

Bringing the home into school: Learning and connecting during the time of the pandemic

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The Covid-19 pandemic brought with it a new way of 'being' in a changed and fearful world. Aotearoa/New Zealand took a relentlessly positive wellbeing approach and in turn we share the positive outcomes which resulted for some low socio-economic schools and communities. In this article, we report on how teachers and schools explored and implemented multiple ways of engaging in productive mathematical interactions through online means. Although the digital divide caused some to only access print resources, others engaged in both synchronous and asynchronous online platforms. We draw on the responses from 24 teachers and school leaders who completed written surveys or interviews. Following the wider Government focus, schools took a well-being first approach which led to increased connections and positive home/school relationships. The results highlight how a disruptive event such as Covid-19 can also be a time to focus on strengths and gain insights. We demonstrate that while focusing on mathematics, teachers and school leaders gained deep insights related to their students' funds of knowledge and saw opportunities for learning both for students, parents, and the teachers themselves.

Introduction

The Covid-19 pandemic is something nobody in Aotearoa/New Zealand had ever experienced or expected to experience in their lifetime. As a closely connected and interconnected diverse population of people, our united choice as a small island nation has been to adapt and focus on collective well-being. Our widely accepted moral and ethical position is one which was unrelentingly positive and focused on positioning lives as more important than wealth. Within this frame, as researchers and educationalists, we have been provided with another positive opportunity; specifically the chance to reinvent how mathematics education can look outside the traditional constraints of the formal structures of schools and classrooms. Being able to reimagine and learn how mathematics teaching and learning can happen differently is particularly pertinent for Māori and Pāsifika who have been traditionally underserved in mathematics classrooms in Aotearoa/New Zealand. Māori are indigenous to New Zealand, while Pāsifika people, as close cousins are a multi-ethnic, heterogeneous group of people that includes

those who identify themselves with the cultures of Samoa, Tonga, Cook Islands, Niue, Tokelau, Fiji, Solomon Islands, Tuvalu, and other Pacific Island countries (Anae, Coxon, Mara, Wendt-Samu & Finau, 2001).

For too long Māori and Pāsifika learners within Aotearoa/New Zealand have had low levels of mathematical achievement. This directly reflects the structural inequities many of these learners encounter in Aotearoa/New Zealand schools. The reasons are many, but one key reason can be attributed to the further increased cultural and ethnic heterogeneity in classrooms in the 21st century. This has compounded the long reaching negative effects of colonisation and further emphasised the urgent need for teachers to engage with students whose home lives and context differ hugely from their own. Rubie-Davies (2016) describes how these cultural mismatches create cultural misunderstandings and construction of deficit perspectives. In the past we have drawn on culturally sustaining (Paris, 2012) and strength based approaches (González, Moll, & Amanti, 2005; Hunter & Hunter, 2018) to support teachers to successfully engage in these poly-ethnic mathematics classrooms. We have done this by explicitly deepening their knowledge of the lived realities of their students' home contexts (Hunter, Hunter, & Bills, 2019). But this new novel Covid-19 pandemic environment has opened the doors on another positive opportunity—our ability to position squarely the home within the school community. In doing so, we have all become learners, researchers, school learners and teachers alike, as we grapple with working with students and their family with mathematics in a remote on-line situation. In this paper, we want to share the learnings we have all made. The question we aim to explore is; What can we learn when homes become part of the school context in terms of developing and maintaining culturally sustaining mathematics pedagogy during a pandemic?

Culturally sustaining mathematics pedagogy

Culturally sustaining mathematics pedagogy (CSMP) is a form of teaching long supported by multiculturalists (e.g., Banks & Banks, 2009; Nieto & Bode, 2011) because it supports an education system that is both culturally diverse and equitable. Johnson (2014) describes this as an education system which at its core has a curricula which is culturally

responsive and with corresponding appropriate pedagogical and assessment practices. These are organised so that interactions are facilitated across racial and ethnic lines where every student is able to learn and achieve equitably. The way in which we view culturally sustaining pedagogy builds on the seminal work of Gay (2002, 2010) and Ladson Billing (1993, 1994), related to culturally responsive pedagogy, but in doing so we embody a more dynamic and changing face of culture.

