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Teaching Preservice Teachers in the Time of COVID: What's Worth Keeping?

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Synopsis

As we begin to transition from online instruction to in-person, we (four mathematics teacher educators) reflect on how COVID-19 impacted our instruction and address the question: what will we take back to in-person instruction? This article includes our individual reflections and an analytical synthesis of them. Findings reveal that there were unanticipated ways that human connection and consideration arose from teaching online, much of which we want to maintain in some form when returning to brick and mortar classrooms. We conclude by highlighting the value and importance of reflection for our own well-being.

Keywords: COVID-19, distance learning, in-person instruction, equity, pre-service teacher education.

1. Introduction

Who among us will forget the waning of winter 2020 and the advent of COVID restrictions? Though many of the memories will fade over time, the shift to socially distanced living and learning was visceral and ferocious, and is likely to live in our bones for a long time. If you are a mathematics teacher or mathematics teacher educator (MTE), as we are, you probably scrambled to shift your teaching practice to online or distance-based contexts. Like us, you probably mourned the loss of direct contact with your students and the wonder of seeing students' "aha!" moments in brick and mortar or in-person classrooms. Like us, you likely wondered and worried about how to retain the humanity of your teaching, and your students' learning, in the tiny boxes that represented us on video conference calls. Or, as in many cases, the black rectangles labeled with a student's name. Oftentimes you may have only heard the echo of your own voice as you spoke into cyberspace.

And perhaps, like us, you found humanity in mathematics education lurking, oozing, emanating from unexpected places. In the chat bar of a Zoom call. In a private message from a student, letting you know of their need or appreciation for something you'd done. In the ways your students rose to the occasion, embraced the challenges, sent you their best thinking. Or the ways they expressed their sorrow, their outrage, their frustration, their human need for more, for less, for better.

Recently, Jenny Ruef and Kathy Stoehr met by phone. One of the best and brightest parts of social distancing has been the return of the phone call. The walk-and-talk, as we call it, is a rewarding way to meet with colleagues and friends: get outside, enjoy the weather, see the seasons change, get some work done. Or just connect. In discussing the shift back from online to in-person teaching and learning, Kathy Stoehr recounted her experience in a breakout room at the 2021 Association of Mathematics Teacher Educators (AMTE) conference. In discussing the effects of COVID-19 on the state of mathematics teaching, a fellow MTE shared that most MTEs were so focused on caring for others, they had not stopped to reflect on how COVID had impacted themselves and their practice. Kathy was struck by this and recognized the need to stop and reflect. Kathy then asked Jenny a pivotal question: what is worth keeping? What would we, as MTEs, take with us when we returned to teaching in brick and mortar classrooms?

This was an important question, because it reminded us that there are always lessons to be learned, and gifts emerge from chaos and reconstruction. It reminded us to build back better. We decided it was a question worth asking ourselves.

2. Our Perspective on Supporting Pre-Service Teachers

We are four mathematics teacher educators who work in university teacher preparation programs. In our work with pre-service teachers (PSTs), we are each committed to attending to issues of equity and access in mathematics education. Our commitment to equity is grounded in the importance of supporting pre-service teachers to “change the game of mathematics” [10], which necessitates *rehumanizing mathematics*, allowing students to feel “whole as a person” [10, page 1], fully recognized and valued, as a human participant in the mathematics classroom. Our efforts to teach mathematics for equity include *relational equity*, the ways in which classroom community members seek to understand and support one another to achieve mathematical understandings [5]. This includes appreciation for intellectual risk taking [2, 18], valuing the inherent messiness of problem solving [11] and framing students’ contributions as assets for communal sensemaking [8, 12].

With these commitments, we strive to support our PSTs to: 1) recognize the political nature of mathematics education [9], 2) provide opportunities for all students to engage in multi-dimensional [4] and cognitively demanding [20] mathematics, and 3) notice and value the multiple mathematical knowledge bases [22] that our students bring to the classroom. Through engagement in reflection [19] and collaboration, we are committed to improving our instructional practices to better support PSTs to attain these goals.

3. Contributors

Jenny Ruef taught elementary mathematics content and elementary and secondary mathematics teaching methods courses across the COVID year. Her onboarding to online instruction took place primarily over the summer of 2020, and she relied heavily on colleagues near and far, social networks of mathematics teacher educators, recent literature, and institutional supports to re-tool her courses and her pedagogy.

Kathy Stoehr taught elementary science methods online in the spring of 2020 to students who had been in her two-quarter elementary mathematics methods in-person class in the fall of 2019 and the winter of 2020. She attended a four-week professional development course during the summer of 2020 that focused on preparing university instructors to teach remotely. In fall 2020 and winter 2021, she taught elementary mathematics methods online to a new cohort of PSTs.

