“The wall now between us”; Teaching math to students with disabilities during the COVID

spring of 2020

Preprint September 2, 2020

Rachel Lambert

Rachel Schuck

Gevirtz Graduate School of Education

University of California Santa Barbara

Santa Barbara, CA USA

Corresponding author: rlambert@ucsb.edu

“The wall now between us”; Teaching math to students with disabilities during the COVID spring of 2020

This paper presents a case study of the experiences of a highly experienced special educator named Ms. Z teaching standards-based mathematics during Emergency Remote Teaching (ERT) during the spring of 2020. Pre-COVID, Ms. Z provided her students, all of whom had an IEP for Specific Learning Disabilities and/or Attention Deficit Hyperactivity Disorder, daily opportunities to tackle challenging mathematical problems and taught self-regulation strategies for students to better understand themselves as learners. After the shift to ERT, Ms. Z described “the wall between us” as various digital barriers that made teaching online far more challenging than in person. Challenges included supporting students with productive struggle when not present with them, engaging students in mathematical talk, and creating accessible multi-modal materials. Another barrier was supporting student self-regulation. We analyze Ms. Z’s experience using Universal Design for Learning as the important themes spanned emotional and cognitive engagement, as well as strategic self-understanding. We include recommendations for engaging students with LD and/or ADHD in meaningful mathematical problem solving in ERT. Despite the “walls” in ERT, teachers must create meaningful relationships with students, provide opportunities for students to engage in mathematical talk, create accessible multi-modal materials, and support students to better understand themselves as learners.

In the spring of 2020, due to the COVID-19 pandemic, teachers across the world transitioned to Emergency Remote Teaching (ERT; Hodges et al. 2020). The sudden closure of schools has affected all students, but perhaps no group more dramatically than disabled students,¹ particularly those who are minoritized through non-dominant class, race and language learner status. Pre-COVID, students with disabilities in US schools underperformed their nondisabled peers in mathematics, affecting student opportunity (Wei et al., 2013). We have located this problem in a lack of access to mathematical meaning-making caused in part by deficit conceptions of these students (Lambert 2018; Lambert & Tan, 2020). Students with disabilities should be given access to standards-based mathematics, such as those called for in the Common Core State Standards of Mathematics. The CCSSM include the Standards for Mathematical Practice, which call for student engagement in sustained, challenging problem-solving connected to conceptual learning, as well as student discourse around mathematical strategies. Research has documented how students with disabilities have been offered fewer opportunities to engage in conceptual mathematics in separate self-contained classrooms (Jackson & Neel, 2006).

This case study documents the shift to ERT for a unique case, a special educator skilled in providing standards-based, conceptual mathematics for her students in a special education classroom. Ms. Z teaches a self-contained classroom of 3rd-5th grade students with moderate support needs, such as Specific Learning Disabilities and Attention Deficit Hyperactivity Disorder (ADHD). Over 90% of the students in her classrooms are Latinx and over 70% qualify for free and reduced lunch. Ms. Z is an experienced special educator with considerable training in teaching mathematics through student problem-solving. She was named by district personnel as an exceptional teacher for her high mathematical expectations of her students, as her students

¹ We use both person-first and identity-first language to describe disability to respect varied preferences in the disability community.

consistently engage in rigorous standards-based mathematics. Her experience, then, allows for a specific look at teaching standards-based mathematics during COVID through ERT to students with disabilities. After conducting a series of interviews and a focus group with 3 special education teachers who taught during the spring of 2020, we present two related articles. The second paper describes the experiences of two teachers of students with significant support needs, as they navigated ERT (Schuck & Lambert, in preparation).

Research Question:

- How did a highly trained special education teacher plan standards-based mathematics instruction during ERT? What tensions emerged in their planning?

Literature Review

Our research rests on the following conceptual frameworks: 1) Disability Studies and Neurodiversity 2) Previous research on distance learning and students with disabilities, and 3) Universal Design for Learning (UDL).

Disability Studies and Neurodiversity; Framing Disability

Following the Disability Rights Movement and the Neurodiversity Movement, we understand disability as a natural and beneficial feature of human populations (Linton 1998; Walker 2014). We analyze disability in schools through the lens of Disability Studies in Education, which problematizes traditional approaches to special education (Baglieri et al., 2011). In traditional approaches, disability is seen as a medical problem, a deficit, that educators seek to remediate or fix in the individual. Instead, we do not frame disability or disabled children as the problem. The problem instead is inaccessible schools, segregated settings, and persistent low expectations.

The majority of students in this classroom had an Individual Education Program for Specific Learning Disability or ADHD. For students with dyslexia and/or Learning Disabilities (LD), the most persistent challenge is difficulty decoding text and related issues, such as difficulties with reading comprehension and language processing. Strengths can include visual processing and creative problem solving (Attree, Turner, & Cowell, 2009; Everatt, Weeks, & Brooks, 2008). For students with ADHD, strengths can include creativity (White & Shah, 2011). Challenges for students with both disabilities often include difficulties with executive functioning, such as planning and organization. A persistent issue for these students is the pervasive low expectations throughout their schooling, which may cause students to internalize their difficulties as fixed (Lambert et al., 2019). Students with LD and/or ADHD also have higher rates of anxiety than the general population (Schatz & Rostain, 2006; Nelson & Harwood, 2010).

