



# Making it Count: Teaching Maths in Years 1–3

## SUMMARY



The first few years of primary school are when crucial maths learning happens. Years 1–3 are when students develop the foundational maths skills and understandings that they need for future success. However, many students aren't as confident about maths as they could be, and national maths achievement is declining.

ERO looked at good practice in the teaching of maths in Years 1–3. We used robust evidence to clarify 'what good looks like' for maths teaching in the early years of school, and how teachers implement these practices in their classrooms. This summary gives an overview of what we learnt.

### **ERO looked at good practice in maths teaching for Years 1–3**

Maths is important. It is the pathway to success across a wide range of learning areas and longer-term life outcomes. High-quality, deliberate maths teaching makes a big difference for students' confidence and capability in maths, starting in the crucial early years of primary school.

ERO wanted to find out what good practice looks like for maths teaching in Years 1 to 3. We started with a deep dive into the evidence base, looking at a wide range of national and international research that clarifies what works best for young students.

Then we talked to students, teachers, and school leaders from 12 diverse primary schools, to hear how they put these evidence-based maths practices into action.

ERO's report and guide for teachers share practical strategies for Year 1–3 teachers, to support improvements in this vital area of teaching and learning.

## Why we need to focus on improving maths teaching

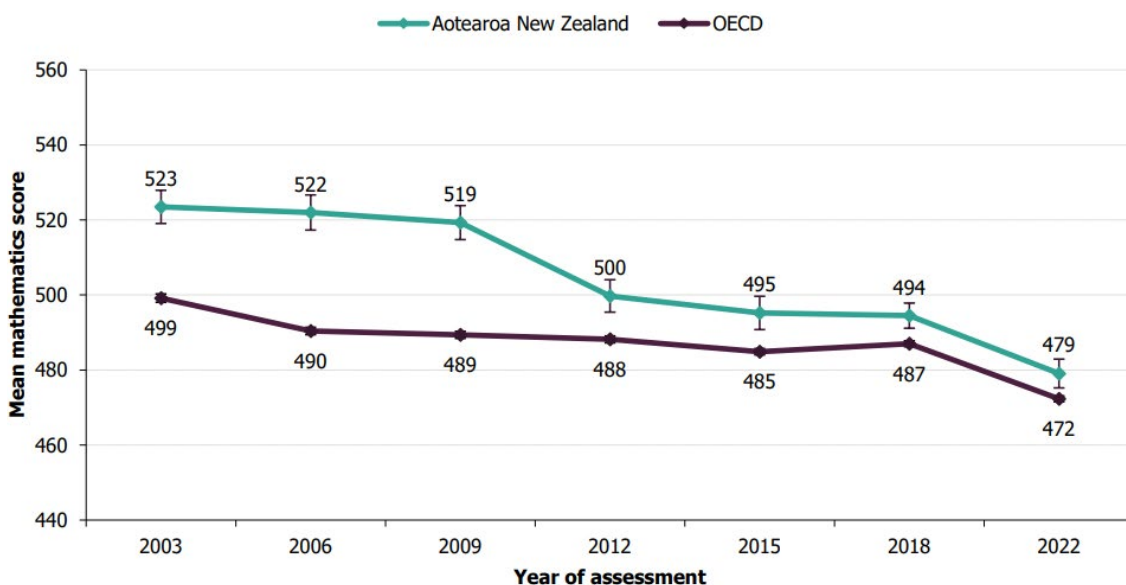
### Our national maths achievement picture is poor

The 2022 National Monitoring study of Student Achievement (NMSSA) shows a concerning shift in maths achievement between Year 4 and Year 8, from 82 percent meeting curriculum expectations in Year 4 to less than half (42 percent) of Year 8 students – right as they are about to enter secondary school. Maths results from late primary school and beyond have their roots in the preparation that students receive – or don't – in their early years at school. Building a strong foundation of early maths skills, concepts, and understandings is crucial to later success.

We also know that student confidence in maths is often lower than in other subjects. It is common to hear both adults and children say they are 'bad at maths', or that maths is 'only for some people'. The recent Programme for International Student Assessment (PISA) study, which assesses the knowledge and skills of 15-year-old students in mathematics, shows that two thirds of students worry about doing badly in maths, and over half experience anxiety about failing maths.