Shifting the view of culturally responsive pedagogy to CSMP allows us to reframe it as an asset-based pedagogy. This perspective supports us to sustain “linguistic, literate and cultural pluralism as part of the democratic project of schooling and as a needed response to democratic and social change” (Paris & Alim, 2014, p. 88). Inherent within this perspective are beliefs related to empowerment of the whole community involved within our mathematics classrooms. Within notions of empowerment the development of relationships and trust are of paramount importance. Many articles (e.g., Bonner, 2014; Civil & Hunter, 2015; Hodge & Cobb, 2016; Powell et al., 2016) show how shared power based relationships are developed through these. In this article, we consider empowerment and power sharing as not only being related to the students and the wider collective of community members but also teachers, and school leaders. One of our aims will be to explore the way in which the building of relationships and trust across the whole collective occurred and how power sharing developed as students, their families and their teachers engaged in mathematics.

Developing respectful reciprocal relationships and drawing on cultural values and experiences

A key aspect of culturally sustaining pedagogy is the development of respectful reciprocal relationships between educators, students, and their families and communities. Research literature both from within New Zealand and internationally (e.g., Averill, 2012; Bonner, 2014; Hunter et al., 2016; Robinson, Hohepa & Lloyd, 2009) highlights both the importance of teaching that aligns with cultural values and experiences along with parental involvement in schooling.

Pāsifika people, while a heterogenous group, share a set of common values (Ministry of Education, 2013). According to the Pasifika Education Plan developed by the New Zealand Ministry of Education, the core Pāsifika values are: belonging, family, inclusion, leadership, love, reciprocity, relationships, respect, service, and spirituality. These Pasifika values parallel core Māori values such as *whanaungatanga* (sense of belonging), *kotahitanga* (oneness), *tuakana/teina* (relationships), *kaitiakitanga* (reciprocity), *whakapapa* (family lineage), *aroha* (love), *wairua* (spiritual well-being) and *hauora* (see Berryman & Eley, 2017; White, 2011). Evident in these values is the strong role of collectivism along with service and well-being. Research studies (e.g., Anthony, 2013; Hill, Hunter, & Hunter, 2019; Hunter, in press) demonstrate that these collectivist orientated values remain important to students while learning mathematics. For example, two different studies (e.g., Hill et al., 2019; Hunter, 2019) found that Pāsifika students ranked family, respect, and collectivism as key mathematics educational values important to their learning.

Meaningful mathematical learning and relationship building is strengthened when teachers incorporate the cultural contexts of their students and neighbourhood into lessons. For example, Bonner (2014) while investigating the practices of successful teachers of underserved students in the USA, found that parents and community members valued teachers who supported students to take pride in their cultural identity and retain cultural practices while learning mathematics. For example, one teacher drew on student experience and practices within a “Black church” that many attended and connected to this in the mathematics classroom with the use of music and movement. What Bonner highlighted was an important component in relationship building; teacher awareness of student and family funds of knowledge.

The theoretical framing of funds of knowledge recognises that all people and cultures have bodies of knowledge and skills which are historically accumulated, culturally developed, and support individual and household functioning and well-being (Moll, Amanti, Neff, & Gonzalez, 1992). If teachers are aware of student, family, and community funds of knowledge they can then use this to mathematize students’ lived experiences in meaningful ways. Studies (e.g., Barton, Drake, Perez, St. Louis & George, 2004; Civil &

Bernier, 2009; Monson, 2010) also show that parent involvement and engagement can have significant effect on students' mathematics achievement and dispositions. However, Barton and colleagues (2004) argue that traditional notions of 'parental involvement' need to be expanded because they are often measured from a school perspective. This means that parents (especially from minority low-income families) whose activities do resemble traditional forms of involvement, are classified in the literature as having minimal involvement. Civil & Bernier (2009) suggested that a wider view of effective partnerships between schools and families considers language, individual differences, and parental concerns, and views parents as partners in the education process.