For a student with ADHD, for example, schooling can be challenging because of the constant demands to pay attention in narrowly defined ways. Students must sit up, look at the teacher, and perform attention even when the material is not motivating. Students must move between subjects based on the schedule, rather than based on interest or their ability to hyperfocus on particular tasks for longer periods of time. Much of schooling relies on organization skills for grading purposes, which unfairly penalizes students who have challenges in this area. Schools are organized around an ideology of ability (Annamma et al., 2013), which marks certain behaviors and objects, such as an organized binder, as signaling ability. Narrow definitions of ability particularly affect students of color with disabilities such as those in this study.

Previous Research on Students with Disabilities and Distance Learning

Though still a burgeoning field of inquiry, some literature exists regarding online learning for students with disabilities. Several studies have highlighted areas of potential benefits with regards to distance learning for students with disabilities, usually focused on university level studies. For example, having open access to course materials can facilitate repetition of material, such as watching a demonstration video multiple times (Serriani & Coy, 2014). Satterfield and Kelle (2017) found that university students with autism were more likely to prefer review of videos and blogs, a finding echoed by two of the three participants in Nieminen and Valtteri Pesonen's (2020) study. In another study of adult students with learning disabilities, participants reported appreciating the flexibility and self-management in their online classroom, and also reported not having to worry about social stressors around feeling "inferior" to other students (Murders, 2017). A potential benefit with regards to distance learning in younger grades is that parents may have the opportunity to be more involved in what their child is learning (Sorensen, 2019).

However, it is important to keep in mind that the majority of studies on K-12 special education distance learning were conducted with families who chose to enroll their child in distance learning. Therefore, the ERT of the COVID-19 pandemic is not synonymous with online/distance learning in general (see Hodges et al., 2020 for a discussion of the differences at the university level). Given that online learning requires intrinsic motivation to stay engaged, parents may need to be involved at all times (Greer, 2014), especially if their child struggles with executive functioning and self-management (Serriani & Coy, 2014). This time commitment may be too much for some parents, even in times of societal normalcy (Rice et al., 2019; Smith et al., 2016). The unexpectedness of the move to mandatory distance learning was thus a major

transition for all stakeholders (e.g. teachers, students, and parents), presenting challenges above and beyond those normally inherent in distance learning. Several newly published articles describe the emerging crisis of the loss of in-person schooling for students with disabilities, particularly for mental health of these students (Patel 2020; Lee 2020).

Universal Design for Learning

UDL is a framework for designing educational experiences for students that builds on learner variability, or the natural variation in all learners across multiple dimensions (Meyer, Rose & Gordon, 2014; Rose, 2017). UDL asks teachers to plan across student variability in three dimensions of learning: Engagement (affective domain), Representation (developing understanding of content), and Strategic Action (executive functioning and self-regulation). Universal Design for Learning is a useful framework to design across variability in uncertain times, particularly if teachers see their work as design work, and creatively problem-solve beyond traditional solutions (Lambert & Imm, in preparation).

UDL asks teachers to develop curriculum so that students develop as expert learners. For mathematics, expert learning is closely aligned to the Standards of Mathematical Practice in the US Common Core State Standards. Developed using research on the practices of mathematicians and expert mathematical learners, these practices allow students to engage in complex problem solving. Currently, students with disabilities are offered less access to mathematics of engagement in problem solving, as special education research has focused on direct instruction, or providing students with predefined mathematical procedures (Lambert & Tan, 2017; 2020). Using UDL in mathematics means providing students with disabilities with support to engage in productive struggle, or sustained mathematical problem-solving (Lynch et al., 2018). In addition, teachers need to consider the emotional valence of the mathematics classroom, provide multiple

ways to engage in mathematics, and support students in developing understanding of themselves as mathematics learners (Lambert, 2019).

The special educator in this study had been engaged in a multi-year professional development series on Cognitively Guided Instruction (Carpenter et al., 2014). CGI is an approach to the professional development of mathematics teachers that focuses on student thinking. Participants in CGI professional development engage in analysis of student thinking and learn to respond to student thinking in their instruction. CGI is an effective professional development for mathematics teachers (Carpenter et al., 2000). Emergent research has investigated the effects of CGI on teachers of students with disabilities (Moscardini, 2014) and on the mathematical learning of students with disabilities (Foote & Lambert, 2011; Lambert et al., 2020).

