The Maths Guarantee:

How to implement great maths teaching in primary schools

A guide for principals

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This guide accompanies Grattan Institute's April 2025 report, *The Maths Guarantee: How to boost students' learning in primary schools*.

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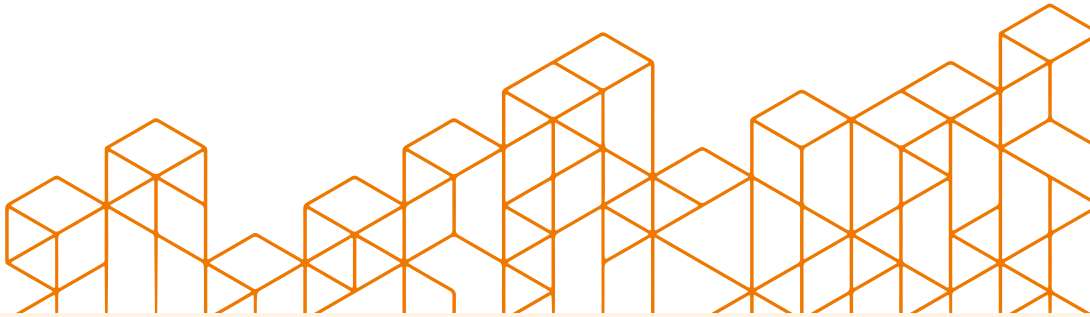


Overview

Maths is essential for daily life, whether completing calculations at work or figuring out the household budget. When we teach maths well, children and the nation benefit.

But Australia's underperformance in maths is stark: one third of our students fail to reach proficiency in NAPLAN, and our top performers lag far behind the best in the world.

The critical foundations for maths are set in primary school. But teaching primary school maths isn't as straightforward as it seems.

Students learn best when they are taught new content explicitly step-by-step, given lots of time for practice and to develop fluency, and have opportunities to apply new concepts and skills to novel problems. This requires a carefully sequenced curriculum that expertly guides learning from Foundation to Year 6, supported by a consistent teaching approach from classroom to classroom.

This approach is also best for teachers. Teaching this way helps make students' learning visible to teachers, so they can identify any adjustments they need to make, and whether any students need extra help.

Working collaboratively with peers and instructional experts, teachers can also strengthen their own maths knowledge, hone their practice, save hours of planning time, and enjoy the professional reward of seeing their students succeed.

Unfortunately, this approach is not embedded in all Australian schools. Grattan Institute's April 2025 report, *The Maths Guarantee: How to boost students' learning in primary schools*, sets out what governments and sector leaders should do to help tackle this problem.

But principals should not wait for others to act. This guide sets out practical steps school leaders can take now to embed great maths teaching. It draws on the lessons we learnt studying seven schools across Australia that exemplify great practice. We hope that sharing their experiences will help others start their improvement journey.

Section 1 explains why primary schools should focus on improving maths performance.

Section 2 sets out the key elements of a systematic approach to maths teaching.

Section 3 breaks down how the research informs key features of a systematic, school-wide approach to maths, including setting aside purposeful time for maths, using shared curriculum materials, and building teacher expertise.

Section 4 sets out key steps principals can take to embed this in their school.

1. Why primary maths teaching matters

Too many Australian students are failing to learn essential maths skills, and too few excel at maths. Ensuring strong mathematical foundations in primary school is essential for students' success in secondary school and beyond.

1.1 Australian students are not mastering the maths they need

Maths remains as important as ever. Strong maths skills empower people to make better personal decisions, from health to family finances. Adults with strong maths skills are better able to secure higher-paying jobs, and are better prepared for an increasingly technological future.[1]

But too few Australian students are proficient in maths or achieve excellence. NAPLAN results suggest more than a million current school students risk leaving school without a solid foundation in maths. Disadvantaged students are years behind their peers. And Australia's maths performance is dwarfed by global leaders such as Singapore.

1.2 Strong maths foundations in primary school are the key to future success

Maths skills develop cumulatively over time. Students who have mastered basic counting will find it easier to tackle addition and subtraction. Comfort with addition and subtraction precedes competence with multiplication and division. These, in turn, support later success in fractions and algebra.