Achievement results from the 2022 (PISA) study are very worrying. These show that the maths skills and knowledge of our 15-year-olds have seen a significant decline over the last 20 years. (See Figure 1.) In 2022, Aotearoa New Zealand's average mathematics score was above the OECD average, but lower than 2003–2018.

**Figure 1:** Aotearoa New Zealand and OECD mean mathematics scores, 2003–2022



**Notes:** Error bars on the graph provide a 95% confidence interval for the estimate of the average. The OECD mean shown is based on as many of the 38 countries that have data available. These estimates differ slightly from the OECD reports as they include more countries. Luxembourg did not participate in 2022.

Source: OECD, 2023

PISA's 2022 study also shows:

- the difference between our highest and lowest performers has widened and shifted down, and is among the widest in the OECD
- the proportion of 'low' performers has increased since 2018 and almost doubled since 2003 (29 percent compared to 15 percent)
- the proportion of "high" performers (those who score Level 5 or above) has halved since 2003
- there is a higher difference between the scores of the lowest and highest advantaged students in Aotearoa New Zealand than the OECD average
- boys score higher than girls, on average, and a higher proportion of boys are high performers
- anxiety about maths has increased, and is higher than the OECD average, with girls reporting significantly higher anxiety than boys
- our students report a relatively negative maths learning environment compared to most other countries.

### **Not all teachers are confident about teaching maths**

ERO surveyed new primary teachers in 2023, finding that nearly a quarter (24 percent) felt 'unprepared' in their maths content knowledge when they first started in their role.

While national studies show that most primary teachers enjoy teaching maths and agree it is important, teachers in the junior school are less confident about teaching all strands of mathematics than their senior peers (comparing Year 4 and Year 8 teachers). Teachers are not as well set up as they could be for the deliberate, structured approach to maths teaching that the evidence tells us makes the difference.

### **Maths in early primary school matters**

Maths achievement in the primary years is linked to later success across a range of life outcomes, like higher education achievement, better jobs, better income, and social mobility. Maths results have even been shown to impact on national economies.

In the early years of primary school, teachers have the opportunity to set the scene for their young maths students through purposeful strategies and explicit instruction. It is in these early years that students learn about the building blocks of all future maths learning, and develop their understanding of how capable they are as maths students. Maths learning builds on itself and gets more complex over a student's time in school, so getting the foundation right is really important. Any misunderstandings, shortcuts, poor self-belief, or lack of engagement in these early years sets a poor foundation for years to come.

To make this happen, teachers need to ensure that all students benefit from high-quality maths experiences every day. When maths is a consistent and engaging feature of the daily classroom programme, students have lots of opportunities to make connections, cement new learning, think and talk in maths terms, and explore maths ideas. Purposeful and evidence-based maths practices are the key to more confident maths students in the future.

## What are the main things to know about good practice in maths in Years 1–3?

ERO drew on robust global and local evidence and experts to find out what really makes a difference for Year 1–3 maths learning. We found that there are two key enablers and nine key areas of teacher practice that have the most powerful impact on learner outcomes.

### There are two enablers for great maths teaching practice

These are the enablers that need to be in place before teachers can do their best maths teaching.

#### → Enabler 1: Teacher knowledge

Teachers need to be confident in their *own* maths knowledge and skills to be ready to teach them to students. They also need to understand what works best for young students, i.e. the specific teaching strategies that are most effective in setting students up for this crucial time in their maths journey. This includes being clear about how to structure their teaching to develop important maths understandings over time, while avoiding misunderstandings or shortcuts which negatively impact on later learning.

#### → Enabler 2: School culture and a whole school curriculum

Teachers' school settings can promote good maths practice through a clear, shared understanding of quality maths teaching. This involves clearly setting out what maths teaching and maths progress looks like in a documented, structured whole school curriculum, and by supporting teacher understanding with great learning and collaboration opportunities. It's useful when schools have an embedded culture of being open to learning, sharing, and continually improving.

### There are nine key areas of teacher practice

The national and international research evidence base shows that there are nine key areas of practice that make a real difference for young maths students.

