Working with whānau to support their children's learning

Whānau are key partners in developing the maths skills and knowledge of students. They can support learning at home and school, and they can share their own life experiences and knowledge. Students benefit when whānau and schools work reciprocally to respond to their unique needs and aspirations, particularly those of Pacific students and ākonga Māori.

Principals play an important role in fostering participation and collaboration within the school community. They can promote whānau involvement by ensuring teachers and leaders:

- listen to what whānau say about their children's experiences at school, and respond with changes in practice
- work with whānau to foster positive mathematical identities and mindsets about maths[7]
- achieve a shared understanding with whānau about what and how students will learn in maths, so that there is alignment between practices at school and home
- provide structured, specific suggestions for building maths confidence, skills, and knowledge at home
- work with whānau to identify ways they use maths in the home and in their communities
- provide frequent, regular updates on students' progress – for example, through online portfolios or real-time reporting using digital tools.

NZMaths has developed a range of resources that whānau can use to support maths learning at home.

Recommended reading and viewing

Pāngarau Mathematics and Tauanga Statistics in Aotearoa New Zealand

This 2021 report from the Royal Society Te Apārangi includes information on the current state of maths education in New Zealand (including a discussion on leadership) and the benefits of maths learning.

Keeping Children Engaged and Achieving in Mathematics

This 2018 report shares some of the strategies and approaches used by schools that have focused on improving and accelerating achievement in maths.

Math Anxiety

This 2020 booklet provides information on how to identify maths anxiety, recognise its impact, and reduce it.

Observation Guide for Mathematics

This 2018 resource provides a useful framework for planning, conducting, and reflecting on observations.

Mathematics and Statistics Skills and Knowledge Learners Need to Know

This 2021 curriculum refresh report to the Ministry of Education discusses the skills and knowledge New Zealand students need to have, important cross-disciplinary links, and rapid changes and growth in computer science and ICT.

Developing Mathematical Inquiry Communities

This 2015 set of videos presents the perspectives of students, teachers, leaders, and whānau on a ground-breaking approach to accelerating achievement in maths that has been adopted in a number of New Zealand schools.

Endnotes

[1] The New Zealand Curriculum, page 26

[2] Pāngarau Mathematics and Tauanga Statistics in Aotearoa New Zealand, page 6

[3] https://www.educationcounts.govt.nz/topics/bes/resources/spotlight-on/spotlight-on-leadership#1

[4] Procedural fluency is the ability to apply procedures accurately, efficiently, and flexibly.

[5] https://assets.education.govt.nz/public/Literacy-and-Maths-strategy-development-in-2021/Progress-and-achievement-and-the-context-of-mathematics-and-statistics-learning-in-New-Zealand.pdf

[6] The Victoria State Government webpage Addressing maths anxiety in practice provides guidance on addressing maths anxiety in students and teachers. It includes questions that could be used in an anonymous staff survey and a team activity for teacher use.

[7] https://nzmaths.co.nz/parents-and-wh-nau-have-role-too

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Teachers at Tōtara Grove School use their local curriculum and culturally responsive pedagogy to ensure that all learners experience success in maths.

Over the past five years, Te Kura o Tōtora Grove | Tōtara Grove School in Whangārei has redeveloped the school's strategic plan to better reflect the culture and identity of its students. Data showed that school-wide progress in maths also needed to be a key focus. The teaching staff embarked on a professional development programme strongly aligned with the schools' strategic goals, including learning te reo Māori, understanding how to accelerate learners in maths, and building skills and knowledge in effective teaching of maths.

The principal and senior leadership have been strong advocates of effective maths teaching. They've modelled a love for maths and ensured that it's talked about often and taught well.

Four culturally sustaining practices have been central to change:

- recognising what students bring to the classroom via their language and culture
- empowering students to drive their own learning
- engaging with whānau
- designing rich learning opportunities grounded in the local curriculum.

Such practices are woven into every stage of maths teaching and learning. This has resulted in collaborative planning focused on big ideas, the use of rich tasks and flexible groupings, students leading the learning, and teachers purposefully guiding class discussion to deepen students' understandings. By building their understanding of the big ideas of maths and effective pedagogy, teachers now design their own problems or adapt tasks from NZ Maths or NRich, with a focus on the experiences and stories of students and the local curriculum.