Maddy Ahearn taught elementary mathematics content and secondary mathematics teaching methods courses during the year. She piloted the first online mathematics content course for her department in Spring 2020, and her innovations provided a foundation for the courses that followed in subsequent terms.

Kathy Sun was on leave at the start of distance learning and returned to work ten months after the initial shelter-in-place orders in California. She typically teaches elementary and secondary mathematics methods courses. Returning to her institution for the spring quarter in March 2021, she needed to learn quite a bit before feeling prepared to teach her first course via distance learning.

In the following section, Jenny, Kathy Stoehr, and Maddy share their reflections on the question, what is worth keeping? Each reflection was written independently of one another. In the findings section, Kathy Sun synthesizes their reflections, identifying themes that emerged across all three reflections and describing personal learnings from their responses.

4. Reflections

Jenny: Agentic Alchemy

I titled my section “agentic alchemy” because, as a learning community, my students, co-instructors, and I had to be agentic to build community under challenging circumstances. Alchemy mixes chemistry and magic, a metaphor that captured our delight in creating an online learning community with no prior experience to draw upon. Having no proof such a thing was possible, the successes felt magical. Alchemy also describes the interpersonal chemistry foundational to relational equity. But let us be clear: the “magic” emerged from intentions and effort.

The pandemic pushed educators to replicate the tools, practices, and culture of an equitable and effective classroom online. In terms of struggle and challenges, I anticipated that moving online would be more difficult than moving back to brick and mortar classrooms. It is easier to feel the warmth of human interaction within shared physical spaces. We did manage to replicate some of that connectedness online, but that space always felt a bit haunted—the dead, echo-less audio-sphere of dozens of muted mics, the black rectangles bearing names like digital tombstones. If I’m honest, I won’t miss it. If I’m honest, I’ll keep returning to parts of it, but for better reasons: equity and efficiency. I will return to that point.

So, again, what IS worth keeping?

Doing more with less. The US mathematics curriculum has been criticized as being a mile wide and an inch deep. And while I’ve been clear that educators need to develop critical filters to select content, the seemingly endless expanse of four-hour teaching methods classes gave a false sense of vast stretches of time. The ability to filter curriculum grows with time, practice, and feedback. In this sense, the pandemic hit at an important turning point in my own teaching—I was ready to let go of what no longer served. The pandemic provided further license to justify what felt like sweeping changes. Simply put, the time was right to jettison marginal content and scrutinize the alignment of what was left.

How did we make this happen? I switched to “we,” because I always have thought partners in planning and enacting instruction, including co-instructors and colleagues. The key was exigency: we knew we could not teach four-hour Zoom classes, we knew some things would not translate well, and we knew that the core principles of the courses had to remain intact. This led me to restructure class time and assignments.

Restructured class time. As we return to in-person instruction, we will keep our classes segmented. Four-hour continuous evening classes¹ never really worked. By 9:00 pm, we were all mentally exhausted. I have a vivid memory of a student from one of those night classes volunteering to share

¹Four-hour classes really met for three and a half hours, with the inclusion of ten minutes between each hour of instruction. Please excuse my poetic license in equating instructional hours with actual hours.

her thinking. Mid-way through her argument, she paused to say “I’m sorry, my brain is cake right now. Everything is just crumbling.” That I recall, in vivo, her declaration from three years past is testament to its impact. But I was stuck; I didn’t have the agency or authority to *not* teach four-hour blocks of class. Or so I thought.

For example, in the past we structured our four-hour in-person classes in three sections. The first hour was dedicated to planning and enacting in-person teaching rehearsals, with three or four preservice teachers working as a team to plan, teach, and debrief a math lesson to their colleagues. There were two hours for methods instruction that included theoretical and practical work such as reading discussions; practice with elements of planning, instruction, and assessment; analyzing records of practice; and doing mathematics together. The fourth hour was reserved for guided workshop time for major class assignments.

To adapt to online instruction, we repurposed the first hour of the class as online small group discussion of readings and workshop time for major class assignments. The groups had the option of calling in an instructor, and the instructors had the option to pop into breakout groups to sit in on the discussion or ask for feedback on how the group was experiencing their collective work. The second part of the class, which before COVID was two hours of in-person whole group instruction, was modified for online instruction with the students able to unmute and contribute verbally, or participate via the chat bar or through polls constructed by the instructor. As a class, we were able to watch short videos and discuss, and electronic files of student-facing materials (i.e., handouts) were uploaded ahead of class in organized modules on the course Canvas site, the portal through which instructors delivered information and materials and students uploaded assignments. Small group discussions were possible in breakout rooms, with instructors responding to requests to join and sometimes popping in to join discussions. The fourth hour was repurposed as asynchronous content, with students choosing when to watch the video records of practice or webinar we selected to extend the themes of the week.

