TEACHERS' PERSPECTIVES OF STRENGTH-BASED MATHEMATICS LEARNING BEFORE, AND DURING THE PANDEMIC

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21ST CENTURY CLASSROOMS

CHALLENGES

- Dissonance caused through teachers lives which differ sharply from those of their students
- Cultural mismatches cause cross cultural misunderstandings and constructed deficit views
- Marginalisation of groups of students and loss of cultural identity

PĀSIFIKA NATIONS AND INDIGENOUS MĀORI STUDENTS

- Pāsifika peoples multi-ethnic group of people from different Pacific Island nations, including second to fourth generation born in Aotearoa/ New Zealand.
- Wide range of languages, diversity in ways of knowing and being.
- Many overlaps as first cousins across all the Pāsifika nations including Māori


CHINA
Taipei
Taiwan
Manila
PHILIPPINES
Philippine Sea
South China Sea
Northern Mariana Islands (U.S.)
Saipan
Hagåtña
Guam (U.S.)
FEDERATED STATES OF MICRONESIA
CAROLINE ISLANDS
Palikir
Melekeok
PALAU
MARSHALL ISLANDS
Majuro
Wake Island (U.S.)
Marcus Island (JAPAN)
Midway Islands (U.S.)
HAWAIIAN ISLANDS
UNITED STATES
Honolulu
Hawaii
Johnston Atoll (U.S.)
North Pacific Ocean
MOLOKAI FRACTURE ZONE
CLARION FRACTURE ZONE
CLIPPERTON FRACTURE ZONE
Kingman Reef (U.S.)
Palmyra Atoll (U.S.)
Tarawa
KIRIBATI (GILBERT ISLANDS)
Howland Island (U.S.)
Baker Island (U.S.)
Jarvis Island (U.S.)
Yaren District
NAURU
KIRIBATI
LINE ISLANDS
BRUNEI
MALAYSIA
Borneo
Celebes Sea
INDONESIA
Java Sea
Banda Sea
TIMOR-LESTE
Dili
Timor Sea
Arafura Sea
Ashmore and Cartier Island (AUSTRALIA)
PAPUA NEW GUINEA
New Guinea
Port Moresby
Bismarck Sea
SOLOMON ISLANDS
Honiara
SANTA CRUZ ISLANDS
TUVALU
Funafuti
Tokelau (N.Z.)
Wallis and Futuna (FRANCE)
SAMOA
Apia
Pago Pago
American Samoa (U.S.)
VANUATU
Port-Vila
FIJI
Suva
TONGA
Nuku'Alofa
Alofi
Niue (N.Z.)
Cook Islands (N.Z.)
Avarua
SOCIETY ISLANDS
Papeete
ARCHIPEL DES TUAMOTU
ILES MARQUISES
French Polynesia (FRANCE)
ILES TUBUAI
Adamstown
Pitcairn Islands (U.K.)
Indian Ocean
Darwin
Gulf of Carpentaria
Coral Sea Islands (AUSTRALIA)
Coral Sea
New Caledonia (FRANCE)
Noumea
Cairns
Townsville
Mackay
Rockhampton
Brisbane
Gold Coast
AUSTRALIA
GREAT SANDY DESERT
GIBSON DESERT
GREAT VICTORIA DESERT
SIMPSON DESERT
Alice Springs
Mount Isa
Lake Eyre
Geraldton
Perth
Kalgoorlie
Broken Hill
Whyalla
Adelaide
Canberra
Sydney
Newcastle
Wollongong
Melbourne
Geelong
Great Australian Bight
Bass Strait
Tasmania
Launceston
Hobart
Tasman Sea
Norfolk Island (AUSTRALIA)
Kingston
Lord Howe Island (AUSTRALIA)
KERMADEC ISLANDS (N.Z.)
NEW ZEALAND
North Island
Auckland
Hamilton
Tauranga
Wellington
Christchurch
South Island
Dunedin
Invercargill
CHATHAM ISLANDS (N.Z.)
South Pacific Ocean
Indian Ocean
Scale 1:41,000,000
Mercator Projection