Te ao Māori is authentically woven through teaching and learning. Connecting with the local environment and the stories of mana whenua has been a school-wide focus. For younger tamariki, the focus has been on the immediate school environment, including birds, trees, plants, and the local awa. These are often incorporated into maths problems. Senior tamariki are exploring stories of their rohe, including place names, pūrākau, and mana whenua narratives. Authentic opportunities for maths learning are woven into this process. For example, in preparation for a hīkoi, students used their maths skills to work out the distance of the walk, how long it might take, the costs per child for the buses, and the number of adults needed to achieve a 1:6 adult child ratio.

Whānau involvement is encouraged and supported. The school has invited whānau to participate in full-day learning experiences, including opportunities to work alongside their tamariki. By participating in collaborative groups working on the number problem for the day, whānau could see and understand how maths is taught at Tōtara Grove School.

Te Kāwanatanga o Aotearoa
New Zealand Government

TE TĀHUHU O TE MĀTAURANGA
MINISTRY OF EDUCATION

Leading mathematics teaching and learning in years 1–8

What principals need to know and be able to do

Principals play a key role in ensuring that all students have access to effective maths teaching and learning in their school. They do so by:

- establishing and regularly revisiting goals and expectations
- planning and resourcing strategically
- leading the design, evaluation, and coordination of the curriculum
- observing and guiding teachers in their practice
- leading professional learning.

Maths is a foundational learning area that is key to all learners' progress, achievement, wellbeing, and participation. Learning maths supports students to develop their ability to think "creatively, critically, strategically, and logically".[1] It provides intellectual challenge, requiring students to solve problems, predict outcomes, justify their ideas, and see things from other perspectives.

Maths is also a tool that can be used in a wide range of situations at home, at school, and in the community. It opens doors to knowledge in learning areas such as science, technology, and social studies, helping students to be critical consumers of data.

All students in Aotearoa New Zealand need opportunities to "learn pāngarau mathematics and tauanga statistics thoroughly and well".[2] While the school system in Aotearoa New Zealand has its strengths, not all learners are developing the maths skills and knowledge they need for future success.

This resource provides guidance for primary and intermediate principals on how to best support maths teaching in their school. It explores:

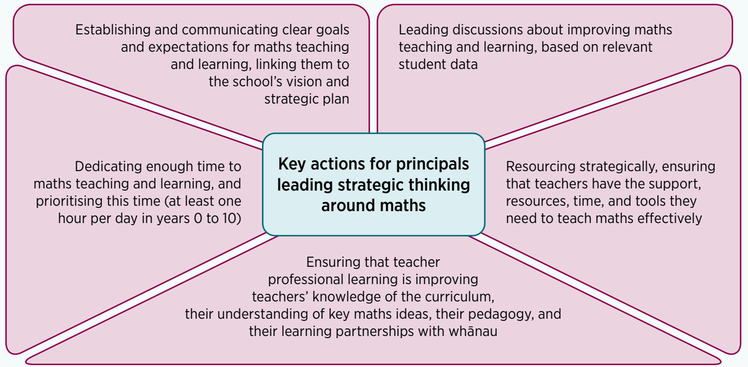
- leading strategic thinking about maths teaching and learning
- what effective maths learning looks like
- developing teachers' confidence and ability to teach maths
- working with whānau to support their children's learning.

See also the poster
A balanced maths diet.

Leading strategic thinking around maths teaching and learning

In this resource, the term 'maths' refers to the subject matter, skills, competencies, and understandings that encompass all aspects of mathematics, statistics, and numeracy.

Principals must take the lead in ensuring that maths teaching and learning in their school is effective and responsive. A key finding from *School Leadership and Student Outcomes: Identifying What Works and Why [BES]* was around what leaders should concentrate on – the more they focus their influence, their learning, and their relationships with teachers on the core business of teaching and learning, the greater their influence on student outcomes.[3] Promoting and participating in effective professional learning was found to have at least twice the impact of any other leadership activity.



> ***Maths learning is ring-fenced in our school timetable, with all students doing maths every day. As well as explicit maths teaching and problem solving, we make sure that maths teaching is integrated across the curriculum.***
>
> Intermediate school principal

What effective maths learning looks like

While most principals won't be maths specialists, they do need to understand what high-quality maths teaching and learning involves. They will draw on this understanding when visiting classrooms and observing teachers and students at work.

