). Making the move to online teaching: One reluctant professor's informal self-study. *TechTrends*, *59*(6), 35–40. https://doi.org/10.1007/s11528-015-0902-6

Koehler, M. J., Mishra, P., & Yahya, K. (2007). Tracing the development of teacher knowledge in a design seminar: Integrating content, pedagogy and technology. *Computers & Education*, *49*(3), 740–762. https://doi.org/10.1016/j.compedu.2005.11.012

Krammer, M., Rossmann, P., Gastager, A., & Gasteiger-Klicpera, B. (2018). Ways of composing teaching teams and their impact on teachers' perceptions about collaboration. *European Journal of Teacher Education*, *41*(4), 463–478. https://doi.org/10.1080/02619768.2018.1462331

la Velle, L., Newman, S., Montgomery, C., & Hyatt, D. (2020). Initial teacher education in England and the Covid-19 pandemic: Challenges and opportunities. *Journal of Education for Teaching*, *46*(1), 1–13. https://doi.org/10.1080/02607476.2020.1803051

Laverick, D. M. (2016). *Mentoring processes in higher education*. Springer International Publishing. https://doi.org/10.1007/978-3-319-39217-2_4

Li, S., Zhang, J., Yu, C., & Chen, L. (2017). Rethinking distance tutoring in e-learning environments: A study of the priority of roles and competencies of Open University Tutors in China. *The International Review of Research in Open and Distributed Learning*, *18*(2), 189–212. https://doi.org/10.19173/irrodl.v18i2.2752

Martin, F., & Bolliger, D. U. (2018). Engagement matters: Student perceptions on the importance of engagement strategies in the online learning environment. *Online Learning*, *22*(1), 205–222. https://doi.org/10.24059/olj.v22i1.1092

Martin, F., Budhrani, K., Kumar, S., & Ritzhaupt, A. (2019). Award-winning faculty online teaching practices: Roles and competencies. *Online Learning*, *23*(1), 184–205. https://doi.org/10.24059/olj.v23i1.1329

McKenzie, S., Hains-Wesson, R., Bangay, S., & Bowtell, G. (2020). A team-teaching approach for blended learning: An experiment. *Studies in Higher Education*, 1–15. https://doi.org/10.1080/03075079.2020.1817887

Meyers, K., & Thomasson, M. A. (2021). Can pandemics affect educational attainment? Evidence from the polio epidemic of 1916. *Cliometrica*, *15,* 231–265. https://doi.org/10.1007/s11698-020-00212-3

Minett-Smith, C., & Davis, C. L. (2020). Widening the discourse on team-teaching in higher education. *Teaching in Higher Education*, *25*(5), 579–594. https://doi.org/10.1080/13562517.2019.1577814

Monteblanco, A. D. (2021). Power dynamics, common pitfalls, and successful strategies associated with co-teaching. *College Teaching*, *69*(2), 63–68. https://doi.org/10.1080/87567555.2020.1810610

Morelock, J. R., Lester, M. M., Klopfer, M. D., Jardon, A. M., Mullins, R. D., Nicholas, E. L., & Alfaydi, A. S. (2017). Power, perceptions, and relationships: A model of co-teaching in higher education. *College Teaching*, *65*(4), 182–191. https://doi.org/10.1080/87567555.2017.1336610

Mutch, C. (2015). The role of schools in disaster settings: Learning from the 2010–2011 New Zealand earthquakes. *International Journal of Educational Development*, *41*, 283–291. https://doi.org/10.1016/j.ijedudev.2014.06.008

Nilson, L. (2015). *Specifications grading: Restoring rigor, motivating students, and saving faculty time*. Stylus Publishing.

Philpott, D. (2019). *Public school emergency preparedness*. Bernan Press.

Prior, D. D., Mazanov, J., Meacheam, D., Heaslip, G., & Hanson, J. (2016). Attitude, digital literacy and self efficacy: Flow-on effects for online learning behavior. *The Internet and Higher Education*, *29*, 91–97. https://doi.org/10.1016/j.iheduc.2016.01.001

Rovai, A. P. (2002). Sense of community, perceived cognitive learning, and persistence in asynchronous learning networks. *The Internet and Higher Education*, *5*(4), 319–332. https://doi.org/10.1016/S1096-7516(02)00130-6

Sawalha, I. H. (2020). A contemporary perspective on the disaster management cycle. *foresight*, *22*(4), 469–482. https://doi.org/10.1108/FS-11-2019-0097

Simons, M., Coetzee, S., Baeten, M., & Schmulian, A. (2020). Measuring learners' perceptions of a team-taught learning environment: Development and validation of the Learners' Team Teaching Perceptions Questionnaire (LTTPQ). *Learning Environments Research*, *23*(1), 45–58. https://doi.org/10.1007/s10984-019-09290-1

Stake, R. E. (1995). *The art of case study research*. Sage.

Strohschen, G., & Heaney, T. (2000). This isn't Kansas anymore, Toto: Team teaching online. *New Directions for Adult and Continuing Education*, *87*, 33–41.

Vesikivi, P., Lakkala, M., Holvikivi, J., & Muukkonen, H. (2019). Team teaching implementation in engineering education: Teacher perceptions and experiences. *European Journal of Engineering Education*, *44*(4), 519–534. https://doi.org/10.1080/03043797.2018.1446910

Whittle, R., Walker, M., Medd, W., & Mort, M. (2012). Flood of emotions: Emotional work and long-term disaster recovery. *Emotion, Space and Society*, *5*(1), 60–69. https://doi.org/10.1016/j.emospa.2011.08.002

Williams, J. B., Evans, C., & Metcalf, D. (2010). Team teaching: A collaborative approach to effective online instruction. *National Teacher Education Journal*, *3*(3), 33–38.