Within the Aotearoa/New Zealand context during the Covid-19 pandemic lock-down, a study (Riwai-Couch, Bull, Ellis, Hall, Nicholls, Taleni & Watkinson, 2020) surveyed the views of parents of Maori and Pasifika primary and secondary students. The key findings were that while parents enjoyed the freedom to decide on learning content as well as how and when learning took place, many were concerned with how children would re-adapt to the structures and expectations of school when they returned. According to the parents, the primary area in need of improvement was home-school partnerships. Relevant to the study reported in this article is that "finding ways of developing such partnerships and valuing the learning that happens across the boundaries between homes and schools, seems an important step in expanding our view of what counts as quality education, making schooling more equitable, and in honouring the Tiriti o Waitangi" (Riwai-Couch et al., 2020, p. 7).

Research Context: Developing Mathematical Inquiry Communities

Developing mathematical inquiry communities (DMIC) is an evidence based comprehensive professional learning and development (PLD) model with an emphasis on equitable outcomes for *all* students (Civil & Hunter, 2015; Civil et al., 2019; Hunter et al., 2018). Set in Aotearoa/New Zealand DMIC PLD utilizes culturally sustaining pedagogy within ambitious teaching (Kazemi, Franke & Lampert, 2009) and complex instruction (Featherston et al., 2011). Within this model, systematically marginalised students (e.g. Māori, Pāsifika and other diverse students) are positioned to have

opportunities to learn mathematics with deep reasoning using a range of mathematical practices (Hunter & Anthony, 2011). Mixed ability rather than streamed groups are used as being culturally appropriate for our Māori and Pāsifika learners (Hunter & Hunter, 2018; Hunter, Hunter & Anthony, 2020). Other research (e.g., Alton-Lee et al., 2011; Hunter et al., 2019; Hunter, Hunter, & Restani, 2020) also shows that student wellbeing, cultural identity, mathematical identity, motivation, and self-esteem have been enhanced by engaging in learning mathematics in DMIC classrooms. DMIC focuses on building collaborative learning communities across and within schools and classrooms, and with groups of teachers and teacher educators.

Methodology

The data included in this study is from a larger study examining the experiences of mathematics teacher educators, mathematics teachers, and school leadership during the Covid-19 pandemic lock-down period in Aotearoa/New Zealand. To understand the context of the lock-down within Aotearoa/New Zealand, we begin with a brief timeline of the pandemic. Our first case of Covid-19 was reported on February 28th, 2020. By March 21st 2020 with a rising number of cases, a four level alert system was introduced by the Aotearoa/New Zealand Government to help combat Covid-19. On March 23rd 2020 with over 100 cases and evidence of community transmission, New Zealand moved to a higher alert level 3 and educational facilities were closed. At midnight on March 25th 2020, the country moved into the highest alert level 4 and all non-essential businesses closed with people instructed to stay at home for a minimum of a four week lock-down period. New Zealand schools were closed from March 25th 2020 until a partial reopening when the country moved to alert level 3 on April 28th 2020. Approximately 5-10% of students returned to school. The full reopening of schools occurred on the 18th of May 2020 after the country moved to alert level 2.

In this article, we focus on the responses of 24 primary school educators as they reflect on their experiences during the Covid-19 pandemic lockdown in Aotearoa/New Zealand. This included 19 teachers and five principals/deputy principals who volunteered to participate from an email invitation sent to their school. The majority of these educators

(n = 18) were from urban schools in low socio-economic areas which have high numbers of Pāsifika and Māori students. Another group (n = 6) taught at schools in rural locations with a range of students from different socio-economic backgrounds but including a significant percentage of Māori students. Data was collected through audio-recorded interviews or written responses to 14 interview questions. These questions focused on how they connected with students and their families, how they enacted mathematics teaching and learning over the lock-down period, and the learning that resulted from this experience. Data was also collected from 14 mathematics teacher educators who support the delivery of DMIC PLD in schools. While these responses are not the focus of this paper, we used their responses to confirm and support the insights gained from the primary school educators.

In the first instance, interview responses were transcribed and annotated to identify initial themes. A grounded theory approach (Strauss & Corbin, 1994) was then used to develop codes that described patterns as they emerged from the data. To ensure reliability of the coding, two researchers coded the data independently and then cross-checked the analysis. The research team engaged in discussions of the coding and for instances where there were contradictions, a discussion was undertaken between the research team so that a consensus was reached. Insights gained from the interviews and questionnaires are presented in the following sections.