Students who fall behind often get stuck, and risk developing negative attitudes that affect their wellbeing and engagement with school. Conversely, strong primary maths foundations enable students to succeed in later years and adult life.[2]

Figure 1: Primary teachers need more help with maths teaching

Teachers we surveyed told us about the challenges they experience with teaching maths:

- **Less than half** said that teachers in their school agree on how maths should be taught
- Only **2 in 3 teachers** said their school has mapped out the maths curriculum taught in each term
- Only **2 in 5 teachers** said they use agreed textbooks or lesson materials
- Only **2 in 5 teachers** agreed that professional learning at their school left them more confident to teach maths effectively
- **Less than half** received feedback on their maths teaching over the past 12 months.

Note: Total number of responses – from top statement to bottom statement – were 1,512, 1,512, 1,501, 1,206, and 1,418.

Source: 2024 Grattan Institute survey on primary maths teaching.

[1] Hunter et al (2025), *The Maths Guarantee: How to boost students' learning in primary schools*, Grattan Institute.

[2] Ibid.

Students at Charlestown South Public School.

Research confirms that a systematic approach to primary maths instruction is essential – but also that it is very difficult for teachers to adopt this approach on their own.[3] Some primary teachers in Australia lack confidence teaching maths, and many are not sure about best practice. Most need better curriculum materials and professional development (see Figure 1).

Our case study schools show it is possible to turn this around (see Box 1).

1.3 A systematic approach to teaching maths brings big benefits

A systematic approach to primary maths teaching ensures students receive consistent, sequential instruction that builds knowledge and fills any gaps in their learning. This helps create successful, confident mathematicians. A coordinated, school-wide approach also ensures teachers have sustainable workloads. Teaching maths as efficiently as possible creates more time for other subjects and learning experiences too, such as history, choir, sport, and excursions.

Box 2 shows how Bentleigh West Primary School embedded a systematic approach, transforming maths teaching and student results.

1.4 Effective school leadership is essential

Effective school leadership is essential for change. While enthusiastic teachers can drive innovation, leadership is critical to establish a shared vision, make the trade-offs required, foster a strong professional culture, and coordinate and weave together the individual components of a great maths program. Designing, embedding, and sustaining a strong approach takes long-term commitment.

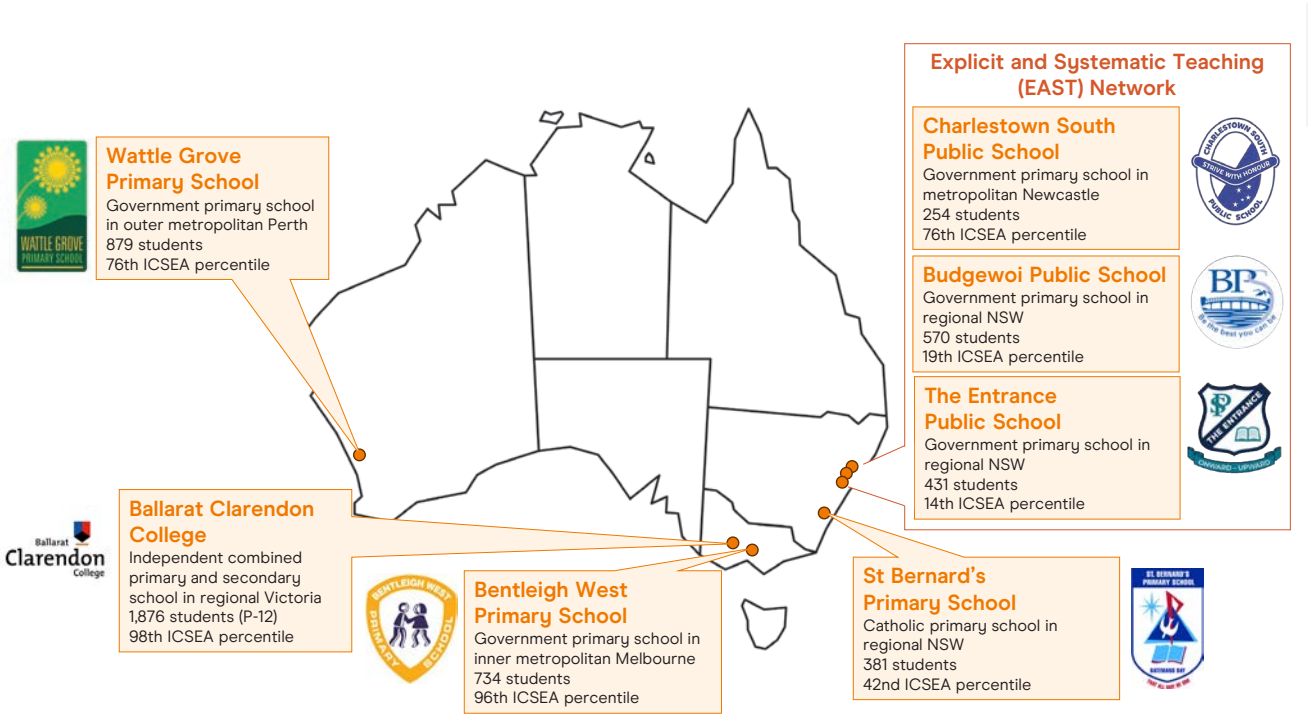
[3] See Hunter et al (2025), *The Maths Guarantee: How to boost students' learning in primary schools*, Grattan Institute.