Methods

Setting and Participants

Ms. Z works at an elementary school with a predominantly Hispanic/Latinx (over 90%) student body, with over 70% of students socioeconomically disadvantaged, 16 - 19% English language learners, and 12 - 15% students with disabilities. Ms. Z had previously participated in a professional development program with the first author. Ms. Z teaches a self-contained special education class, in which all students have Individual Education Programs (IEPs) and receive special education services. The majority of her students had IEPs for Specific Learning Disabilities and many also received services for Attention Deficit Hyperactivity Disorder.

Data Collection and Analysis

The first author conducted an individual interview with Ms. Z (and two other special education teachers) approximately 2 weeks after the closing of school buildings. The interview

protocol began with open-ended questions such as “How is it going” and used follow-up questions to document what issues were emerging in the teacher’s practice during ERT, in particular mathematics teaching.

Both authors used open coding to analyze these interviews and then compared what themes emerged. We took our consensus themes and did focused coding (Bogdan & Biklan, 1997). We coded separately and then compared coding, resolving any discrepancies. We then created a memo that summarized the initial themes of the first set of interviews.

This memo was used in a focus group of 3 teachers held one month later. Data from the other teachers’ interview and focus groups focused on teachers whose students have significant support needs (Schuck & Lambert, in preparation). Again, this focus group was semi-structured. We began again with “How is it going” to elicit any shifts since the first interview. We then presented the participants with the emergent themes as a member check.

Following the focus group, the first and second author recoded all focus group data under the themes and wrote memos on each emergent theme. At this point, as the themes were different for Ms. Z and the other two participants, we separated analysis into two case studies. When the first draft of the findings for this case study was complete, we did a second member check, sending the draft to Ms. Z for feedback. We used extensive member checks in this research since the topic is emergent, and we wanted to make sure we were accurately capturing the teachers’ perspective.

Findings

In the following section, we begin by briefly describing Ms. Z’s mathematical teaching before school buildings closed. We then provide a summary of school closures and her

Emergency Remote Teaching in mathematics. Finally, we highlight three instructional dilemmas that Ms. Z faced during this time.

Ms. Z Teaching Mathematics Pre ERT

Ms. Z had participated in over five years of intensive professional development in Cognitively Guided Instruction. The first author had visited her special education classroom on four occasions to observe mathematics. Each time, Ms. Z did a warm-up activity like a Number Talk or Number String, and then she gave the students a complex problem to solve. The class ended in a whole group discussion of student strategies. First, the classroom was notable for the high expectations held for her students, both in the rigor of the problems presented and the student independence. Second, the students in the classroom had freedom to engage in problem-solving in multiple ways. Ms. Z first launched the story problem, which involved visual images, pauses for student processing, and engaging students in the story of the mathematical problem. Next, students were allowed to solve the problem alone or in groups, or they could seek out the assistance of a paraprofessional. They had the choice of using drawing, manipulatives, or calculators. Students were expected to solve complex mathematical problems using their own strategies and then share their solutions in the final share. Third, Ms. Z focused on developing her students' strategic self-understandings, so that students would know themselves as math learners and create their own accommodations, such as taking breaks. She also stressed throughout the class the importance of making mistakes and learning from them in mathematics, encouraging her students to take mathematical risks. Despite challenges in communication, processing, and executive functioning, students in Ms. Z class solved complex problems without direct instruction and were able to share their thinking and engage in the strategic thinking of

others. These findings document Ms. Z's struggles to create similar learning opportunities in ERT.

Summary of Teaching Mathematics during ERT

As school closed in the spring of 2020, Ms. Z attempted immediately to make contact with all of her students. Determining who would stay at home with children was a concern for families in this community, many of whom were essential workers. Some students were cared for by grandparents. One child moved to stay with an uncle, as her mother was concerned that she could not provide appropriate support for at-home learning as she was a Spanish speaker and not fluent in English. Ms. Z used this as an example of how disruptive the current situation was for her families.

Ms. Z sent home packets of work almost immediately after the closure of schools, but students did not engage in the packets. Once she had made contact with almost all students, Ms. Z planned Zoom meetings, beginning with a few times a week, and transitioning into a daily Zoom session. By the end of the spring, Ms. Z was doing daily Zoom meetings, moving between subjects. She also offered students the option of 1:1 Zoom meetings with her. She reported that a small set of students (3-4) would ask for multiple meetings a week over the course of the spring.

Ms. Z described how the first Zoom meetings were taken over by the students, with a focus on sharing interests;

The first week I started off very just like, the kids wanted to talk to each other. It was hilarious. In one screen, you see somebody having their little cars zooming by and another one, somebody is holding up like five Pokemon cards, just switching through them. And another one, somebody's got like a family picture. And I'm just like, you guys, you're

supposed to be listening. But they were just so excited to see each other. So we were just doing share outs.

Ms. Z let her students dictate the content of these early Zoom meetings, allowing them to spend time checking in with each other in a way that made sense to them. This flexibility seemed necessary as students reconnected with each other through unstructured social time.