Findings and Discussion

We begin by presenting the themes from the interviews with teachers and school leadership which related to how they provided mathematics support to the homes. Our first focus is on how teachers and schools worked to provide mathematics resources to their school communities in order to ensure equitable access. We then show how their actions in privileging the well-being of their students led to opportunities for greater connections and relationships and learning for all in regards to mathematics education.

Providing equitable access to resources

A clear digital divide in relationship to who has access to devices and connectivity is well documented within Aotearoa/New Zealand. Rewai-Couch and colleagues (2020) describe the inequities of access are most evident for Māori and Pāsifika living in low socio-economic communities. This is something our educators who work in these high poverty schools were aware of and so their initial action was to proactively ensure that their students were provided with culturally sustaining mathematics activities at home. Nearly half (n = 11/24) of the school educators recounted how they supplied their school community with hard copy home learning packs. For example, a deputy principal described how they worked quickly during the short window before the lockdown began stating: *two staff looked after the children and the rest of the staff made home packs so every single child had a home pack for them.* Schools used various means to distribute the packs including asking parents to pick these up from school to teachers delivering them to homes of students. This illustrated that they knew their community well and in providing hard copy packs of appropriate culturally relevant mathematical and other material, in recognition of the lack of digital access (which was being promoted as the education platform for lockdown), they showed their deep concern and support.

The New Zealand Ministry of Education, also conscious of a digital divide couriered to learners home learning packs where needed. Although all the teachers were appreciative of this effort they expressed a range of concerns. To begin, they suggested that the resources would not adequately cater to their students' cultural identities. One school leader stated that although the packs were largely developed for Māori and Pāsifika students they had generic content. Others (n = 10/24) alluded to the difficulties for a centralised agency: *without knowing the cultural identities of our students and community* to cater specifically for diverse groups of learners. This provided them as teachers the opportunity to recognise just how important were culturally relevant tasks and why centralised generic ones would not suffice. As one teacher reflected: *it makes you understand equity and access to the curriculum and resources that support learning.* Their concerns showed their awareness of what Moll and colleagues (1992) describe as family funds of knowledge. These teachers were aware that there were across culture

connections but also that families functioned individually with their own historically accumulated funds of knowledge. As Bonner (2014) suggests, this provides a key aspect of relationship building; teacher awareness of their student's funds of knowledge. Inherent in affirming student funds of knowledge is the support it provides to their well-being.

From a well-being orientation to building relationships

Throughout the lock-down, the well-being of the community was a clear focus of leadership and teachers. They all described how they recognised the need for them to take a holistic view of the well-being of both students and families, before considering mathematics teaching. For example, one principal stated: *pastoral care for the community has been a real worry before worrying about the curriculum or academics. A big focus on the well-being of the family rather than the individual child.* Forms of pastoral care included schools providing food packages to families in the few days before the lockdown began. Every participant described reaching out to connect with parents and families in supportive ways. They drew on multiple modes of communication to ensure that they stayed connected with whanau (family), with half of them (n = 12/24) describing how they used phone calls, text messages, email, and social media platforms such as Facebook and even TikTok to connect with their school community.

Well-being rather than education stayed foremost and they were cognisant that this was a stressful and anxious time for many families: *I had to step back and realize that everyone was going through times at the moment and I didn't know what was going on for each family.* More than half of participants (n = 16/24) referenced a personal or school-wide philosophy that there was no expectation that students had to complete work or engage with online mathematics material. As one teacher stated, this approach of connecting, supporting, and prioritising well-being meant: *that most families have kept an open line of communication with us. No one feels bad if all they got done that week was one maths challenge or only just managed to get to the whole class zoom.* The teachers and schools actions to ensure well-being could best be described as encompassing the Māori concept of *hauora*. As they attended to the physical, mental and emotional, social

and spiritual well-being of their communities they brought a strengthened relationship through bringing the home into the school. This goes some way towards what Barton and colleagues (2004) argue for in changing the school-home partnership.