As we return to in-person instruction, I will keep the rough outlines of the online classes. First, an hour of small-group workshop time, which includes discussion on current assignments, readings, and video analysis. Second, two hours of whole-class instruction, including teaching rehearsals, doing mathematics together, and engaging with new course content.

Finally, a fourth asynchronous hour, which will include watching video records and webinars and writing short reflection papers to analyze the content.

Restructured assignments. Knowing that our preservice teachers would not have access to in-person classrooms, I reached out to colleagues via social networks and email to gather online resources such as video records of practice, webinars on teaching and learning principles, and other related resources on teaching for social justice and equity and engagement in multi-dimensional mathematics. Long a professional goal, the pandemic forced me to complete this work as it supported modifications to course content and assignments.

In the past, we required students to enact iterations of different assignments, such as interviewing a student about their mathematical thinking, teaching a Number Talk [16], assessing student work, and planning, teaching, and analyzing the effectiveness of an entire lesson. Repetition provided students multiple opportunities to practice, and get feedback, on key elements of teaching and learning mathematics. During COVID, given the demands on our students and limited access to in-person classes, our assignments changed in two key ways. First, rather than starting with new mathematical content, we asked students to revisit a planning assignment completed during the summer course as a basis for a lesson planning assignment for the fall course. Second, we could not ethically request that our students record their online teaching for analysis. We retained the planning assignments, but did not require the students to teach and analyze those lessons. Instead, we offered a choice of video records of practice as the basis for the analysis assignments. We selected video records of the planning, teaching, and reflection on re-engagement lessons that mapped to course content and our goals of teaching for equity.

As we return to the classroom, I plan to keep the tightly aligned curriculum and the assessments that flow out of and reflect that work. Each assignment is designed to build on prior work, culminating in a deep dive into planning, teaching, and evaluating instruction.

The chat bar. New to online instruction, I quickly discovered the beauty of the Zoom chat bar, a welcome surprise. I am convinced (though there is always room for research, and more convincing) that I heard from students who might not have spoken up in an in-person classroom for the simple reason that they could type their thoughts into the chat bar. The chat bar was a nearly instantaneous form of communication. The flow of responses emerged

as a chorus of collective reflection, often as though the whole class sang out in the moment. It was data, quickly absorbed and analyzed by anyone who processed it. Chat bar responses were useful for students' responses to questions such as "what did you notice or wonder about how the children made sense of that mathematical problem in the video we just watched?" When a barrage of responses threatened to shut down thinking, we asked students to type their responses to a question but not hit return until the instructor signaled to do so. This allowed for private thinking time before sharing an answer publicly. In general, the chat bar was more effective in eliciting student responses than requests for students to unmute and share their thoughts. It was useful as a substitute for places where I would have asked students to volunteer their thinking in an in-person whole class discussion.

What might the chat bar look like in-person? I recall an activity from a video record of practice. The students in a mathematics class wrote down their responses to a teachers' request, balled up their papers, and threw them to the front of the room. The teacher collected them and quickly analyzed their responses. The students' responses remained anonymous and the teacher gathered information quickly. If the goal is to have all students analyze their peers' responses, a related activity is to respond on small white boards, then display them on chalk or marker trays around the room. The class then does a "gallery walk" to read the collective responses, followed by small group or whole class discussions of emergent themes. This activity is especially useful as an extension to a Number Talk, allowing the class to see, appreciate, categorize, and connect multiple solution strategies.

Flexibility. Across twenty years as a secondary mathematics teacher, my grading practices evolved to better reflect learning and growth. I grade with rubrics. I primarily use diagnostic comments as feedback, and I use them for all assignments. Any assignment can be revised and resubmitted, up to the end of finals week. All due dates can be negotiated, if requested in advance by the student, or after the fact in the case of unanticipated life challenges. This served all of us, students and instructors, well in online settings. The truth is that not much changed in my grading policies and practices as we moved online except that I was perhaps more flexible than usual about requests for extensions that were made on the day of, or even after, due dates. Given the challenges we were all managing, it made sense to assume best intentions and allow as much extra time as possible. I'll keep these humanizing aspects of grading.