Ms. Z described adding in academic content to Zoom meetings:

By the end of the week, it was more academic. And I lost two students because of that, they have not returned to Zoom. Once they realized it wasn't just chatting time . . . it's concerning, because I can't get a hold of those families.

By the third week of the closure, Ms. Z was sending home a weekly asynchronous digital packet with a math problem for each day. These were in the form of a Google Slide deck, with a link to a video Ms. Z made that explained the work for the week. In addition, on each new problem on Google Slides, students had access to an audio recording of Ms. Z reading the problems aloud, with pauses and supports for visualization of the problem. The problems in these slide decks were based on CGI: open-ended story problems rather than procedural work. Ms. Z held Zoom meetings to discuss problem solutions. Ms. Z also did live Zoom Number Talks, in which she would give students a problem and have them share multiple solution strategies. She also held asynchronous routines in which she presented problems and students responded on a Google Doc or on Flipgrid. She also asked students to design and share their own problems. Ms. Z provided opportunities for her students to engage in rigorous standards-based instruction that allowed students to engage in mathematical inquiry.

As she planned instruction, Ms. Z negotiated the technical demands of schooling online.

Multiple students asked her to streamline assignments so that they only had to log into one online system:

Because they told me they're like, 'I don't want to look in a bunch of places. I get confused. I forget.' And so I'm like, that makes sense. But I thought it was great that it came from them. They were just like, this is confusing me and grandma is confused. You need to make my life easier.

This consistency supported students with challenges in organization and planning, two aspects of executive functioning.

There was a wide variation in the amount of support students were given at home. Some students had an adult working alongside them all day. Other students did not receive any one on one assistance from an adult or older student during the day. Ms. Z had some students who were attempting to do Zoom meetings and at home packets without adult support. Some students did not engage in online learning due to lack of support, while other students did engage even though no adult was physically present supporting them.

Ms. Z had a few students who seemed to thrive in distance learning. She told the story of one child. At first, she had difficulty contacting him and his family. Then, "and they picked up his device, and now he's nonstop messaging me, demanding certain things: when are we going to have different kind of problems already?" For this students, Ms. Z noted that school at home seemed to mean less distraction and anxiety.

Ms. Z worked to make the content of her lessons accessible to her students, particularly because they were at a wide range of reading levels. She was particularly worried about making the materials accessible for her students who were working with very little or no adult support.

It's intense. It's full. That's why it, like all of my slides I've made are paired with a video of me reading and explaining the slides because I know there's kids that can't read it. And if they're alone, they need somebody telling them what it means.

Ms. Z sent home Google Slides with math problems, and she recorded herself reading aloud the problem, with pauses to help students to give them time to process.

I recorded myself reading the slide to give more access to it, because I was wondering if that was part of the problem too, the kids who need to hear it a few times, especially because their reading levels are all over the place. And then I kind of read it in a specific way, pausing in certain places to give them time to visualize the problem.

She would also keep the context of the problems consistent, so that she could make sure that students understood the context and then build mathematically on that situation. One week of problems was all centered on a story in which Ms. Z adopted a family of bunnies, for example, as the students in the class were very interested in pets.

Dilemmas in Planning Mathematics ERT for Students with Disabilities

In this section, we describe three dilemmas that emerged in Ms. Z's discussion of planning mathematics during ERT. The first was planning problem solving that would engage students in productive struggle without being an emotional trigger for students. The second was issues around student engagement in digital mediums, particularly student to student discourse. Finally, we discuss her concern that families had little experience with their student's self-regulating strategies for schoolwork and needed support to build routines to foster student independence despite self-regulation challenges.

Challenging Students with Productive Struggle

Conscious of how challenging the situation was for the families of her students, Ms. Z tried to ensure that her initial demands were not making an already tense situation worse. Her initial strategy for math was to avoid emotional reactions that she knew were possible with complex mathematical demands, if unsupported. She reflects in the first interview (3 weeks after school closure):

So for math, I just left stuff where I knew they wouldn't be having a meltdown... But I think that's one of the things where I'm struggling with what to do the next few weeks until May. But really I'm assuming it's going to go past it. But it's like, I don't want them to be crying at home. Like at school, they get really frustrated, but I'm there and I can catch it right before it gets to that point.

We note that mathematics, while it can be joyful and engaging, as we had seen in her classroom, can be a possible trigger for “meltdown” and “crying.” Mathematics is the only subject in school with its own anxiety condition (math anxiety) and is emotionally processed and felt (Eligio, 2017). She names these emotional reactions to mathematics as a significant difficulty of teaching mathematics during ERT, as she cannot be present to support students in these moments. When asked what she does in the classroom to “catch it right before it gets to that point,” Ms. Z said,

It means being aware of a student's frustration level. I try to "catch" right before they feel hopeless or defeated. The productive struggle is important but once it's unproductive and kids feel badly about themselves, they stop learning. I watch and swoop in with a guiding question that will steer them back on track or with a suggestion about taking a mental break for our brains to regain energy.