THE LONG REACH OF COLONIZATION

Non-dominant students disenfranchised from mathematics

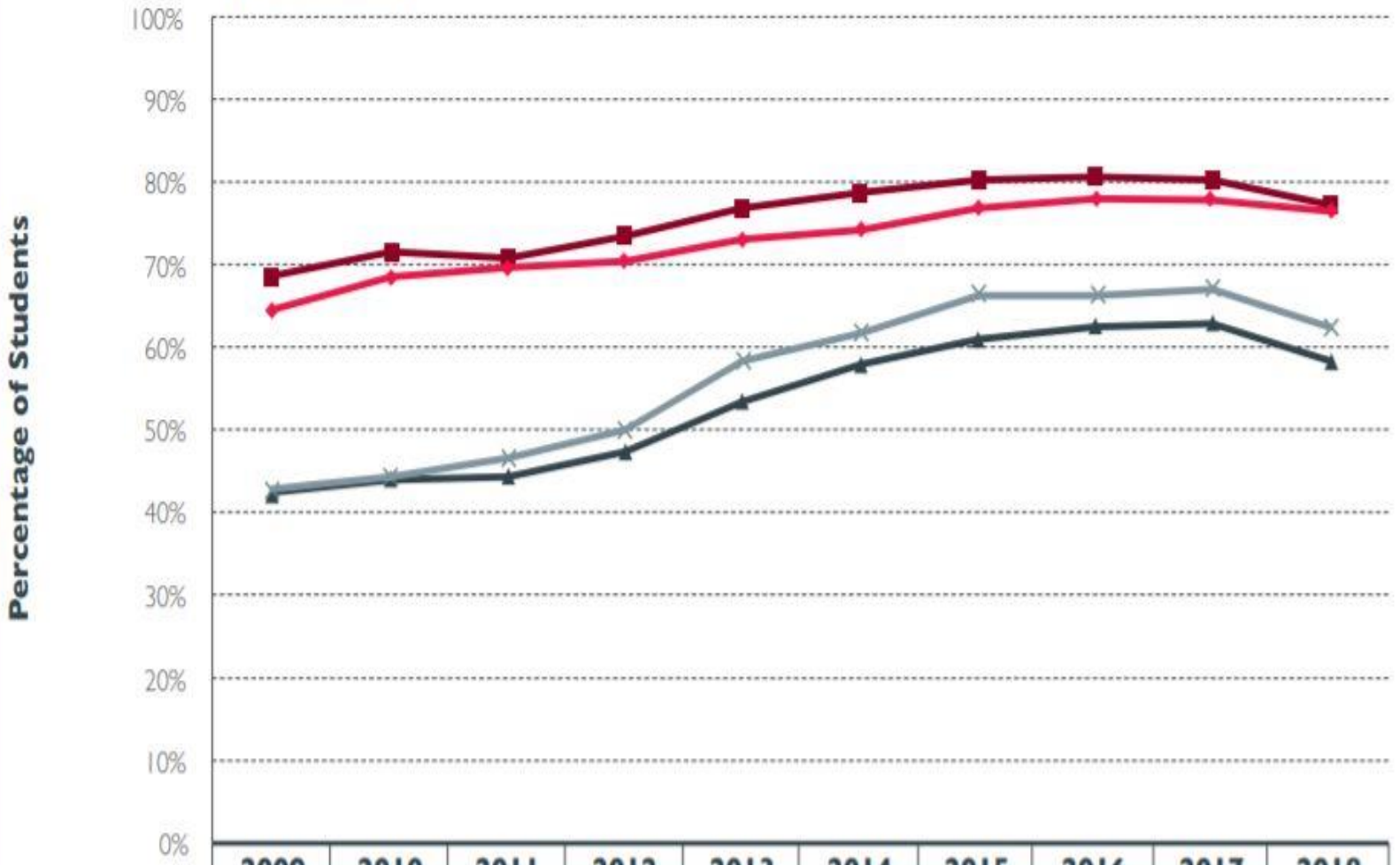
- Persistent low levels of achievement
- Student constructed deficit views
- Loss of identity

INTERROGATE THE RESULTS

NCEA is standardised national tool students sit when 15 Years old.