Student Feedback. We increased the frequency of feedback requests. Each class closed with a brief reflection on what worked, and what didn't. I will keep this activity as it informs the rapid evolution of the course during a time of increased challenge.

As we move back to more familiar spaces, the course will still benefit from more regular feedback. In response to reported technology challenges, I obtained grant funding to send a document camera to students in three mathematics or methods courses. The students used the cameras to share their thinking in class, and in the case of the preservice teachers, with their own students. The analysis of their reflections is ongoing, and I look forward to learning more about how this technology supported their collective learning.

Equity. There will always be a call for online interactions. Most of my research groups meet online, extending my network across the country and around the world. Many of our preservice teachers work far from our campus, on reservation schools and in urban settings. It is burdensome for them to return to campus for in-person classes. As we consider how to teach for equity, what we learned in online settings can support us in supporting students physically far from us. I say this with trepidation: not all things translate well, or at all, to online learning. But some things do, enough to justify an experiment in distance learning. In many ways, aiming for efficiency in the design of our courses recognizes and honors the work of our students. Planning for online instruction pushed me to be more efficient in those ways.

My equity goals center on recognizing and appreciating the human experiences of students. How does the design of our coursework and my instruction support a broad distribution of authority and agency? Do students have the agency to pose and refine mathematical arguments? Are they agentic as they grow into the early stages of their teaching career? Do they see themselves as critical thinkers and change agents, empowered to select and modify mathematical content and instruction to best meet the needs of all their students? Do they understand the importance of asset-framing their own mathematical work so they can do the same for their students? Do they see, acknowledge, and support the brilliance in their own students' mathematical thinking? When our shared work includes taking intellectual risks, sharing our incomplete thinking, and developing shared understanding, we build both individual and collective successes. This is relational equity [5].

The work of moving from in-person to online and back again is a problem of optimization, and we do love a good optimization problem.

Kathy Stoehr: Lessons I Have Learned Looking Backwards and Forward

It was the second week of March 2020 and the last week of the spring quarter at my university. I had just finished teaching one of my two sections of elementary mathematics methods to my PSTs. As I made my way back to my office, I was informed that starting on the following day, all classes would be required to be taught remotely on Zoom as a result of the COVID-19 outbreak. The expectation was that our online classes would continue until mid-April, at which time we would return to our brick and mortar buildings. But as we all know that did not happen.

Initially I felt a deep sorrow thinking about not being in the same room with my students whom I had built a deep and rich community with over the previous two quarters. Like all teachers and teacher educators, I had to quickly transform my teaching into a format that felt foreign to me. I wanted to ensure that my students were supported in the ways that prepared them to be ready to step into their own classroom in just a few months later. Each week it seemed like I was just staying one step ahead of the next as I experimented with different ways to engage my students in a venue that no one had anticipated or expected. When the summer arrived, it provided me with the necessary opportunity to rethink, revise, and attend professional development events to support my future remote teaching.

Fast forwarding to the spring of 2021, I have spent important and valuable time reflecting upon how my teaching has adapted and changed over the last fourteen months as well as thinking about what I will take with me as I anticipate teaching again in person. I have learned the importance of identifying what I am calling the “*must haves*” in my courses. These are the anchors of my commitment to preparing prospective elementary teachers to teach mathematics and science in a socially just and equitable fashion. For example, helping my students to develop the knowledge, dispositions, and practices that support children’s mathematics thinking by leveraging their cultural, linguistic, and community based knowledge [23]. I am focusing on fine-tuning the tools that future teachers need to deliver content to *ALL* their future students that provide them with opportunities to see themselves as confident and competent students in these two content areas.

I am learning how to let enough be enough and not try and add in just one more additional mathematics or science task or reading that, although valuable in and of itself, is just too much for students to reap the intended benefit. These “*must haves*” are important as I think they have the potential to shape my students’ own teaching of mathematics with their future students.

I believe I have a deeper appreciation and understanding of what it truly means to be flexible. I thought of myself as being flexible with my students but as a result of the pandemic, I learned what this means at a much deeper level. I learned when and how to adapt an assignment in the moment. For example, having my students complete an assignment in pairs instead of by themselves. Or creating a graphic organizer for an assignment with bullet points for responses instead of a more formal writing. I learned when our virtual class needed to conclude before the originally scheduled time, what reading or reflection needed to be moved to the following week, conducted asynchronously or omitted. This level of flexibility is something I will take with me into my future teaching.