This created a dilemma for Ms. Z. She wanted to minimize stress at home, yet she felt the need to push her students into deeper mathematics.

This struggle connected with her challenges in planning. Guidance from the district was that teachers should focus on consolidating prior knowledge for students with disabilities, rather than move forward in inequitable conditions. Ms. Z noted, “The biggest message we're getting is it's about maintaining and making sure they don't regress.” Ms. Z, though, struggled with this guidance to simply maintain current skills and wanted to push her students harder:

At first I was thinking, am I continuing to push them along? Or am I just making sure they keep what they've had this far?... I just feel like, you know, we were towards the finish line, so we have done a lot already. But I still had a few more things that I wanted to get to. And so how much is it fair for me to try that?

She describes this as an equity issue- is it “fair” for her to put these expectations on her students under these conditions? Was it fair when there was a dramatic difference in the availability of adult support in each students’ home? Ms. Z spoke at length about this dilemma. She believed that she needed to push her students into new challenging content and continue to give them complex problems. However, she did not know how to support them through that challenge when she was not present with them—how to “catch” them as they struggled with new content.

Student Engagement

In her classroom, Ms. Z used discussion as a key element in mathematical pedagogy. Students discussed mathematical problems in whole group, pairs and in small groups. If students needed time to process, Ms. Z would have them “turn and talk” to a partner. This kind of student-to-student discourse seemed to disappear in ERT. Ms. Z shared,

I think that's what we are struggling with the most is that in class, we had that peer support constantly. They were always allowed to work with partners if they wanted to. And now all of a sudden for math, there's no one to turn and say, are you doing this today? Are you getting this? What are you going to do? So the ones who need that sort of validation, they're not getting it anymore because it used to be from each other. And now that's gone.

Ms. Z noted that in all forms of online instruction she had tried—synchronous Zoom lessons, asynchronous FlipGrid and Google Slides— students were sharing their strategies and commenting on the strategies of others at much lower rates than in the physical classroom. She noted that this was getting slightly better over the course of the spring, but still not close to the level of buzz and conversation that was in her math classroom pre-closure. This became a focus for her planning for the fall of 2020.

Student Independence and Self-Regulation

Online instruction, both synchronous and asynchronous, demands organizational and planning skills that were a challenge for many of her students. Ms. Z had worked hard with her students on what she called “independent skills.” These skills involved both executive functioning and emotional self-regulation. For example, she taught students who got frustrated during mathematics to recognize their own frustration and take a break. Those breaks, for one particular child, were now a normal part of the school day. The child was able to decide when they needed a break, rather than the adult monitoring the situation. As she watched her students transition to learning at home, Ms. Z noticed them becoming less independent and not applying these skills to their learning at home. She told about a boy who had been independently taking breaks when he needed them during school,

One of my kids who's brilliant. He is so amazing. But like the wall right now between us is, I can't provide that structure that he needs . . . He needs constant emotional check in. And mom called me one day in tears because she's like, he's really hard to work with. And I'm like, yeah, I'm like, but he needs a break. So why does he need breaks? He's so far behind, he should get less breaks. And I'm like, No, no, it's okay, uh also he's home. So it's fine. Those are the walls.

This quote is where the title of the paper comes from, providing a metaphor for distance learning creating walls between teachers and students. Those walls might be different for each child. Structure in this case refers not simply to rules, but to self-understanding. The structure she envisions at home is for the child to have opportunities to develop self-understanding as a learner (When I am frustrated, I need to take a break), as well as learning when and how to use these strategies, not when told. Structure is a system that helps the child understand themselves and self-regulate, not a rigid external structure that tells the child how to be.

Ms. Z spoke about these issue at length. She did not blame the parents but analyzed the situation as a failure of communication on her part. She said that she had never discussed these strategies with families, and planned to do much more in the future, communicating what self-regulation strategies were effective,

Even some of my kids who are independent, and I've taught them how to self-regulate, and take their own breaks when they need it . . . that's been like a big like eye opener as far as a good thing, I think. How much I need to make parents aware that I really work on independent skills.

She noted that she would work on this in the fall of 2020.

Ms. Z described several issues with students who were being given too little independence in their learning at home. She described one particular student whose family member attended all the child's Zoom meetings. Another's work had changed significantly since the move to home, and she believed he was having the work done for him to a significant degree. For Ms. Z, this connected to her conviction that families (and teachers) should put more faith in the children; she noticed that there was a lack of trust from families that the students could do the work independently without intensive adult support. This disconnect led her to wonder how she could foster better communication between her classroom and her students' families.

Discussion

Using data from a case study of a special education teacher and her mathematical pedagogy during ERT, we notice that the issues that emerged went beyond the content of mathematics. Ms. Z particularly needed to consider student engagement, including students' emotional states while solving mathematics problems. Ms. Z needed to make the mathematical content she sent home accessible and multimodal. And her greatest concern was her students' strategic development, particularly their self-regulation strategies. These findings align well with the three dimensions of learning in UDL. We use UDL as a lens to analyze these findings, and to begin to discuss the implications for teachers planning distance learning for this fall as well as in the future.