Practice area 1	Teachers use their understanding of assessment and how students learn maths to ensure they all progress
Practice area 2	Teachers use quality teaching practice in maths
Practice area 3	Teachers provide dedicated maths time every day so all students engage meaningfully in learning
Practice area 4	Teachers notice when students require extra support for learning and provide effective targeted teaching
Practice area 5	Teachers use tools and representations to express mathematical concepts

<b>Practice area 6</b>	The classroom learning environment encourages mathematical thinking, collaboration, and the enjoyment of maths
<b>Practice area 7</b>	Teachers make the most of moments throughout the day to highlight and use maths
<b>Practice area 8</b>	Maths classes reflect the cultures of their students and whānau
<b>Practice area 9</b>	Teachers work in partnership with families / whānau to support maths learning

## What does good teacher practice look like, across the nine key areas of practice?

ERO reviewed the international evidence base to establish a robust set of the highest-impact teacher practices, that the evidence shows make a real difference for maths learning. We then worked with schools and experts to find out how these practices can be applied effectively in an Aotearoa New Zealand context. Below is a summary of the nine key areas of practice, why they matter, and how they can look when teachers put them into action.



### Practice area 1: Teachers use their understanding of assessment and how students learn maths to ensure they all progress

This practice area is about teachers using their knowledge of students and about how maths concepts connect and build on each other, to line up learning experiences in a deliberate way.

#### Key teacher practices are:

- teachers determine what students bring to their learning, and build on what they already know
- teachers actively notice, recognise, and respond to students' progress as they engage in maths
- teachers use assessment and progressions to plan for, document, and monitor students' progress.

#### Why this is important

It is important that teachers gain an in-depth awareness of students' understanding, so that they can respond in a timely and effective way to move them forward. Assessment helps teachers to set up expectations and goals for students, and plan purposeful learning steps which they can monitor to inform their decisions to move on. Assessing students' understanding and knowledge also helps teachers adapt their practice and understand how effective it is in promoting the learning and progress of their students.

### What this can look like in real life

Teachers work with leaders to align their views on expected progress from Year 1. These are used to develop a schoolwide document of expectations for maths progression. This provides teachers with “the backbone of the curriculum plan, and they all know what they are doing, and how to adjust their teaching to the students.” (School leader)



## Practice area 2: Teachers use quality teaching practice in maths

This practice area is about ensuring effective teaching practices form the foundation for maths teaching practice. This means using deliberate, intentional teaching and organisational strategies that support students to focus, draw out their ideas, and support their progress. Teachers will draw on good questioning skills and use timely, specific, and actionable feedback. They also help students review and understand how they got an answer to a maths problem, even if it's wrong. They recognise when to support or extend students, when to move on to new learning, and when to spend longer on an area to consolidate learning for all students in their class.

### Key teacher practices are:

- a) teachers provide scaffolding for students in maths
- b) teachers use explicit teaching in maths
- c) teachers use flexible grouping in maths
- d) teachers provide a range of cognitive and metacognitive strategies in maths.

### Why this is important

Teachers are not able to capably implement good maths-specific practices without knowledge of key teaching practices that work. Teachers who demonstrate good-quality teaching skills in other learning areas are well on the way to being effective teachers of maths.

### What this can look like in real life

A teacher works with a small group in Year 1 to scaffold their learning about ordering numbers. She prompts them about their prior learning, “Remember we have been learning about the word ‘after’ – like ‘after school’, ‘after playtime,’ then we talked about lining up.” The teacher arranges the five students in a line and asks them to turn and identify, “Who’s *after* you? Who’s *before* you?” The teacher then talks about how this works with numbers too. She uses a cut-out arrow to point to a number in a sequence to 10 written on the tabletop. She then asks students to point to numbers that are directly ‘before’, and ‘after’. Students then write the number themselves on the table with whiteboard pens. They each use number strips and put their finger on a number, then write the number that comes before, and after. They then continue this exercise on paper.



### **Practice area 3: Teachers provide dedicated maths time every day so all students engage meaningfully in learning**

This practice area is about providing daily opportunities to learn and practise maths. Daily maths should be timetabled, purposeful, and sequenced in a way that builds on existing knowledge and prepares students for further complexity. Within the time that is dedicated to maths, every effort should be made to maximise the time spent learning.