I learned how to read the faces of my students as a means to gauge engagement. The little Zoom squares, which often only displayed the heads of my students, provided me with clear evidence of who was with me versus who had checked out. For example, were my students’ eyes glossed over? Were they looking down at their computer screen? Had they turned off their camera? Had they already spent so much time in an online classroom that day that they were just Zoomed out? Asking these questions to myself allowed me to change the course of how I was presenting the material in the moment. Moving forward into teaching in-person, I believe that I will be more capable and attentive to reading my students’ facial and body language expressions so that I may make more equitable decisions regarding when my students have reached their limit on engaging in the content.

I made it a priority to meet with my students one-on-one to check in to see how they were doing — not only in my class but overall as individuals. I learned about the incredible challenges that some of my students were experiencing. This included the loss of a pet, the death of relatives due to COVID, or their own battle with COVID. I learned about the fears and anxieties that some of my students encountered as they were learning how to teach in a digital world. They shared the joy they felt when they taught a

successful mathematics or language arts lesson. These one-on-one meetings are something that I plan to keep as we return to the brick and mortar classroom.

Additionally, I also provided my students with the chance to catch up with each other during the first five minutes of class. Each week, students were randomly assigned in small groups of four to breakout rooms. Students knew that this was their time to check in with each other and share what was going on in their professional and personal lives. When the five minutes ended, students returned with big smiles on their faces. I plan to continue offering this small but precious space to my students moving forward.

In the fall 2020 and winter 2021 quarters, I began having my students create an audio or video reflection on main assignments as opposed to a written one. This afforded me with the opportunity to feel as if my student and I were having a one-on-one conversation. The reflections were also much deeper than the written ones I had students submit pre-COVID. The personalities of my students sprang to life as they shared how the assignment shaped their understanding of what it means to teach mathematics as well as their journey of becoming a teacher. This is a modification that I plan to carry forward post-COVID.

One very important thing that I have learned from the online world of teaching is that it has a place in my future work in educating prospective teachers. Across a ten-week course, I can clearly see the benefit of creating a hybrid learning experience for my students. My students spend a significant portion of their day at an elementary school site. Then they commute in the busy Bay Area traffic to attend my class. By offering them the opportunity to have some in-person learning weeks and some remote or asynchronous learning weeks within the comfort of their own home may prove to be invaluable to student learning. Additionally, this may result in humanizing [10] the teacher preparation experience for my students as I aim to care for the “whole person.”

COVID has also resulted in the department meetings at my university being held remotely. As the director of our teacher preparation program, I have learned that having these meetings take place online saves on the wear and tear of our faculty. People show up on time, as they do not have to commute during peak traffic hours. Our meetings are more focused and productive. Although I do think that the in-person camaraderie is important, as it helps

to build community and caring among faculty, having a combination of in-person and online meetings is something I will support in the future.

Maddy: What I Want to Figure Out How to Keep

What I will miss and want to keep from Zoom. All of our online classes ran through a Zoom platform, and various features were both helpful and a hindrance. For example, breakout rooms, waiting rooms, and the chat bar. I elaborate on these below:

Breakout Rooms. I found that breakout rooms had positives and negatives. Unlike a brick and mortar classroom, the breakout rooms allowed for truly private conversations because there was no chance of anyone overhearing. However, I also lost the ability to listen in on group conversations, which is really useful in deciding next steps for instruction, such as how long to continue an activity, who to ask to present, or when to offer clarification. But I also had the ability to pop in and out of rooms. This was good, in the sense that I could easily move from room to room, and not good, because I often appeared suddenly and abruptly, like a genie from a bottle. In Zoom classes, the transitions between small-group and whole-class instruction were both abrupt and smooth, and it was easy to flexibly assign groups manually, randomly, or allow students to choose a group.

Waiting rooms before class. Allowing particular students in from the waiting room, provided a space for private conversations before class, which supported building relationships with the students. The waiting room allowed an unexpectedly cozy enclosure at times.

Private chat messages to the teacher. I found students used this feature a lot to ask questions or let me know something was up. I am really going to miss this feature, and I wonder if there is a way to replicate it for in-person instruction.

Public chat. I appreciated how this feature provided participation space with less risk as well as real-time public processing and it also keeps conversations from being overly didactic. I'm going to miss this feature as well, and wondering what this might look like back in the physical classroom.

Pedagogical considerations are worth keeping. As I think about the ways we interacted and organized instruction, I come back to these key points.