Representation

Representation is a learning dimension that encompasses the organization and presentation of content material, particularly accessibility. This was a concern for Ms. Z, particularly around the reading levels of her students and for students who were working without

adult support. She recorded directions for packets in videos, as well as adding read-aloud to every problem in the set of slides. She also built pauses into those recordings, allowing time for students to process and encouraging visualization. By keeping contexts consistent (the series of problems around her keeping rabbits as pets), she is supporting her learners as well to understand the content.

Engagement

The dimension of engagement includes students' emotional state and motivation to learn. It also involves student engagement in collaboration and discourse. Ms. Z's initial goal was making sure that students were safe, felt safe, and were ready to engage in learning. Ms. Z had a small class size and had students for multiple years, so she already had strong relationships with families. She spent time having student-run Zoom meetings where students shared. As the closure continued, she spent time in conversation with the majority of her students and their families, with an exception of some students and families that did not respond to many attempts at communication. She invited students to have one on one Zoom sessions with her, and had multiple students who asked for that time, some as often as four times a week.

Engagement intersected with mathematical content in her concern about balancing productive struggle with student "meltdowns." At the time of the last interview, this was still unresolved, as she did not know how to push her students to the perfect spot of struggle, while watching carefully for signs that they were too frustrated. It seemed impossible to replicate the in-person dynamic on-line. But it also gives us clues as to what a skilled teacher like Ms. Z does in person to encourage children to take mathematical risks. In addition to creating an environment in which they spoke frequently about what mathematicians do (solve problems, try multiple solutions, take time to solve problems), she also watched her students carefully as they

worked, particularly watching for emotional reactions to the mathematics. When one of her students needed support to stay engaged, she provided just in time support for them: a conversation, a check-in, a suggestion to work with a partner, take a break, or try drawing out a solution. She also provided one on one Zoom meetings for students who asked for it.

Finally, she was concerned about student to student engagement in mathematical discourse. Again, this was not yet resolved at the end of the spring. Ms. Z believed that students needed space to talk through their thinking with peers and had yet to find a way to do that virtually that engaged all her students.

Strategic Action

Strategic action includes student planning, expression, and self-regulation. A challenge for many students in her class was executive functioning, including self-regulation. Ms. Z worked on these skills with each of her students. She focused on developing their skills with the aspects of self-regulation that they needed individually. For some students that was taking breaks, for others it was finding a way to talk with peers as they thought through a problem. She create a culture within her class in which students made choices that worked for them. She found that this aspect of her classroom was very challenging to transfer into the digital realm. In fact, this is when she named “the wall between us”, noting that she felt that there was a wall between her and each of her students, a wall that made it challenging for her to reach them. As her students worked at home, she saw their independent skills seemingly diminish, in most cases, although there were exceptions. She believed that this was due to her lack of communication with parents about these strategies.

Conclusion

It is unfair to compare ERT with typical distance learning, as ERT was unplanned, and suddenly imposed on millions of children and teachers. Research in distance learning suggests potential for students with LD and ADHD, but is typically chosen by students and families, and is also far more studied for older students. Ms. Z noted that this way of teaching did not feel equitable for her students. She was unable to reach some students and felt that some students were losing gains that they had made in school, particularly around their self-regulation skills. At the same time, a few students seemed to thrive in the new online setting.

The purpose of ERT was to continue schooling during a pandemic in which it was unsafe to be in schools together. At the time of writing, schools in CA are almost completely distance learning. Ms. Z will be teaching online this fall as well. What implications does this case study hold? As we enter the fall of 2020, discourses of learning losses and gaps in math focus on these students, mandating remediation rather than meaningful mathematics engagement. Interventions that do not account for emotional factors could result in compounding educational trauma.

First, we must begin with relationships. Much of Ms. Z's work was built on strong emotional bonds that she had years to develop with her students. Teachers who do not have the benefit of multiple years with students, as is the case with many special education self-contained classrooms, must build relationships with their students so that they can feel safe enough to learn, to engage, and to take mathematical risks. In distance education, students are in the driver's seat of their own education. Motivation and relationships will be critical in engaging them.

Second, all teachers need to make sure that digital materials are accessible. That includes inclusion and general education classrooms, which also have students with a range of reading levels. Multiple modalities should be the central focus to increase accessibility. All text should

be accompanied with audio or video recordings of the content. Students will be supported by video introductions to asynchronous problem sets. Videos should also be captioned, which supports Deaf students as well as those learning the language of instruction. These supports are particularly necessary for the students who both have disabilities and may lack adult support during distance learning; we must provide material that is accessible for all students during this time.