#### **Key teacher practices are:**

- a) teachers support students to learn, practice, create, and use maths daily
- b) teachers show students how to use maths procedures and skills accurately, efficiently, and flexibly
- c) teachers prompt students to talk about their maths ideas
- d) teachers provide cognitively challenging mathematics activities.

#### **Why this is important**

Focused daily maths time is needed for students to continually develop their foundational maths skills and knowledge. Studies show that students achieve better in maths when they have daily exposure to maths instruction, time to practice, and opportunities for application and critical thinking. At this early stage of their maths journey, it is important students have sufficient time to interact with and familiarise with maths concepts. This involves providing students with learning experiences at a pace that challenges them and supports their continued progress.

#### **What this can look like in real life**

Leaders and teachers in one school have reviewed their approach to maths across the junior school. They put strategies in place to ensure there is a consistent approach to prioritising and implementing maths. This includes a schoolwide discussion on maths topics, followed by planning sessions in the syndicate, with a strong focus on unpacking maths concepts.

To strengthen their focus on maths, teachers have established a consistent ‘maths time’ at the start of each day – the time that they had noticed students are most engaged. All teachers work through agreed content, and undertake assessments at the same time at the end of a unit. In their review, they had also recognised that the areas of weakest performance (e.g. fractions) were taught later in the year. To remedy this, fractions was brought to the start of the year, for more focus and stronger effort.



### **Practice area 4: Teachers notice when students require extra support for learning and provide effective targeted teaching**

This practice area is about paying attention to students who demonstrate a lack of engagement, motivation, or success in maths. Teachers recognise when to support or extend a student, when to move on to new learning, or when to spend longer on an area to consolidate learning for individual students. Teachers need to understand any barriers to learning and find effective ways to ensure all students make progress.

**Key teacher practices are:**

- a) teachers identify and monitor students who need additional support
- b) teachers partner with others and are supported to implement targeted approaches
- c) teachers support students with identified needs to access and engage through planned and targeted interventions
- d) teachers extend competent maths students through adding challenge and complexity.

**Why this is important**

Foundational maths concepts and attitudes that are learnt during the first few years of school set students up for success – or struggle – for the rest of their maths journey, even into adulthood. Early experiences of maths leave lasting impressions and impact on students' ongoing achievement. It is essential teachers are alert to early signs of difficulty or disengagement, and act on these promptly.

**What this can look like in real life**

At one school, teacher aides who are thoroughly trained in a targeted maths intervention run a 15-minute structured programme during the class maths lesson. These sessions are designed with the teachers to attend to the specific areas of maths learning that students require support with, and content is clearly linked to the content of the main session. Students in the intervention group join their peers for the majority of daily maths time.

**Practice area 5: Teachers use tools and representations to express mathematical concepts**

This practice area is about teachers intentionally using a range of materials, specialised equipment, diagrams, and symbols as they introduce or reinforce maths concepts. They model how to use and apply tools and representations, supporting students to understand and express ideas related to the concepts being taught.

**Key teacher practices are:**

- a) teachers plan how to use tools and representations, based on a clear rationale
- b) teachers make clear links between maths concepts and tools and representations
- c) teachers encourage students to use or adapt tools and representations to express their maths ideas.

**Why this is important**

Mathematics is highly abstract, and students need good support to be able to make sense of these abstract ideas. Providing deliberate strategies for making these links is a key part of the teacher's role. Evidence shows that tools and representations help young students to build their mental models of key maths concepts and processes, by making connections to the physical ('real') world.



### What this can look like in real life

A teacher plans a lesson for a Year 2 group to focus on dividing 24 counters into four groups – but ensures she also has fraction strips, an abacus, and multiplication arrays handy. During the lesson, this preparation helps her to reinforce the learning for some students by modelling connections to fractions and repeated addition, as well as multiplication and division.



### Practice area 6: The classroom learning environment encourages mathematical thinking, collaboration, and the enjoyment of maths

This practice area involves physical set-up (the classroom itself) as well as emotional and behavioural set-up (behaviours, values, and rules). For example, teachers might arrange displays and seating to promote participation, talk explicitly about rules and expectations for respectful maths debate, and provide plenty of opportunities for students to talk about maths with their peers, confidently take part in discussions, and record and communicate their ideas.