Math for Equity facilitation. Our teacher preparation program is centered on principles of teaching for equity, and every decision we make takes those principles into consideration. Given the need to condense curriculum for the online version of the course, the re-design was based on the principles that students need opportunities to rehearse ambitious teaching practices [13], and that unpacking the meaning of “math teaching for equity” is critical. Based on this foundation, I created the *math for equity rehearsals*, where the focus of the rehearsal is ambitious instructional moves, and the content of the lesson is not mathematics, but an aspect of math for equity. In these rehearsals, student groups chose a math for equity topic as the content for their rehearsals, such as the role of tracking in reproducing inequality, rehumanizing mathematics, or math as a non-neutral subject. They then researched their topics from a list of resources that I curated and then collaboratively created a 45-minute lesson to enact, online, with their peers. For example, a lesson on math for social justice began with students showing a brief video clip of a math for social justice lesson, facilitating think-pair-share time to reflect on the example, monitoring collaborative math task refinement using breakout rooms and jamboard and providing time for reflection and goal setting at the end of the lesson.

In the past, we had time for students to collaboratively plan and rehearse a lesson on specific math standards as well as time to engage in lessons I facilitated on various math for equity topics. Merging aspects of these two course components into one was highly generative and rewarding, and we will keep it as we move back to in-person instruction. The secondary mathematics teaching methods course has students seeking both math and non-math primary teaching endorsements, so the first rehearsal not being math content specific is beautifully low-stakes and allows everyone (myself included) to focus on aspects of instruction and avoid unintentionally statusing primary math endorsement students over others.

What will be lost, as we move back to in-person instruction, are the safe and private “teacher timeout” [7] moments where facilitators sent everyone to breakout rooms and I could debrief and provide one-on-one coaching. In those moments, the teachers could catch their breath, ask a question, or just get acknowledgement that they were doing great. This is possible in person, but not nearly as safely.

Shorter Class Segments. While this was a forced choice due to screen fatigue, we should keep it when we return to in-person classes. Four-hour classes are inhumane! Even with breaks, it's too long. We have learned how to reorganize the required class hours so they are more effective for students and instructors, and that's worth keeping.

Digital Organization. The initial switch caused me to consider how someone might participate asynchronously. As a result, I felt greater urgency to organize resources on the learning management systems (our institution uses Canvas) in clear and accessible ways. Also, while I had used hyperdocs in the past as an organizational tool for sharing lots of resources, I increased their use for digital organization.

Discussion Boards for Homework Review. I created discussion boards on Canvas, and required students to post twice before class. Their post took one of two forms: a question or a response. I provided highly structured sentence frames, examples and non-examples for posts, and in my second term of online teaching, I showed anonymized exemplars from the previous class. I praised the risk-taking act of asking questions liberally and publicly and referenced our class norms in celebrating these kinds of posts. Eventually, these asynchronous mathematical conversations were rich and productive. For students who appeared less engaged with the discussion board, I checked in one-on-one and found that most often, they did not see any benefit from the discussion boards because they already “get it,” feeling their procedural understanding was proficient and there was no benefit to be had from reviewing their colleagues' ideas. My response to these students was typically some reflective prompts aimed at opening up what it means to “get it.” I used their future as a teacher to motivate them to go to the discussion board seeking diverse ways of “getting it.” For example, I would say, “As a teacher, your students will bring diverse ways of seeing mathematics, similar to the variety your classmates are sharing on the discussion board; engaging with your classmates' questions and strategies now is great practice for this aspect of your future career.”

These online discussions are a definite keeper for our mathematics content classes. We used to spend fifteen to twenty minutes reviewing homework during class through predominately didactic means. This now occurs asynchronously, with everyone checking in and out at their own pace, asking/answering questions, sharing examples, encouraging each other, practic-

ing mathematical explanations and justifications. It turned out to be truly glorious even though I was very skeptical about implementing it in the beginning. It was so good that when chosen to share an aspect of online teaching with my department, I picked this one.

Virtual manipulatives and simulations. Students bought personal kits of key mathematics manipulatives, such as base ten blocks, fraction bars, and linking cubes, for home practice. However, I found that roughly one out of eight breakout rooms were referencing physical manipulatives and one in ten students would reference them on independent assignments. Through informal check-ins, students shared that they were rarely engaging in course content from the same location, so having the right tool at the right time was not practical. They also shared that the lack of in-person modeling with the tool limited their comfort (despite my attempts to model while on camera). This is where the virtual manipulatives came in. Free and open virtual manipulatives allowed me to model a visual representation of the math concept and when I launched with these tools at the beginning of class, I found students referencing the online version during breakout rooms at higher rates. In fact, I found that the virtual pattern blocks showing fraction relationships and the virtual simulations of nets to solids to be more effective at developing student understanding than the physical versions of these tools.