Third, we need to build collaboration between home and school around self-regulation and executive functioning strategies. ERT created an opportunity for the teachers to see their students in a new light: their home environment. By witnessing students working at home, interacting with family members, Ms. Z realized that not all of the work they had been doing in the classroom was being communicated to the home, particularly that work that was outside of academic subjects, such as self-regulation strategies. As teachers plan distance learning, including specific planning for self-regulation and executive functioning will also be important. Learning rigorous mathematics for all students, but particularly for those with LD/Dyslexia and/or ADHD, involves teaching students skills to manage their own work and understand themselves as math learners. It involves more than just content and should be included in planning for the fall.

Finally, we urge scholars to collect more narratives, particularly those from students, on the “walls between us.” What made this experience better for some children? What benefits might emerge as families and teachers must work more closely? How can we support students and teachers emotionally with this shift? Only through sustained inquiry on the perspectives of teachers, families, and students can we identify these walls and work to dismantle them.

References

- Annamma, S. A., Boelé, A. L., Moore, B. A., & Klingner, J. (2013). Challenging the ideology of normal in schools. *International Journal of Inclusive Education*, 17(12), 1278–1294.
<https://doi.org/10.1080/13603116.2013.802379>
- Attree, E. A., Turner, Mark. J., & Cowell, N. (2009). A virtual reality test identifies the visuospatial strengths of adolescents with dyslexia. *CyberPsychology & Behavior*, 12(2), 163–168.
<https://doi.org/10.1089/cpb.2008.0204>
- Baglieri, S., Valle, J. W., Connor, D. J., & Gallagher, D. J. (2011). Disability Studies in Education: The need for a plurality of perspectives on disability. *Remedial and Special Education*, 32(4), 267–278. <https://doi.org/10.1177/0741932510362200>
- Bogdan, R., & Biklen, S. K. (1997). *Qualitative Research for Education*. Boston, MA: Allyn & Bacon.
- Carpenter, T. P., Fennema, E., Franke, M. L., Levi, L., & Empson, S. B. (2000). *Cognitively Guided Instruction: A Research-Based Teacher Professional Development Program for Elementary School Mathematics*. Research Report. <http://eric.ed.gov/?id=ED470472>
- Carpenter, T. P., Fennema, E., Franke, M. L., Levi, L., Empson, S. B., & Lindquist, M. M. (1999). *Children's mathematics: Cognitively guided instruction* (2 edition). Heinemann Press.
- Eligio, U. X. (2017). *Understanding emotions in mathematical thinking and learning*. Academic Press.
- Everatt, J., Weeks, S., & Brooks, P. (2008). Profiles of strengths and weaknesses in dyslexia and other learning difficulties. *Dyslexia*, 14(1), 16–41. <https://doi.org/10.1002/dys.342>

- Foote, M. Q., & Lambert, R. (2011). I have a solution to share: Learning through equitable participation in a mathematics classroom. *Canadian Journal of Science, Mathematics and Technology Education*, 11(3), 247–260. <https://doi.org/10.1080/14926156.2011.595882>
- Greer, D., Rowland, A. L., & Smith, S. J. (2014). Critical Considerations for Teaching Students With Disabilities in Online Environments. *TEACHING Exceptional Children*, 46(5), 79–91. <https://doi.org/10.1177/0040059914528105>
- Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). *The Difference Between Emergency Remote Teaching and Online Learning*. <https://medicine.hofstra.edu/pdf/faculty/facdev/facdev-article.pdf>
- Jackson, H. G., & Neel, R. S. (2006). Observing mathematics: Do students with EBD have access to standards-based mathematics instruction? *Education and Treatment of Children*, 29(4), 1–22.
- Kurz, A., Elliott, S. N., Lemons, C. J., Zigmond, N., Kloo, A., & Kettler, R. J. (2014). Assessing opportunity-to-learn for students with disabilities in general and special education classes. *Assessment for Effective Intervention*, 40(1), 24–39. <https://doi.org/10.1177/1534508414522685>
- Lambert, R., Chun, M., Davis, J., Ceja, K. L., Aguilar, K., Moran, P., & Manset, L. (2019). “My Dyslexia is Like a Bubble”: How Insiders with Learning Disabilities Describe Their Differences, Strengths, and Challenges. *Learning Disabilities: A Multidisciplinary Journal*, 24(1), 1–18. <https://doi.org/10.18666/LDMJ-2019-V24-I2-8765>
- Lambert, R., & Tan, P. (2017). Conceptualizations of students with and without disabilities as mathematical problem solvers in educational research: A critical review. *Education Sciences*, 7(2), 51–69. <https://doi.org/10.3390/educsci7020051>
- Lambert & Imm, in preparation

Lambert, R. (2020). Increasing access to Universally Designed mathematics classrooms.