#### Key teacher practices are:

- teachers learn about students and their relationship with maths
- teachers build a classroom culture that encourages engagement in maths learning
- teachers organise the classroom environment to encourage engagement in maths learning.

#### Why this is important

Classroom environments can encourage – or discourage – engagement and learning, setting the scene for each maths lesson. This is true through the physical environment (how the classroom is arranged) and the emotional environment (whether learning about and discussing maths feels safe and inviting).

With targeted actions, teachers can create a classroom culture where all students feel confident to contribute ideas, participate in maths talk, express their ideas, learn from their mistakes, try different maths methods, and problem-solve with and learn from their peers. The way teachers encourage and respond to students, and how classmates work with one another, is crucial. Good rules and expectations can help with this.

### What this can look like in real life

A teacher purposefully roams the classroom and observes maths group tasks, with particular attention paid to whether some students are doing more of the work while others are passive. The teacher intervenes to remind the group about agreed practices for maths group work, for example, ‘everyone shares ideas.’



### Practice area 7: Teachers make the most of moments throughout the day to highlight and use maths

This practice area is about teachers strengthening students’ understandings of maths by highlighting all the ways that maths ideas are relevant within their world – not only in maths lessons. This can occur in planned or spontaneous ways, within the range of everyday activities that take place in a school day, including routines, play, and other curriculum areas.

**Key teacher practices are:**

- a) teachers plan how maths ideas are incorporated into a range of activities
- b) teachers make links to maths when teaching other curriculum areas
- c) teachers find spontaneous ways to bring maths concepts into play and routine tasks.

**Why this is important**

Regularly highlighting maths concepts in contexts that *aren't* maths sessions helps students to see the 'hidden maths' that is all around, which can ignite their interest, curiosity, and maths learning. When maths keeps popping up in everyday activities, like routines and other subject areas, this demonstrates the relevance and application of maths throughout students' lives. This practice also provides additional, meaningful opportunities to practise maths skills.

**What this can look like in real life**

During cross-country training, students receive a bean for every lap they run. After training, they work together to update a class bar graph that shows their number of laps.



## **Practice area 8: Maths classes reflect the cultures of their students and whānau**

This practice area is about reflecting the cultures of students through the choice of tasks, the scenarios used for problem solving, or the materials used in teaching and learning.

**Key teacher practices are:**

- a) teachers demonstrate and help all students make connections between maths and te ao Māori
- b) teachers ensure maths tasks include contexts, content, or approaches that are culturally relevant to students
- c) teachers use the classroom environment to promote interest in maths through cultural contexts, symbols, materials, and artefacts.

**Why this is important**

Students find maths more relevant and interesting when maths tasks are clearly linked to their culture, language, and home experiences. As well as supporting interest and engagement, using familiar contexts also reduces the 'cognitive load' for students: all their focus can be on understanding the maths problem – rather than *also* trying to make sense of an unfamiliar context.

**What this can look like in real life**

In a class with a high proportion of Pacific students, the context of White Sunday is used for setting maths word problems. For example: 'Nearly all of Sione's aiga attended White Sunday at his church last week. Here are the different people in his family (using photographs or diagrams). How many altogether? Half of the 150 people at the church were children – how many children were there?'



## Practice area 9: Teachers work in partnership with families / whānau to support maths learning

This practice area is about teachers working closely with families to learn about maths practices within home contexts, showing or talking with whānau about what maths looks like in their child's classroom, and offering ideas and resources so that they can support their child with maths in their home and community.

### Key teacher practices are:

- a) teachers talk about maths learning with families/whānau
- b) teachers provide maths information and resources to families/whānau to reinforce what is being learnt in the classroom.

### Why this is important

It's important for young students to see themselves as capable maths students, experience maths concepts and ideas in a range of contexts, and have opportunities to practice and use maths in ways that feel relevant to them. Strong home-school partnerships help with all of these. Teachers can work with families/whānau to ensure that students benefit from shared, positive messages about their maths capability and the value of maths learning, as well as reinforce and embed the learning that happens in the classroom.