By positioning student and whanau well-being at the centre, we argue that the Covid-19 pandemic lock-down in Aotearoa/New Zealand provided an opportunity to develop stronger relationships between students and their whanau and teachers and schools. As Riwai and colleagues (2020) argue, relationships are a key component needed to build a shared power relationship between homes and schools. All school participants (n=24) recognised the valuable opportunities the pandemic provided them with to build these shared relationships. They stressed the importance of initial and ongoing contact as they were brought into their students' homes through multiple means. This clearly showed that foundations for new ways of engaging across the school and home community were possible. Once the immediate well-being needs of the community were addressed, the teachers were then able to turn their attention to mathematical learning, again in a new space where they needed to go into their students' home through remote means.

Opening spaces for mathematics learning

Despite the challenges that the pandemic had brought to schools and communities, there was a sense that they all wanted to continue with professional learning and sustain changes they were making in the school setting: *everyone wants to keep going with DMIC and no one wants to give it up*. The pause that Covid-19 bought was seen as a time to keep moving forward but with: *a feeling of urgency to make necessary changes to the way we deliver, but not what we deliver*. The teachers also reflected Covid-19 had challenges but also gave them opportunities to strengthen connections.

As a way to allow the new forms of mathematics pedagogy to continue in the homes, the DMIC teacher educators provided each school with a set of cognitively demanding mathematical tasks which matched the lived reality of the students' home world. These tasks were designed to fit with not only Māori and Pāsifika learners from the different Pacific nations group but also other marginalised students in Aotearoa/New Zealand. They were designed so that whanau members could work together on them through

drawing on their collective funds of knowledge (Moll et al., 1992) and mathematising it. Teachers used these as either independent mathematics tasks or as teacher led tasks in online teaching and learning sessions. The teacher educators interviewed (n=14/14) all noted how positive this was for the teachers. As one said:

A lot of teachers commented on what good problems looked like. They could see how math could be reflected through a cultural lense. We had so many teachers... praising how we have supported our teachers with tasks that the students can use during lockdown.

Clearly, the tasks supported the teachers to maintain culturally sustaining (Paris & Alim, 2014) mathematics pedagogy in these trying times.

Although the teachers used the tasks provided, the teachers (n=12/24) also noted how parents were not always reliant on school-provided mathematics tasks. They described how families utilised other day-to-day activities to support mathematics learning. These included cooking but also outdoor chores, or fixing things. As a parent explained to a teacher:

He's set up a firewood business with his cousins next door. They are collecting pine cones and he's chopping kindling...it covers maths, working out the sales figures...and working out marketing/business plan

Another teacher said: *One boy has been learning how to mix petrol and oils for his motorbike.* It is clear that the teachers were being directly exposed to, and learning about, their student's funds of knowledge (Moll et al., 1992) within mathematics. As Barton and colleagues (2004) explained, parental involvement can impact significantly on both mathematical achievement and disposition. Being taken into the homes also changed the home school partnership as teachers learnt the extent of parental knowledge of mathematics in their home settings. Civil and Bernier (2009) argue that this is needed if parents are ever to be viewed as true partners in the education process.

Taking mathematics into homes through digital means

Although the digital divide caused some students to be inaccessible to teachers and schools, many schools were able to obtain and deliver IT equipment and others were already online schools. Where online mathematics teaching and learning was possible the teachers used a range of different ways of bringing the families into mathematics learning. Most commonly, teachers used Google classroom ($n = 16/24$) or for synchronous teaching Zoom ($n = 15/24$) or Google meet ($n = 6/24$). For many teachers, the quickly evolving situation meant that they themselves had to upskill at speed. For example, one of the teachers recalled: *I had to learn Zoom myself, I didn't even know what Zoom was seven weeks ago so the logistics of the technology.* This illustrates the level of commitment these teachers had to their students. Not only were they engaging in, and committed to, a new form of mathematics pedagogy which was challenging for many of them, but now they were further challenged by the need to use remote teaching and learning skills. Māori and Pāsifika values situated within a collectivist society positions service to others before self (Anae et al., 2001) as foremost. Clearly, this was being enacted by teachers to their community.