Ztanford, CA: PACE. <https://edpolicyinca.org/publications/increasing-access-universally-designed-mathematics-classrooms>

Lambert, R., & Tan, P. (2020). Does disability matter in mathematics educational research? A critical comparison of research on students with and without disabilities. *Mathematics Education Research Journal*, 35, 5–35. <https://doi.org/10.1007/s13394-019-00299-6>

Lambert, R., & Sugita, T. (2016). Increasing engagement of students with learning disabilities in mathematical problem-solving and discussion. *Support for Learning*, 31(4), 347–366. <https://doi.org/10.1111/1467-9604.12142>

Lambert, R., Sugita, T., Yeh, C., Hunt, J. H., & Brophy, S. (2020). Documenting increased participation of a student with autism in the standards for mathematical practice. *Journal of Educational Psychology*, 112(3), 494–513. <https://doi.org/10.1037/edu0000425>

Linton, S. (1998). *Claiming Disability: Knowledge and Identity*. NYU Press.

Lee, J. (2020). Mental health effects of school closures during COVID-19. *The Lancet Child & Adolescent Health*, 4(6), 421. [https://doi.org/10.1016/S2352-4642\(20\)30109-7](https://doi.org/10.1016/S2352-4642(20)30109-7)

Lynch, S. D., Hunt, J. H., & Lewis, K. E. (2018). Productive Struggle for All: Differentiated Instruction. *Mathematics Teaching in the Middle School*, 23(4), 194–201.

Meyer, A., Rose, D. H., & Gordon, D. T. (2014). *Universal design for learning: Theory and practice*. CAST Professional Publishing. <http://udltheorypractice.cast.org/>

Moscardini, L. (2014). Developing equitable elementary mathematics classrooms through teachers learning about children's mathematical thinking: Cognitively Guided Instruction as an inclusive pedagogy. *Teaching and Teacher Education*, 69. <https://doi.org/10.1016/j.tate.2014.06.003>

- Murders, M. (2017). A Phenomenological Study of the Online Education Experiences of College Students with Learning Disabilities. *Theses and Dissertations*.
<https://scholarworks.uark.edu/etd/2518>
- Nelson, J. M., & Harwood, H. (2011). Learning Disabilities and Anxiety: A Meta-Analysis. *Journal of Learning Disabilities*, 44(1), 3–17. <https://doi.org/10.1177/0022219409359939>
- Nieminen, J. H., & Valtteri Pesonen, H. (2020). Taking Universal Design Back to Its Roots: Perspectives on Accessibility and Identity in Undergraduate Mathematics. *Education Sciences*, 10(1), 12. <https://doi.org/10.3390/educsci10010012>
- Patel, K. (2020). Mental health implications of COVID-19 on children with disabilities. *Asian Journal of Psychiatry*, 54, 102273. <https://doi.org/10.1016/j.ajp.2020.102273>
- Rice, M., Ortiz, K., Curry, T., & Petropoulos, R. (2019). A Case Study of a Foster Parent Working to Support a Child with Multiple Disabilities in a Full-Time Virtual School. *Journal of Online Learning Research*, 5(2), 145–168.
- Rose, T. (2017). *The End of Average: Unlocking Our Potential by Embracing What Makes Us Different* (Reprint edition). HarperOne.
- Schatz, D. B., & Rostain, A. L. (2006). ADHD With Comorbid Anxiety: A Review of the Current Literature. *Journal of Attention Disorders*, 10(2), 141–149.
<https://doi.org/10.1177/1087054706286698>
- Satterfield, D., & Kelle, S. (2017). Ethical Issues in Online Education. In T. Z. Ahram & W. Karwowski (Eds.), *Advances in The Human Side of Service Engineering* (pp. 257–266). Springer International Publishing. https://doi.org/10.1007/978-3-319-41947-3_24
- Schuck & Lambert, in preparation

Serianni, B. A., & Coy, K. (2014). Doing the Math: Supporting Students With Disabilities in Online Courses. *TEACHING Exceptional Children*, 46(5), 102–109.

<https://doi.org/10.1177/0040059914528330>

Smith, S. J., Burdette, P. J., Cheatham, G. A., & Harvey, S. P. (2016). Parental Role and Support for Online Learning of Students with Disabilities: A Paradigm Shift. *Journal of Special Education Leadership*, 29(2), 101–112.

Sorensen, T. (2019). *Special Education in Idaho Virtual Schools: An Analysis of the Efficacy of Service Delivery* [Ph.D., Northwest Nazarene University].

<https://search.proquest.com/docview/2239311802/abstract/F068B45C8BDB4766PQ/1>

Walker, N. (2014). *Neurodiversity: Some Basic Terms & Definitions*. Neurocosmopolitanism.

http://neurocosmopolitanism.com/neurodiversity-some-basic-terms-definitions/?fbclid=IwAR0GIVt-wzuMIDRS-DE4k-pUJs2dLDcn4n_6t3kzLBt44GMpI2n3rha90Uc

White, H. A., & Shah, P. (2011). Creative style and achievement in adults with attention-deficit/hyperactivity disorder. *Personality and Individual Differences*, 50(5), 673–677.

<https://doi.org/10.1016/j.paid.2010.12.015>