

Professional learning in mathematics

ROB PROFFITT-WHITE, WITH JONATHAN FISHER AND JULIE ROBERTS

Late in 2022 Julie Roberts and Jonathan Fisher caught up with Rob Proffitt-White to find out about the recent professional learning workshops he ran with teachers and school leaders around New Zealand. They asked Rob about the underlying approach to the short-term Just-in-Time Maths initiative and his thoughts about future professional learning in mathematics.

Supporting school leaders to lead mathematics effectively in schools

In 2022, teachers from around New Zealand participated in Ministry of Education funded professional learning and development (PLD). At the same time school leaders attended region-based workshops, supported by the Ministry of Education and the New Zealand Principals Federation.

The workshop series for leaders introduced maths routines using existing resources, including those on NZMaths. The resources and teaching approach shared in the workshops had been reported in a Ministry of Education pilot project in 2021 (Proffitt-White, 2021) as having a positive and immediate change to leaders' and teachers' beliefs and practices when teaching and assessing mathematics and statistics.

The Just-in-Time Maths PLD for teachers was based on a mathematics curriculum project¹ for teachers and leaders in Queensland. The New Zealand PLD took place in region-based clusters, comprised online workshops, in-school support days and Q&A online. Alongside focusing on existing resources and

the maths proficiencies (conceptual understanding, procedural fluency, strategic competency, adaptive reasoning and productive disposition), the PLD aimed to help teachers plan a balanced rich mathematics programme.

Rob's passion for this type of PLD stems from his extensive experience as a maths educator in Australia, and more recently in New Zealand. His experience in supporting teachers and schools to translate curriculum intent into effective practices, combined with his wide reading of relevant research, has informed his passionate belief that it is important to balance top-down and bottom-up approaches to PLD. The workshops achieve this balance in a way that is designed to support teachers' professionalism and empower them to build their own knowledge (pedagogical and content knowledge) and utilise a range of existing high-quality New Zealand resources already available for use in the classroom. The PLD aims to have teachers directly apply what they have learnt from the sessions in their classrooms with ongoing interactions and support. We asked Rob more about the PLD and the knowledge he gained on

universal practices for effective teaching and learning in mathematics over his career. What works for both teachers and students in mathematics?

Q. How do you know this approach to building teachers' maths knowledge works?

A. I say to teachers if we can build your capacity to demonstrate, interpret, and relate maths to a variety of contextualised problems, you will feel empowered, passionate, enthusiastic to teach maths, and possibly enjoy maths. That's my key; that's my line of sight: always build that capacity of conceptual knowledge.

Because we know that with our tamariki, if they are said to have conceptual knowledge, it means that they can think with maths, apply maths, extend maths, and they can see the interrelations between the parts. If you want all of that for our kids you've got to start with the teachers who can also think with maths so that they know what feedback to give to their students—otherwise the learning won't happen.

The conceptual knowledge and pedagogical content knowledge is what teachers really enjoy. They can use it to do what they already cover in their mathematics programmes, but they do it better. Teachers have told me that once they come to PLD they feel invigorated. They feel empowered. I know it's working because I see teachers going back to their room and using exactly what they have in the classroom but approaching it with more confidence and skill. Also, the evidence demonstrated in the 2017 MERGA report (Goos et al., 2018) showed us that we have a strong evidence-into-practice model.

When you first arrived what did you notice about the maths education in New Zealand classrooms? What did you see as our strengths, the challenges?

The biggest strength for me was through the lens of *productive disposition*². I found teachers in Aotearoa far more aware and far more observant about winning the tamariki over, localising the curriculum, making it meaningful, and making it relevant. In some countries this is the hardest shift to make, and already a lot of New Zealand teachers have that key aspect sorted.

I suppose the weakness I found was the scatter gun approach to PLD; and I had some concerns about the consistency of what was being taught in maths. I felt a bit like a choose your own adventure book where there's no consistency, and that's not fair on kids. All tamariki deserve the opportunity to explore all the mathematics proficiencies and all the strands of the maths learning area.

You've been out and about in New Zealand recently, what have you noticed as you've been working alongside teachers and school leaders?