### What this can look like in real life

Some schools hold open days for families/whānau to attend classes during maths time. These sessions purposefully demonstrate how teachers and students use equipment, how students work together, the role of games as part of a maths teaching session, and how teachers provide explicit teaching. This supports families to understand what maths teaching and learning looks like, and how 'maths talk' can easily be incorporated at home.

These nine key areas work as a set of effective practices. When teachers develop proficiency in each of these areas, supported by the enablers of good teacher knowledge and effective school conditions, the evidence shows that students benefit. This means that Year 1–3 teachers have the opportunity to set learners up with a crucial foundation for positive learning and life outcomes well beyond these early years.

## What next?

Maths teaching and learning needs improvement. Our achievement picture isn't strong, and not all teachers are confident about teaching maths. Worrying maths results from late primary school and beyond have their roots in the preparation that students receive – or don't – in their early years at school. Now is the time to support teachers with deliberate, practical strategies that make a difference.

Great maths teaching starts with teachers *valuing maths*. When maths is prioritised, this is visible through teacher actions like dedicated daily maths time, weaving maths learning throughout other curriculum areas, purposeful use of maths talk, linking students' interests and cultures back to maths ideas, and making great tools and materials available and well understood.

This all starts with clear messages from teachers: that maths is important, maths connects to their world, maths is fun and interesting, and maths is for everyone.

ERO's research report and guide for teachers are designed to equip and inspire Year 1–3 teachers to improve their maths teaching. These resources can be downloaded for free from ERO's website, [www.evidence.ero.govt.nz](http://www.evidence.ero.govt.nz)

- Main report: *Making it Count: Teaching Maths in Years 1 to 3*  
<https://evidence.ero.govt.nz/documents/making-it-count-teaching-maths-in-years-1-to-3>
- Practical guide for teachers: *Guide for Teachers: Teaching Maths in Years 1 to 3*  
<https://evidence.ero.govt.nz/documents/guide-for-teachers-teaching-maths-in-years-1-to-3>

## Useful resources

In addition to ERO's report and guide, there are a range of resources available for teachers interested in improving their teaching of maths in Years 1–3. Links and information about some of these resources are set out below. Leaders and teachers can also seek support and resources from their regional Ministry of Education office.

- Tāhūrangi – New Zealand Curriculum resources: <https://newzealandcurriculum.tahurangi.education.govt.nz>
- For principals – the Ministry's *Leading mathematics teaching and learning in Years 1–8: What principals need to know and be able to do*: [https://nzcurriculum.tki.org.nz/content/download/169510/1250686/file/CO3072\\_Maths\\_Principals\\_011-web.pdf](https://nzcurriculum.tki.org.nz/content/download/169510/1250686/file/CO3072_Maths_Principals_011-web.pdf)
- The Education Hub: <https://theeducationhub.org.nz/?s=math>
- NZMaths (note that some material is migrating to the Tāhūrangi site): <https://nzmaths.co.nz/>
- *Teaching Primary School Mathematics and Statistics: Evidence-Based Practice* by Robin Averill and Roger Harvey: <https://www.nzcer.org.nz/nzcerpress/teaching-primary-school-mathematics-and-statistics-evidence-based-practice>
- ERO's *Practical guide for teachers: What quality teacher aide practice looks like* (particularly the section on 'delivering structured interventions'): <https://evidence.ero.govt.nz/documents/a-practical-guide-for-teachers-what-quality-teacher-aide-practice-looks-like>
- *Improving mathematics in the early years and Key Stage 1*, from the Education Endowment Foundation in the UK: [https://d2tic4wvo1iusb.cloudfront.net/production/eef-guidance-reports/early-maths/EEF\\_Maths\\_EY\\_KS1\\_Guidance\\_Report.pdf?v=1699919581](https://d2tic4wvo1iusb.cloudfront.net/production/eef-guidance-reports/early-maths/EEF_Maths_EY_KS1_Guidance_Report.pdf?v=1699919581)
- 'Learning trajectories' early years resources: <https://www.learningtrajectories.org/math/learning-trajectories>
- Resources from the National Council of Teachers of Mathematics, a worldwide network based in the USA: <https://www.nctm.org/classroomresources/>
- Resources from the NRICH Project, at the University of Cambridge: <https://nrich.maths.org/8495>

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