Flexibility. Keeping flexibility for due dates and the medium for submission (e.g., audio, video, written) was key in supporting students in demonstrating their understanding while we were in distance learning. It was likewise important to be understanding about absences and embed flexibility into asynchronous participation. I like to think of myself as always having been a flexible teacher, but I think it was more of a “come talk to me if you need ___” and now it is just the default setting—everyone gets flexibility—period. When I think about what’s worth keeping, flexibility is the one that stands out to me the most. In reflection, I often think about the raw humanity that was on display as we all logged in to class and saw each others’ (and kids’ and pets’) faces and we nodded in understanding. Or we would see the black box with the name when there was usually a face and we equally understood. The wall that brick and mortar classrooms put up between our home-selves and our school-selves was down and the need to be flexible felt like the only reasonable, the only humane, thing to do. This is worth keeping. I don’t ever want that wall to go back up.

5. Findings & Discussion

Kathy Sun: Retaining the humanity in our instruction

In March 2021, I returned to teaching after taking a ten-month maternity and personal leave. Having missed the initial transition to distance learning, I had much to learn before teaching my first course online. This task felt daunting. I felt anxious because I would be teaching in the spring term, when students would likely be burned out from months of online interactions. Additionally, many of my students were facing their own stressors related to the pandemic and a myriad of challenges associated with facilitating distance learning and transitioning to hybrid instruction.

I feel fortunate to be working with Jenny, Kathy, and Maddy who are reflective about their practice. While working on this article I have had the privilege of synthesizing and learning from their reflections on their experiences transitioning to distance learning as a result of COVID-19. Their reflections served as a resource as I embarked on the journey of facilitating distance learning. Their ideas also serve as a reflective guide as I think about the return to in-person or hybrid in the future.

Across Jenny's, Kathy's, and Maddy's reflections, one thing stands out to me: returning to our commitment to rehumanize mathematics [10], I noticed that each of them humanized instruction while being physically distant. At the core of each of my colleagues' responses was repeated responsiveness to the needs of their students. My colleagues made extra efforts to humanize their courses during COVID to account for the multiple needs and experiences of their students.

In what follows, I identify themes that appeared across the three reflections. I also reflect on what I plan to integrate into my own courses going forward based on what they shared, and highlight how their actions, ideas, and suggestions respect the humanity of our students.

Opportunities for personal connection: Kathy and Maddy highlighted the value of personal conversations through one-on-one meetings, in breakout rooms, or in waiting rooms. Reflecting on my experience teaching in-person, I realized that I took for granted the need to be so intentional in setting aside opportunities to create personal connections because there were frequent conversations outside of class and one-on-one encounters during breaks. As a high school teacher years ago, I strove to make a one-on-one connection with

each of my students each day, whether asking about a sibling or complimenting a new pair of shoes. Since moving to graduate education, I have become less intentional about these interactions. My colleagues' reflections remind me to do the same thing with my graduate students — to be intentional with these human interactions with each student. While I often begin my class with a whole class check in, I intend to try Kathy Stoehr's idea to place students into small groups at the beginning of class to create a space for them to personally connect and check in with one another in a more intimate setting.

Importance of formative feedback: In my mathematics teaching methods courses, we discuss the importance of *formative assessment* [3], which is providing or receiving ongoing feedback so one can identify their strengths and areas for growth. One key aspect of formative feedback is listening to students and adapting instruction accordingly. My colleagues' reflections highlight how the pandemic forced them to check in more frequently with their students. Jenny elicited weekly feedback from her students. Kathy was more intentional about reading faces and body language. And Maddy checked in with students via private chats. In all of these instances my colleagues demonstrated a willingness to seek out feedback from students and be responsive to their needs. They modeled student-centered instruction — they listened to students and used student input to drive the direction of the class. In asking students to share what didn't work, Jenny modeled *intellectual humility* or owning her limitations [24, 17]. She was willing to receive weekly critical feedback to ensure that the course was working for her students. While I occasionally ask for course feedback, Jenny's suggestions to elicit weekly feedback is striking and something I consider integrating into my future instruction.

Another key aspect of formative assessment is *peer- and self-assessment* [3], in which individuals evaluate their classmates or themselves, respectively. Self-assessment has generally been associated with positive learning outcomes [1]. Maddy's decision to transition homework review to online discussion boards (from traditional in-person didactic review sessions) moved the responsibility of assessing homework away from the instructor and on to the students via peer- and self-assessment. For me, this is a good way to flatten the perceived instructor-student hierarchy by giving students the authority to critique each other and themselves. Allowing students to question and comment on each others' work also honors the knowledge and ideas that students bring to the classroom [8]. I particularly liked Maddy's idea of using an

online discussion board to have students either pose or respond to a question about a classmate's strategy, and I will implement something similar.