I think the first thing for both beginning teachers or experienced teachers in the Just-in-Time Maths initial workshop was that teachers wanted affirmation and guidance. Teachers want to know they're doing the right thing; they seem to convince themselves they're not, and they can default back to worksheets, numeracy, or textbooks rather than trusting their own capacity. Teachers have been really honest, and they tell me "Rob, with so much on, if I can just follow a book, it's just one less thing for me to think about." Some teachers say they seem to have lost the nuance of what it is to be a good maths teacher.

Teachers have said what's made the biggest difference from PLD is that little bit of time to be shown what is already in place that they can easily access and start to fold into their programme that they lead rather than just following the book. One thing teachers have really liked is the balanced maths diet utilising a range of resources and using different teaching techniques. As one principal said, "this has made my teachers feel valued once again".

Principals said that what's missing, in a nutshell, is a clear line of sight to what works and the outcomes for student learning. One principal said, "What we need is a clear line of sight; somewhere we can go to for some honest, credible advice without being sent down an avenue of 'you must do this'."

Some principals told me that they're worried that if they change, their students' achievement data will go down. They shared "We just put our heads down and keep going because we don't think we've got the time to make the changes needed. We're worried that the board of trustees will say "Why has your data gone from 92% to 73%? Get it back up there"."

What sorts of resources do you recommend to support teachers in maths education?

For me, start with task resources. An example of task resources are NZ Maths ones that cover the types of tasks that Smith and Stein (1998) talk about. Using a range of tasks—exercise tasks to unfamiliar open rich problems. NZ Maths has a great repository of tasks that teachers can access. That is the sort of resources that teachers need, but no one ever tells teachers how to define or categorise them. We've had massive traction, instantaneous change of attitudes when teachers go back and look at the sorts of problems their tamariki are being exposed to.

The second type of resources I recommend are assessment resources, especially the diagnostic power of assessment tools. We need assessment if we want to truly focus on conceptual understanding and reasoning. You need to have resources to support assessment that include moderated samples. My analogy for that is most teachers today can go into any classroom take 30 samples of writing and without a rubric can say that's about a 3C that's about a 3B ... we can visualise. That means we can walk around the room and assess in the moment and give feedback, but in maths 90% of the teachers can't do that ... yet.

So, we need deep rigorous assessment tools with annotated responses that allow teachers to see a line of sight to know what feedback to give the kids, but more importantly how the kids themselves can feed forward.

The third type of helpful resources are teacher-written short articles that boost conceptual understanding and act like a guide—which the ARBs [assessment resource banks] and NZ Maths provide. They're often teacher written, and the reader can see pictures, images, guides.

So, in summary, teachers need access to 1) rich tasks for students; 2) rigorous assessment tools; and 3) bite-sized teacher-focused articles about how maths works. Putting all three together is really, really powerful.

What are three key messages about ways leadership can support their teaching team?

1. Leaders need to have (or build) a full understanding of mathematics themselves.
2. Leaders need to have a long-term instructional leadership viewpoint, with a long-term vision of where they want teaching and learning in mathematics to get to. They need to make constant investments, optimising the resources, to benefit teachers and students.
3. Leaders need to create best practice networks with fellow principals/leaders.

Do you see your work as helping to build bridges between where teachers are now and where they need to get to with the refreshed mathematics curriculum?

Absolutely. I think that's exactly what we're doing at the moment. It's about allowing teachers to move from where they are now to get ready for the curriculum refresh. The PLD provides both leaders and teacher with the bridge for mathematics that they can wander across, feeling quite confident without having to build the bridge themselves.

We seem to have stimulated and motivated a team of PLD facilitators that can enable that path to be quite smooth for teachers in this interim period while the curriculum refresh is underway. For me, we have some evidence to advise the Ministry of Education that the providers who were part of their Just-in-Time Maths initiative have demonstrated they can access all regions of Aotearoa and provide subject specific professional learning to deliver consistent messages on how to translate curriculum intent into sustainable, balanced, and flexible enactment—a balance of both fidelity and flexibility.

Notes

1. A long-term project for Queensland teachers and leaders to gain confidence in enacting the new mathematics curriculum between 2015 and 2018.
2. *Productive disposition* refers to the tendency to see sense in mathematics, to perceive it as both useful and worthwhile, to believe that steady effort in learning mathematics pays off, and to see oneself as an effective learner and doer of mathematics (Kilpatrick et al., 2001).

References

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Further reading

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