The results split the students into future pathways.

They gain a Pass, Merit or Excellence

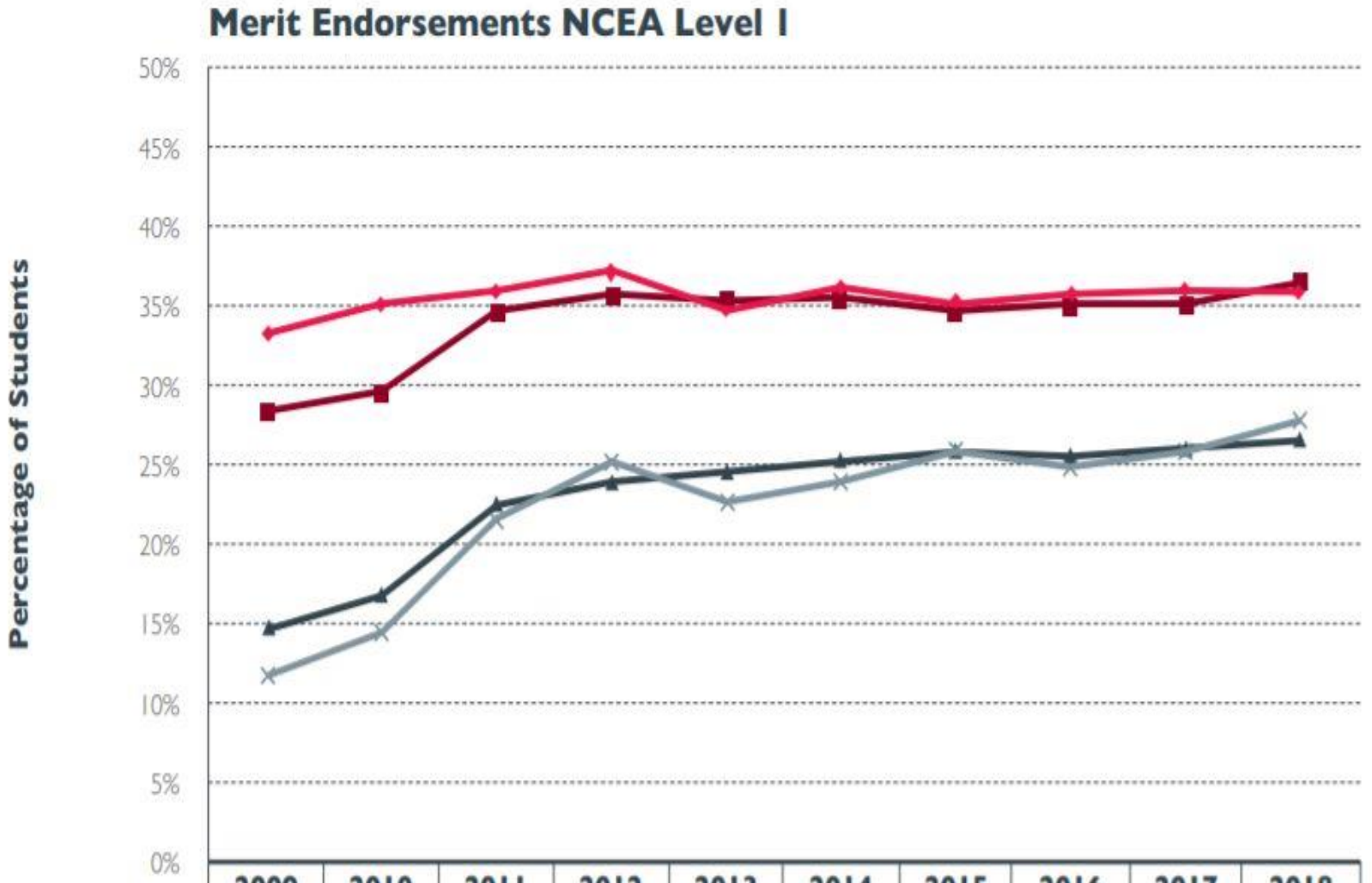


	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Asian	64.5%	68.5%	69.6%	70.2%	72.9%	74.1%	76.8%	77.9%	77.6%	76.7%
European	68.6%	71.4%	70.9%	73.3%	76.8%	78.7%	80.1%	80.5%	80.4%	77.5%
Māori	42.3%	44.1%	44.4%	47.3%	53.4%	57.8%	61.0%	62.6%	62.8%	58.1%
Pacific Peoples	42.7%	44.2%	46.4%	49.8%	58.2%	61.8%	66.3%	66.4%	66.9%	62.3%

Figure 6. Enrolment-based attainment rates of Year 11 students attaining NCEA Level 1 by ethnicity.