Box 1: Our research with teachers and school leaders underpins this guide

For this report, we examined the research literature on effective maths teaching, conducted a survey of 1,745 teachers and school leaders, studied seven primary schools that have embedded exemplary maths teaching, and examined high-performing education systems in England and Singapore.

This guide focuses mainly on what we learnt from the seven case study schools' approaches to implementing systematic maths teaching. These schools are in very different contexts across NSW, Victoria, and Western Australia (see Figure 2). All are shifting the dial for teachers and students in remarkable ways.

Figure 2: Our case study schools have embedded systematic maths teaching in very diverse contexts



Notes: The Index of Community Socio-Educational Advantage (ICSEA) measures the level of students' educational advantage. The 100th percentile is the most advantaged. School demographic data are for 2024, aligned to the timing of school visits.
Sources: ACARA (2024) and the Grattan Institute case study schools.

A teacher and students at Bentleigh West Primary School.

Box 2: How Bentleigh West transformed maths teaching

Before 2014, Bentleigh West was a 'coasting school', achieving unremarkable student results for an advantaged community in Melbourne.

Maths instruction was focused on 'maths-lite' games and activities. There were no shared curriculum materials for maths. As a result, teachers spent countless hours designing their own lessons. With teachers planning solo, students were buffeted by a disjointed maths curriculum that failed to build sequentially year-on-year. In 2014, Year 5 students were performing below their peers in schools with similar students. Many were falling well behind and needed extra help.

Put simply, maths was not a priority. 'It was always the first thing dropped,' the current principal told us. The literacy block may have been sacred, but maths often got squeezed out of the timetable.

When the previous principal at Bentleigh West arrived in 2014, he knew things had to change. From then, school leaders worked relentlessly to turn around classroom maths instruction, implementing:

- a common timetable that guaranteed students 90 minutes of maths every day*;
- a common instructional approach for maths lessons, with all classes explicitly taught new content step-by-step, lots of opportunities for practice, dedicated time for problem solving, and the expectation of mastery;
- a whole-school, sequenced maths curriculum, that broke down the content into lesson-by-lesson chunks and included shared lesson materials such as PowerPoint slides and worksheets;
- weekly assessments to check students' learning, with Friday's maths lesson devoted to 're-teaching' content students were struggling with, and extending students who had already mastered it;
- a maths assessment schedule, including external assessments, to provide an independent measure of students' learning progress; and
- an extension class timetable for high-achieving students.

The benefits for students have been enormous. Classroom routines reduce disruptive behaviour, meaning more time can be focused on maths. Clear explanations and ample practice mean students make quick progress – students now complete both the Foundation and Year 1 maths curriculum in the first year of school.

All of this builds students' confidence and enjoyment of maths. One teacher told us: 'When I say it's time for maths, they cheer – they love it!'

Teachers benefit too. Seeing their students succeed is deeply satisfying. Reflecting on earlier experiences at previous schools, an experienced teacher told us:

> *I never felt like I was effective. Now I feel successful every day – I feel like I'm a great teacher.*

Teachers also save hours of lesson preparation time, giving them time to decide how to teach their students, rather than just what to teach.

The results are impressive. In 2024 NAPLAN numeracy, the average Year 5 student at Bentleigh West performed well above the average Year 5 student at other schools with similar students. And, incredibly, their average achievement was higher than the average achievement of Australian Year 9 students. Half of Bentleigh West's Year 5s scored in the highest NAPLAN achievement level, and far fewer needed catch-up support than in 2014.

These results are a fantastic reward for the sustained efforts of students and teachers. One of the school's leaders told us:

> *I remember one of the first years that a group that had explicit maths instruction from Prep moved through to Year 3. We were almost crying in the office, because we got good results. We were literally hugging and jumping around in a circle because we were so excited – it had worked!*

**Bentleigh West has found that, over time, it could shorten the total weekly time for maths by 45 minutes.*

A teacher and students at Bentleigh West Primary School.