For both asynchronous and synchronous forms of online teaching, the educators ($n = 9/24$) spoke of the need to provide students with different means and ways of sharing their thinking. This included photos of students' solution strategies, videos of students explaining their mathematical thinking, threads or chat functions, and online whiteboards or annotation tools. This supported the continued focus on developing a range of mathematical practices. One teacher described his continued focus on mathematical practices as: *pressing kids to generalise and think about whether solutions would work for other problems. But it's necessary to have done this prior to the lock-down and have it already established.* Over the past decade these researchers (e.g., Anthony & Hunter, 2011; Civil & Hunter, 2015; Hunter et al., 2018) have shown the importance of maintaining focus on developing mathematical practices with Māori and Pāsifika learners as a clear equity issue. They describe the need for students to have opportunities to work collaboratively in order to develop the reasoned collaborative discourse inherent in mathematical practices.

For synchronous online mathematics lessons, teachers explained how they continued to use challenging contextual tasks and support students to work together collaboratively with others. A number of teachers ($n = 6/24$) specifically identified the affordances of the break-out rooms in Zoom. However, teachers ($n = 8/24$) also described the importance of pre-existing relationships between students and the norms that had been developed in the classroom in relation to working together. For example, one teacher reflected: *because the norms are already established, it was easier to transfer this over to a digital environment.* Another teacher explained that having embedded interaction norms was: *easier to work in a virtual way with this. If I see kids just have written answers I say “hey remember I want to see your justification because remember good mathematicians justify their answer” ... “we’re thinking like mathematicians so we act like mathematicians and that’s what it looks like”.* Although this teacher was working in an asynchronous form of online teaching it was evident from her statement that she continued to expect ambitious forms of mathematics as described by Kazemi and her colleagues (2009). Within this online form of mathematics pedagogy all the students continued to learn and do mathematics in ways which deepened their understandings.

An important aspect of being able to work collaboratively and develop productive talk are the social norms constructed in classrooms. In an online environment new norms were needed and so some teachers ($n = 6/24$) described the introduction of either new norms or adaption of existing ones to manage the virtual environment. For the most part, this involved the use of reaction tools or hand signals to maintain a flow of conversation and sharing ideas: *without speaking over each other and glitching the internet.* A principal described how teachers developed hand signals for students to indicate: *I have a question, I agree, I have something to add on.* In the classroom situation Hunter and Anthony (2011) describe the carefully considered approach teachers need to take to develop these social norms to ensure that all their Māori and Pāsifika students engage confidently. Here the teachers have continued to carefully consider the importance of these social norms.

Changing from ability grouping to mixed ability grouping is a central but challenging part of DMIC (Hunter & Hunter 2017; Hunter, Hunter & Anthony, 2020). The teachers and

leadership had opportunities to consider how this might work in an online community when multiple members of whanau were alongside students. A principal recounted her teachers discussing whether collaborative groups could be used: *I said “well we always talk about mixed ability groups, and when they have got older siblings around, in a way that is a mixed ability group”*. Many teachers reflected positively on the way in which parents and other household members joined in and interacted during Zoom sessions. Riwai-Couch and colleagues (2020) when they surveyed views of Māori and Pāsifika parents reported that many described a need for changes in boundaries between home and school. We would argue that this was happening and mathematics is being used here as a tool to achieve it.

Growing relationships through changing the boundaries

Overall, most school participants (n = 18/24) viewed synchronous online mathematics lessons and the learning students were undertaking at home as an opportunity for relationship building. Notable to the teachers and school leadership (n = 16/24) was how engaged parents and family were in their children’s learning: *Having parents working alongside their children during teacher-led lessons on Zoom is great. We are hearing really rich conversations and seeing parents actively supporting learning*. Covid had given the school educators opportunities to see how whanau members’ interactions around mathematics took place in the homes. Mathematics discussions became a balanced power sharing activity as everyone engaged together and brought alive what Paris and Alim (2014) describe as asset based pedagogy.

Many teachers (n=16/24) positively affirmed the warmth of the welcome as they went online into homes and the learning this provided them about their students: *They love maths and especially doing it with their family. We have been welcomed into the homes of our whānau and have learned about real-life for them*. This statement illustrates the way in which the teachers were given opportunities to walk in the world of their students and develop a different and more real partnership. This could be seen as what Riwai-Couch (2020) proposed, in calling for a different form of home-school partnership.