WHAT CHANGES CAN YOU SEE IN THESE RESULTS?

www.nzqa.govt.nz/statistics

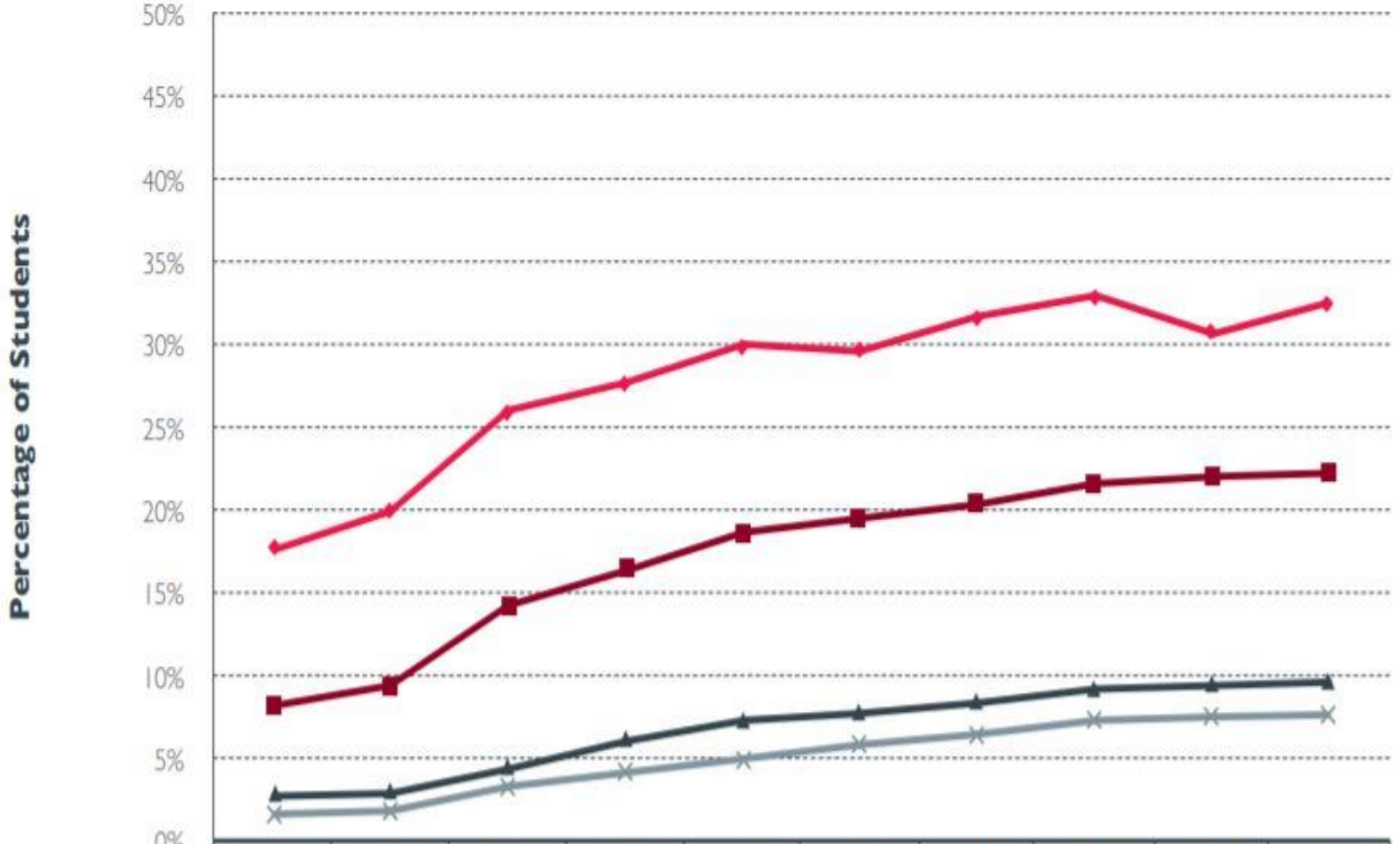


	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Asian	33.4%	35.0%	36.1%	37.2%	34.7%	36.3%	35.2%	35.9%	36.0%	35.9%
European	28.5%	29.7%	34.8%	35.9%	35.4%	35.7%	34.8%	35.1%	35.1%	36.2%
Māori	14.7%	16.8%	22.5%	24.0%	24.7%	25.3%	26.0%	25.6%	26.2%	26.7%
Pacific Peoples	11.8%	14.4%	21.7%	25.3%	22.7%	24.1%	25.9%	24.9%	25.9%	27.9%

Figure 32. NCEA Level 1 Merit Endorsements achieved by Year 11 students with NCEA Level 1 by ethnicity.

NOW WHAT ARE THE RESULTS SHOWING?

Excellence Endorsements NCEA Level 1



	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Asian	17.6%	20.1%	26.1%	27.9%	30.1%	29.7%	31.8%	33.1%	30.9%	32.7%
European	8.2%	9.5%	14.3%	16.5%	18.7%	19.6%	20.5%	21.6%	22.1%	22.3%
Māori	2.7%	2.9%	4.4%	6.0%	7.4%	7.7%	8.4%	9.2%	9.4%	9.6%
Pacific Peoples	1.6%	1.7%	3.2%	4.2%	5.0%	5.9%	6.4%	7.4%	7.6%	7.7%

Figure 33. NCEA Level 1 Excellence Endorsements achieved by Year 11 students with NCEA Level 1 by ethnicity.

THE INFLUENCE OF WHITESPACE

It feels like I am a different person from a Samoan person…because whenever I am learning maths I think I am a Palagi (White) person…because whenever I am doing maths I can't remember I am Samoan.

I don't like about maths when I get to the hard part. I can't do it. I don't feel like a White person anymore. I feel like myself again and I am nervous.