Whittling content to essentials: All three of my colleagues found that the pandemic forced them to think about what Kathy called the “must haves” for their courses. The pandemic was an opportunity for instructors to reevaluate and adapt their courses' assignments, tasks, and activities. Refining our course content and activities allows for us to better attend to our students' needs, not overwhelming them with “too much” (in the words of Kathy Stoehr) or long classes that are “inhumane” (in the words of Maddy). For me this aligns with best practices for lesson planning, which include collaborating with colleagues and identifying the essential assignments that relate to the *big ideas* or “the conceptual velcro” [25, page 65] that will endure beyond the course. This will mean reevaluating assignments or activities that I have done for years and replacing or retooling them in order to better serve my students.

Lowering barriers to participation: Aligned with principles of Universal Design for Learning [6], across the reflections, I noticed how technology broadened opportunities for participation and made learning more accessible. As Maddy and Jenny pointed out, the online chat provided a lower level risk for students to participate and engage in conversation. They heard from students that they might not have otherwise heard from in an in-person context. Maddie also noted how online manipulatives better supported mathematical understanding. Jenny highlighted how remote learning made it possible for students who were physically distant from campus to have access to our classes without having to commute for hours. Kathy noted how online meetings similarly benefited faculty. As a resident of the Bay Area, moving some class sessions online removes the need to battle hours of traffic to attend an in-person class and is a good way to care for our students and faculty. I'm definitely planning on having a percentage of sessions remain online (and I hope my department will keep some faculty meetings online too) — it's the more humane and equitable thing to do.

Being Flexible: I have always known that teaching requires flexibility. However, as my colleagues highlighted, COVID-19 brought a new meaning to flexibility as plans were changing on a moment's notice. Across the reflections, I noted that the key to flexibility was focused on pivoting and adapting based on students' needs and personal situations. Jenny discussed flexibility

around grading and resubmission. Kathy shared the need to change course plans based on student engagement. And Maddy described being flexible around submissions and attendance based on students' situations. All of these suggestions are things that I am currently working to integrate into my current distance learning instruction and plan to continue doing when returning to in-person or hybrid instruction. While my colleagues each used the word flexible in their reflections, another, related word comes to mind: *experimentation*, which is to “try out a new procedure, idea, or activity” [14]. In being flexible, my colleagues adapted and experimented with different activities and class structures. Jenny recounted how the pandemic gave her the agency to rethink her course. I want to do a better job adopting this mindset of experimentation — I want to be more willing to take risks in my own instruction, to do more than moderately tweak assignments and activities I have facilitated for the past ten years. One silver lining from the pandemic is that it might just give me the boldness to truly re-envision and restructure what my courses look like.

Returning to the overarching theme of humanizing instruction while being physically distant, I realize that at the core of our reflections is the need for mathematics teacher educators to care for their students [15]. I teach at a Jesuit institution, which emphasizes *persona curalis* or caring for the whole person, which aligns with Guiterrez's call to rehumanize mathematics by allowing students to “feel whole as a person” [10, page 1]. There has been no time like this pandemic to remind me that *persona curalis* is more important than ever, and that truly caring for the whole person requires many things my colleagues addressed: personal connection, listening, adapting to meet individual needs, providing access, and being flexible. Yes, content knowledge, clear learning objectives, and pedagogical skills are important, but the pandemic has reminded me that we are much more than the work that we do or the products that we create. We are mental, spiritual, and physical beings, and it is important that as teacher educators we do a better job attending to multiple aspects of who our students, our colleagues, and we are as humans.

6. Conclusion

This piece originated from Kathy Stoehr's determination to stop and reflect. In taking the time to think about the question, what's worth keeping, we were reminded that reflection is what makes us uniquely human.

Our innate desire for introspection and to learn from reflection often gets stifled by the busyness and pressing demands we face each and every day. Our reflections focused on our instruction during COVID, and the need to care for our students emerged as a unifying theme. Yet, through this reflection process we were reminded of how reflection is a way to care for ourselves. Reflecting on and writing this piece was cathartic for us. Reflecting allowed us to slow down for a brief moment. Reflecting reminded us that despite being socially isolated during a global pandemic and witnessing inhumane and unjust events over and over again, we also had moments of positivity and human connection.

We hope that this article inspires others to create space to reflect and attend to self-care. And we hope that like us, through this process of reflection, others have the privilege of seeing some good that manifested during an overwhelmingly challenging period for our world. Such hope has fueled and inspired us as we transition back to in-person instruction and continue in our endeavors to improve mathematics education for all students.

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