Teachers (n=12/24) were also provided with opportunities to appreciate the warmth of the relationships they observed between family members: *It is also very special to see those relationships between parent and child working during Zoom workshops. We don't normally get to see that.* Another said: *How engaged some of our fanau (families) are in their children's learning! I'm not sure if this is a new thing or has gone under the radar.*

Others (n = 5/24) described the importance that their school communities placed on mathematics. For example, one principal stated: *Maths would be one of the most popular zoom sessions. It shows parents place a lot of value on maths.* Here we see evidence that bringing the home into the school context provides critically important opportunities to counter the deficit views many school educators construct. These often occur through what Rubie-Davies (2016) describes as cross cultural misunderstandings. Hunter et al., (2019) has shown previously the value of combating deficit thinking because it has a direct link on changing teacher expectations. They show how this results in higher mathematics achievement for Māori and Pāsifika learners.

Observing families working together further changed some teacher's views of their students. The independent and online learning for mathematics during the lock-down period provided them opportunities to learn about their student's mathematical dispositions. Five teachers described how they provided students with choices in relation to difficulty of mathematical task levels. As one noted: *most students chose the more difficult ones.* This led to two teachers commenting that the students were more capable than they thought: *they know way more maths than I thought they did.* Other teachers (n = 5/24) described how students were able to manage their own mathematical learning at home and show resilience: *they are actually pretty resilient, they have just gone on with it.* Again, these teachers were acknowledging their own lower expectations constructed in our poly-ethnic classrooms. Despite being involved in a culturally sustaining mathematics professional learning and development programme deficit expectations often prevail. However, with the importance placed on family and collectivist norms inherent in the Māori and Pāsifika values (e.g., Anae et al., 2001; Berryman & Eley, 2017; Hill et al., 2019) they might instead have expected to see these supportive and mathematically nourishing environments.

Other learnings for the teachers occurred as they did on-line mathematics teaching and learning with their students. They all described the proactive nature of the parents in supporting their children's learning. However, bringing the home into the school context taught many of them (n=18/24) that their assumption that they had taken the parents on a journey of change within mathematics teaching and learning was erroneous. The school partnerships remained traditional which Civil and Bernier (2009) describe as needing to change. They described how initially parents often sat alongside their children and stressed rote use of basic facts and procedures. As one commented:

Some parents have found it hard to work on our maths problems – saying “maths isn't like it used to be”. This isn't meant in a bad way and the same parents have really enjoyed learning alongside their children. Mostly the parent sits with the student and works alongside. We can hear the parents encouraging the students to solve the problems and share thinking.

However over time, as greater balances developed in the partnership many (n=14/24) describe the shift in parents' perceptions of what it meant to learn and do mathematics successfully. They noted that they adapted quickly to this different form of mathematics as they adopted different expectations of what was expected of them all in the tasks:

They quickly adapted to realising that the students were going to need to explain the strategy so just working it out for them or using a calculator was not going to suffice.

Mathematical talk and mathematical practices gained focus and teachers were provided with opportunities to see possibilities for new shared understandings with parents about the nature of what it means to learn and *do* mathematics. Developing the form of more effective partnerships promoted by Civil and Bernier (2009) became possible.

More effective partnerships also developed through teachers being taken into student homes during the synchronous online mathematics lessons. Most teachers (n = 12/24) described a considered approach to their role as visitors into the students' home. For Pāsifika people, home is *vā*, a sacred space. One teacher noted the importance of:

acknowledging that you are a visitor into a family's homes so it is a privilege to be there.

Another teacher took the mathematics classroom into the home saying:

We have that whanau (family) component so that we are all together as a whanau. You realise I am manuhiri (visitor) in your house and you are manuhiri in my class. I am trying to show I value what they do. You don't just go barrelling in there saying "I'm the teacher do as I say". It's a role reversal being respectful as you are presenting yourself in their domain.