2. Why a systematic approach to teaching maths is best

This chapter outlines what effective maths teaching involves. It is based on Grattan Institute's summary of high-quality research (drawing on meta-analyses and syntheses of peer-reviewed papers, including empirical studies where possible). It also draws on the practical insights shared by our case study schools and teachers we consulted on how to translate this evidence into classroom practice. The policy report that accompanies this guide includes a list of references, and at the end of this guide we suggest some further reading.[4]

[4] Hyperlinks in this section are to videos, blogs, and other practical tools that will help teachers implement the evidence. We have included select citations in footnotes where this guide expands on the literature referenced in the accompanying policy report.

2.1 Teaching approaches should match students' stage of learning

All maths teachers share a common goal: for students to be able to tackle novel maths problems successfully. The instructional hierarchy provides a useful framework for thinking about the instructional sequence teachers can use to achieve this goal.

At its core is the idea that teachers need to help students build accuracy and fluency with a skill or concept, to set them up to successfully apply what they've learnt to novel contexts. This instructional sequence aligns with insights from cognitive science about how memory functions during learning (see Box 3).

The instructional hierarchy suggests that different teaching approaches are better suited to different stages of learning, depending on students' degree of mastery and understanding of a target skill or concept (see Figure 3).

For example, while it can be tempting to teach primary maths mostly through open-ended tasks, which may have multiple solutions, this approach tends to be less effective for students still in the acquisition stage of learning. During this initial acquisition stage, explicitly teaching new skills or concepts, and providing lots of opportunities to practice with immediate teacher feedback, is more effective. This increases the odds the students succeed in maths, and means they are less likely to feel anxious about maths (see Box 4).

Box 3: Great maths teaching recognises the limitations of working memory

We all know what it's like to meet a group of people and, by the time the last person has said their name, we've forgotten the name of the first person in the group. This is an example of how humans' working memory lets us down and is why teachers need to manage **cognitive load**.[5]

In simple terms, the brain processes information in **working memory**. But working memory is limited. It can only hold about two-to-five chunks of information for less than 30 seconds without reinforcement.[6]

This has major implications for learning maths. When the total mental demands of a maths problem exceed working memory's capacity to process that information, students are likely to suffer **cognitive overload** – the experience of being overwhelmed with information.

Thankfully, **long-term memory** provides a workaround. The capacity of long-term memory is virtually unlimited. And information in long-term memory can be readily accessed, without taking up limited slots available in working memory. This means students will find it easier to solve a maths problem if they can draw on relevant information already stored in their long-term memory.

With enough exposure to the new information and opportunities to practice it (saying a name repeatedly, for example), humans can store new information in long-term memory. New information is more likely to be encoded in long-term memory if it is connected to what students already know. Teachers should therefore link new maths concepts to previous learning, to help students understand how maths topics interrelate.

What are some implications of memory for maths teaching?

- Schools should seek to build foundational maths knowledge and skills in students' long-term memory as efficiently as possible. With a lot of ground to cover, and only about 200 hours of class time devoted to maths each year, schools don't have a minute to waste.
- Schools should carefully analyse the burden on working memory posed by what they are asking students to do in maths, and whether students have sufficient knowledge in long-term memory to do it.
- When students have little pre-existing information in their long-term memory (that is, they are novices), teachers should break new learning into small chunks and provide more scaffolding (for example, through worked examples) to prevent cognitive overload.
- When students already have a lot of information stored in long-term memory (that is, they are experts, relatively speaking), teachers should increase the difficulty of tasks while providing appropriate support. These tasks may include multi-step problems and open-ended application problems that require students to synthesise different maths skills. Teachers should explicitly teach students strategies for solving such problems.

[5] Example from Woo, E. (2025, April 1). What is the most difficult mathematics question you've ever solved? [Video recording].

[6] Estimates vary but children are typically at the lower end of this range. See Hartman, J. R., Hart, S., Nelson, E. A., & Kirschner, P. A. (2023). Designing mathematics standards in agreement with science. *International Electronic Journal of Mathematics Education*, 18(3). https://doi.org/10.29333/iejme/13179; and Lovell, O., & Sherrington, T. (2020). *Sweller's cognitive load theory in action.* John Catt.