DEVELOPING MATHEMATICAL INQUIRY COMMUNITIES PROFESSIONAL LEARNING AND DEVELOPMENT INITIATIVE

- Research and practice based. Focusing on ambitious mathematics pedagogy and culturally sustaining pedagogy.
- Supported by New Zealand Ministry of Education to work with 197 schools in New Zealand, as well as schools in the Cook Islands and previously Niue.
- 42 mentors who work across schools using dynamic mentoring and focused on adaptive expertise

WHY TAKE A STRENGTH BASED APPROACH?

Narrows demographic gap by working with teachers to:

- Draw on cultural/social worlds of students as learning tools.
- Shape classroom social norms within values and beliefs.
- Connect home/school lives to make *all* students' mathematics real and meaningful.
- Support strong mathematical disposition and positive cultural identity

CONSIDER THE CORE PĀSIFIKA VALUES

- Need for teachers to examine own values and beliefs connected to individualism
- Identify differences within communalism

PĀSIFIKA VALUES AND BELIEFS

Teacher use of Pāsifika values through drawing on metaphors for how families work together key to developing prosocial interaction norms.

- Increased participation.
- Reduction in bullying

TEACHER REFLECTIONS

- Dissonance in grappling with different values and beliefs.
- Lengthy process to deep understanding.
- Many risks on the way but also multiple ‘aha’ moments.