Here are some key indicators to use when observing maths teaching and learning in action:

- The session follows a clear structure, with a motivating start and collaborative discussion to deepen and develop mathematical thinking.
- All students are working on worthwhile, challenging tasks conducive to 'productive struggle' (effortful learning requiring reasoning, problem solving, and perseverance).
- Grouping is flexible. Students work individually, in pairs, and in collaborative groups, and they participate in regular whole-class discussions that build on learning.
- Learning is focused around big ideas in maths and involves all the maths strands.
- Learning draws on the knowledge and skills students bring to school. Students see its relevance to their lives and its practical application.
- Students have the confidence and skills they need to take risks and discuss ideas with others. Mistakes are viewed as a normal and valuable part of learning.
- A variety of representations are used to make connections and communicate thinking (e.g., pictures, graphs, manipulatives, physical or digital models, words).
- Procedural fluency[4] is built through exploring number concepts, strategic reasoning, and problem solving. Practice of procedures is engaging and purposeful.
- Assessment for learning is evident through observations and conversations. The teacher adjusts tasks, scaffolding, and feedback in response to students' thinking.

> ***When we started our journey of raising outcomes in mathematics, lots of teachers didn't have a clear idea about what effective mathematics teaching and learning involved and couldn't describe what it might look like. Our starting point was establishing a shared understanding of effective class culture, including ensuring that the messages students hear about maths are positive and that growth mindsets are actively fostered. Our next step was focusing our attention on the big ideas of maths.***
>
> Primary school principal

Maths in years 1–3

Young children are powerful learners of maths.

> ***An effective mathematics curriculum begins with the premise that all children are powerful mathematics learners irrespective of age and ability. However, it is when children have numerous opportunities to see themselves as powerful and competent mathematical learners that the curriculum can justly be called effective.*** (Te Whāriki Online)

Students in years 1 to 3 need to be given opportunities to:

- **look for and apply patterns and structure**
- **use and make connections between multiple representations**
- **solve problems individually, in pairs, and in small groups**
- **share their mathematical ideas in whole-class discussions.**

As well as building their number skills and knowledge, students in years 1 to 3 need to experience all strands of the mathematics and statistics curriculum. They should also be able to connect their learning to their everyday lives at home and in the community.

Developing teachers' confidence and ability to teach maths

We know that teachers' confidence and teaching approaches influence opportunities to learn and academic outcomes for learners.[5] Principals can help to ensure that teachers are confident and equipped to teach maths and that they integrate their professional learning in their practice.

Principals can support teachers in their confidence and ability by:

- fostering a culture of learning at the school
- making time for collaborative planning that builds teachers' knowledge and ensures consistency and coherence across year levels
- observing maths teaching and learning on a regular basis and engaging in collegial discussions about what they notice and its influence on student outcomes
- being aware of teachers' strengths and needs, and ensuring that PLD responds specifically to those needs
- promoting maths PLD, monitoring its implication, and engaging in it alongside teachers
- ensuring that teachers leading maths have time to increase their own knowledge and to work with others
- repurposing meetings to support the development of strategies and approaches for mathematics teaching and learning.

> ***Collaborative planning plays a really important role in teacher professional learning, allowing teachers to unpack big ideas, learn from each other, and construct a solid learning sequence. Our planning is structured around the '5 Practices Framework' developed by Mary Kay Stein and Peg Smith. We start by identifying our learning goal and a rich task that relates to it. Then we work together to anticipate strategies students might use and misconceptions they might have. After this, we develop a shared set of questions we can use in class that all relate to the learning goal.***
>
> Primary school principal

Maths anxiety

Many students – and teachers – experience negative emotional responses to maths that affect their ability to learn, use, and enjoy maths. Maths anxiety can create a vicious circle where people avoid challenging problems, which then limits their progress and contributes to a sense that maths is something "they just can't do". Teachers who experience high levels of maths anxiety can unconsciously adopt a 'freeze or avoid' approach to learning or teaching maths. This means that maths is often the first subject to be dropped when there are added pressures on a school day or timetable.

Supporting teachers with maths anxiety can include:

- **opportunities for honest discussions about maths anxiety, including the experiences that have shaped teachers' perceptions of themselves as learners and users of maths. It may be helpful to conduct an anonymous staff survey to gauge levels of maths anxiety at the school[6]**
- **a buddy system to help teachers develop their understanding of maths and their confidence teaching it**
- **collaborative planning sessions that support teachers to develop well-constructed lessons, with opportunities to address misunderstandings and gaps in content knowledge.**