Figure 3: Teaching approaches should match students' stage of learning

Stage	Goal	Teaching approach
Acquisition	Students nearly always respond accurately without assistance.	• **Explicit teaching:** clear explanations, worked examples, guided practice, immediate feedback. • **Blocked practice:** repeated practice using the same skill or knowledge.
Fluency	Students maintain accuracy and build speed. They recall facts and execute procedures with 'automaticity' (i.e. little conscious effort).	• **Timed practice:** students race against the clock and try to beat their personal best.
Generalisation	Students apply the skill or knowledge in novel contexts, without confusing it with similar skills or knowledge.	• **Non-routine tasks:** more complex problems, that may have multiple steps, be open-ended, or have several possible solutions. • **Interleaved practice:** varied questions so that practice requires students to discriminate when to use a skill or knowledge.
Maintenance	Students sustain accurate and fluent performance.	• **Spaced, retrieval practice:** students periodically revisit learnt material.

Notes: The original framework from Haring and Eaton (1978) distinguishes between *generalisation* (when the student figures out when to use the target skill and discriminates between it and similar skills) and *adaptation* (when the student adapts the target skill to novel situations). These stages are sometimes bundled, as we have done. *Maintenance* appears as a stage in Rivera and Bryant (1992), and we have added it here as an overlay across the other stages.

2.2 Acquisition: Teaching new content

The most effective way to teach new content is to teach it explicitly.

Teaching explicitly means that teachers:

- clearly explain what students need to know and how it's connected to what they've already learnt;
- model worked examples step-by-step;
- provide students with plenty of opportunities for practice; and
- give students immediate feedback so students know if they are on track or not.

Teaching new content explicitly is more effective and efficient than approaches where students try to deduce the maths themselves before teachers explain it. When teachers explain new maths materials upfront and guide students through practice, it maximises learning for every minute of teaching. This means that students can develop deeper and broader knowledge in maths within a given school year.

When introducing maths concepts and procedures, concrete representations (such as plastic counters or base ten blocks) and pictorial representations (such as number lines) can aid students' understanding. When using these physical or visual aids, it is important that teachers present them alongside the corresponding abstract mathematical notation. For example, a teacher would show base ten blocks alongside the written mathematical notation when introducing the column method of two-digit by two-digit addition with regrouping (as demonstrated in this video).

But teachers should resist the temptation to pull out concrete representations at every opportunity. The ultimate goal is for students to use maths symbols confidently, without relying on concrete representations. Using concrete representations for calculations is time-consuming (adding 28 + 35 using column addition is easier than physically counting out the correct number of base ten blocks), so students need to quickly become skilled at working without them.

Some further things to avoid are:

- using many different concrete representations and pictorial representations (e.g. practising counting with counters one day, and animal figurines the next, then LEGO bricks after that) when one will suffice. See tips here;
- using concrete representations that might create confusion. For example, students might have played with pattern blocks – wooden blocks that can be tessellated – to learn about shapes. These are sometimes used to teach fractions, but this can be confusing if students are used to seeing each block as a whole; and
- using representations with distracting elements or extraneous details (pictures of different types of puppies might be more cognitively burdensome to practise counting than images of plain circles).

Box 4: Teaching maths effectively is the best way to prevent maths anxiety

Maths anxiety is the worry and tension that students can feel when doing maths.

When maths anxiety is severe, the intense feelings of nervousness may impede working memory. This makes it hard for students to solve maths problems.

The good news is that research suggests maths anxiety is mostly a learnt fear linked to poor prior maths achievement. Therefore, helping students develop strong mathematical foundations can build confidence in maths, and combat anxiety.

Simply avoiding maths for fear it will cause students anxiety is not a productive response. Teachers should also be wary of dedicating excessive class time to, for example, giving students deep-breathing exercises or asking them to write down their negative emotions about maths at the expense of time spent on learning maths.

Do

- Introduce new material in small chunks with clear, bite-sized learning intentions (e.g. 'We are learning to share equally between four groups').
- Use precise mathematical vocabulary.
- Provide immediate feedback so students know if they are succeeding. Universal response mechanisms – such as mini whiteboards – can be helpful here.
- Show non-standard examples and non-examples to aid your explanation.
- Give students partially completed problems or problem pairs as a way of gradually reducing the amount of guidance.
- Identify and address misconceptions (e.g. 'Some of you may think 0.23 is bigger than 0.3, because 23 is bigger than 3. But remember that 3 tenths can be renamed as 30 hundredths, which is bigger than 23 hundredths, so 0.3 is bigger than 0.23.'). Once students have built a solid foundation, include practice questions that can only be answered correctly if student do not hold the misconception (rather than avoiding these cases entirely).
- When first introducing most maths procedures, explain why the procedure works with reference to the mathematical concepts that underpin it (see examples here for division procedures). It's OK if some students don't grasp this explanation immediately (for example, they can't explain it to a friend), because knowing the procedure will help deepen their understanding of the concepts over time.