FUNDS OF KNOWLEDGE

Need for teachers to incorporate cultural and social context of students into mathematics teaching and learning

- Need close connections and different ways of interaction than the traditional way so that value is placed on learning that takes place across the boundaries

INITIAL TEACHER REFLECTIONS

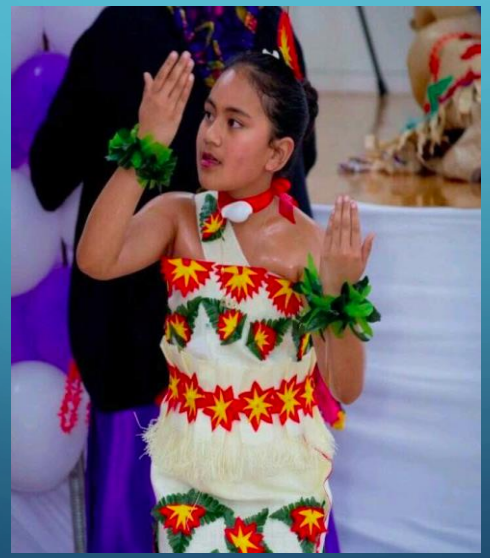
I'm a pretty strong believer in making it relevant, so there's no point talking about, I don't know waka or something if they've never experienced that. I mean it's great to bring in those cultural aspects but, I think if it's not relevant to them, and if they don't understand the context, then how are they meant to ever do anything with that.

If you're presenting a problem that's completely a Pākehā sort of context, or completely a Samoan context, or whatever culture, if the person can't connect with what the information is in the problem, then how are they going to solve the problem?

SUPPORTING TEACHERS TO GAIN ACCESS TO COMMUNITY FUNDS OF KNOWLEDGE

- Parent and community meetings

- Positioning students and families as the experts on their lives outside of school using photography



KEY FOCUS OF ONGOING WORK

- Building on the context in an authentic way
- Honouring the cultural connections throughout the lesson
- Maintaining a high press for mathematics

Challenging for teachers to be making the connections between both cultural context and mathematics

OUTCOMES

We've got a couple of students who have quite low status – had quite low status – and we wrote a couple of problems about them and they could tell everyone about it because it was really specific to their culture and now all of a sudden we've watched them rise within the space.

Make better use of home connections, not just integrating activities that are at school but making much more explicit links to maths in the students' home life. How important the launch of the context really is for children.

TEACHER'S PERCEPTION OF CULTURE IN MATHS

Before DMIC I barely considered culture in maths at all. I actually thought that maths didn't have a culture, …that was a whole new idea for me, so now we work really hard at locating all of our problems in the familiar culture of our children, so whether it's Pacific Island, or Asia, we've got a few Middle Eastern children now so yeah that's a little bit harder, but definitely letting them know that we've pulled ideas and things from their world is really important.

A POSITIVE FACE OF COVID LOCKDOWN

Well-being orientation to building relationships and power sharing

- **Evidence of digital divide**
- **Provision of culturally sustaining hard material**

"Teachers all made family group phone calls and emails to follow up on contact, wellbeing, connectivity throughout lockdown time – this point of contact has been effective for big picture"

OPENING SPACES FOR MATHEMATICS LEARNING

- Provision of cognitively demanding culturally sustaining tasks
- Teacher opportunities to learn from parents
  - Home based mathematics tasks
  - Mixed ability grouping learnings

"We always talk about mixed ability groups, and when they have got older siblings around, in a way that is a mixed ability group."

GROWING RELATIONSHIPS THROUGH CHANGING BOUNDARIES

Having parents working alongside their children on Zoom is great. We are hearing really rich conversations and seeing parents actively supporting learning

We have been welcomed into the homes of our whānau and have learned about real-life for them.

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.

RECOGNISING THE HOME AS VĀ

Their perceived reluctance to turn their cameras on cannot be assumed as being a sign of disrespect or defiance. This is a classic example of delving deeper into the why in terms of cultural responsiveness to understand what else is impacting the decisions that learners are making about the way that they are learning, or the way that they are willing to learn. As an educator, I have a duty to demonstrate complete mindfulness for the whole learner, and all of the variables impacting the learner, if we are to connect with learners in a way that shows reciprocal shared learning, as outlined in the pedagogical practice of Ako and manaakitanga.

CONCLUSIONS

- We need sustained opportunities for teacher learning and change.
- As educators it is our responsibility to empower diverse learners and affirm their cultural ways of knowing and being.
- Covid-19 disruptions can be seen in positive ways.