As student homes were brought into school settings, some teachers (n = 5/24) reflected on how to maintain respectful relationships. This included consideration of how you speak and appropriate scheduling and timetabling. Other teachers (n = 4/24) noted that some students and families were reluctant to have others' view their homes and that teachers needed to both accept and understand this respectfully. One school leader specifically acknowledged that they decided to avoid synchronous platforms such as Zoom given that: *not all kids are in a position to have a quiet space where they can join a meeting.* Being able to accommodate all different responses provided the teachers with real learning about the life and times of their students and whanau. A number of researchers (e.g., Averill, 2012; Bonner, 2014; Powell et al., 2016) have shown the importance of such actions in building relationships of trust and respect.

Honouring and maintaining a student's home language is an important aspect of culturally sustaining pedagogy. Language was a barrier for some teachers because of their own inability to speak multiple languages when taken into their students' homes. However, others (n=4/24) noted the richness they observed of children learning and practising mathematics in their first language. They also recognised the lack of tasks in other home languages precluded family involvement. As one teacher stated:

The feedback we had from our school community is often the whole fanau is getting involved in the learning, and the inclusion of multiple languages would enable those families who don't have strong English to be involved in learning as well.

These teachers are recognising that to be truly culturally sustaining language is another aspect which needs to be considered within an asset-based perspective (Paris & Alim, 2014) and to develop a wider perspective of effective partnerships promoted by Civil and Bernier (2009) multiple languages need to be honoured.

Looking towards the future when students return to school all teachers and leaders were eager to find ways to continue the positive relationships they had across their home communities. As one teacher said: *We have built strong working relationships between school and home which I wish to continue fostering and developing as I have seen huge growth in some students.* Clearly, they had recognised how extending the home into the school community had been empowering for them all. By crossing boundaries between homes and schools had provided possibilities for developing true power-sharing relationships as promoted by researchers (e.g., Bonner, 2014; Civil & Bernier, 2009; Hodge & Cobb, 2016; Powell et al., 2016) who argue for more equitable mathematics education.

Conclusions and implications

In Aotearoa/ New Zealand many media reports voiced concern that our most impoverished group, who are predominantly Māori and Pāsifika students, would be adversely affected by the loss of two months of schooling. In turn, we too could have taken the same deficit outlook caused by what Rubie-Davies(2016) describes as cultural mismatches. However, we knew that these students came from home environments which might differ from that of dominant cultural groups in Aotearoa/New Zealand but also had rich culturally embedded home contexts which would afford learning. Albeit, this would be different from the school context and so we set out to examine and explore the teaching and learning of mathematics when the homes of our Māori and Pāsifika students were brought into the school context. We also changed the focus from the mathematics learning of the students to that of their teachers and school leaders because Covid -19 had reversed the roles and now teachers had to enter their students and their families space rather than the reverse.

A clear finding was that mathematics teaching and learning could and did continue with certain restraints which if the lock down had continued could have been overcome. The resilience of members of both the school and home community and the relentless positioning of wellbeing as foremost served to build foundations for deeper understandings of each other. The school community were able to see the many positive ways families supported and maintained rich home mathematics learning and the importance of recognising their funds of knowledge (Moll et al., 1992).

New and different, more positive and respectful relationships were premised. The teachers and leaders recognised the richness of the relationships that all participants had constructed as they crossed boundaries between home and school to engage in mathematics together. Rather than negative outcomes the Covid-19 pandemic lockdown had given a unique chance for teachers to become critically conscious of the wealth that their students and whanau had to offer to the school setting. Construction of positive relationships and trust is central to constructing culturally sustaining pedagogy (Paris & Alim, 2014) and empowerment and power sharing (Bonner, 2014; Hodge & Cobb, 2016; Powell et al., 2016) and the potential for this has become possible.

An enduring theme of all teachers and leaders was the hope that they could continue the close power sharing relationships and learnings the Covid-19 lock-down had afforded them of their students and their whanau in the busy everyday life of teaching mathematics in school. What would this take? This needs to be considered in the new post Covid-19 world in which new ways of thinking and doing are possible. We have highlighted in this article that although the Covid-19 pandemic has caused disruption and distress, we can also use it as an opportunity to grow and reimagine mathematics education.

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