Don't

- Don't ask students to explain things which you have not taught them.
- Don't skimp on working through a series of problems as part of whole-class guided practice (i.e. 'we do').

A student at Wattle Grove Primary School.

2.3 Fluency: Building speed while sustaining accuracy

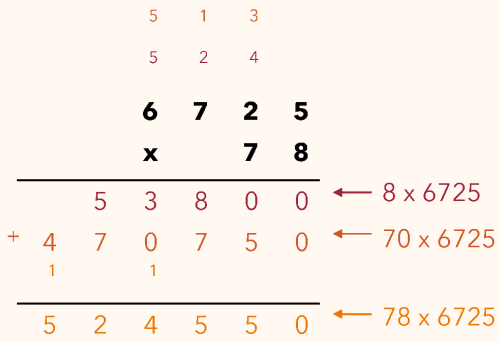
Once students are consistently able to provide accurate responses (that is, they get around 90 per cent or more of problems correct), but still do so haltingly, they need to develop fluency.

Fluency is a combination of speed and accuracy. When students are fluent, they readily retrieve a procedure or mathematical fact from their long-term memory. With enough practice, students will be able to carry out that procedure or recall that fact with almost subconscious ease.

Fluency practice supports students' ability to solve worded problems and generalise what they know to tackle real-life scenarios. Fluency also builds students' understanding of maths topics – they are mutually reinforcing. For example, explaining the procedure for column addition and having students practise it can strengthen their grasp of place value concepts.

Fluency also makes multi-step problems easier. Figure 4 shows why. This Year 5 question is much easier for students who have fact fluency – that is, students who can readily retrieve simple addition facts (e.g. 16 + 4 = 20) and the 7 and 8 times tables from their long-term memory.

Figure 4 - An example of why fact fluency matters



For this problem, if students use the standard algorithm, they will do:

8 multiplication facts

11 addition facts

19 simple calculations in total

- Kylie takes 10 seconds to do each simple multiplication and sum.
- She relies on inefficient strategies, such as skip counting (e.g. 7, 14, 21) and summing on her fingers.
- It takes her more than 3 minutes to do the problem.
- Her cognitive resources are spent calculating, increasing the chance she experiences cognitive overload and makes mistakes (such as forgetting to record the placeholder 0 when multiplying by the tens digit).

- Fatima has memorised her maths facts.
- She knows each simple sum and multiplication fact by heart, so it only takes her 30 seconds to complete the problem.
- She does about three problems in the time it takes Kylie to do one.
- She can expend her cognitive resources on correctly carrying out the vertical multiplication procedure, rather than calculating each simple fact.

Students who are fluent are also better prepared for multi-step worded problems like this:

> *It's the school fair!*
>
> *You're in charge of the lolly stand and have a $200 gift card to order the lollies you need. If you order 18 boxes of assorted sweets for $7.50 each, how much remains on the card?*

The good news for schools is that there is a solid body of evidence on how to build students' fact fluency (see Box 5).

To build fluency, students should complete some timed practice. Once students achieve a high degree of accuracy, timed practice gives teachers more information about what students have mastered and stored in their long-term memories.

Timed practice results in rate-based metrics such as 'digits correct per minute' (for a student who gave the following answers: 4 + 5 = 9 would be one digit correct, 4 + 8 = 12 would be two digits correct, and 7 x 6 = 41 would be one digit correct because the tens digit is correct but the ones digit is not). Rate-based measures allow teachers to determine if students still need to work on fluency (if their digits correct per minute rate is low) or have mastered the skill and are ready for generalisation (if their digits correct per minute rate is relatively high).

Teachers should not worry that adding time pressure to practice may make students anxious and lead to them disliking maths. This worry isn't well supported by research.

Some of this practice is likely to be repetitive, such as repeatedly practising the procedure for column addition or division facts. This is fine. Mastering most hard things requires practice, as any budding athlete or musical performer can attest. This type of practice can also be fun and is a great way for students to experience success, which itself is highly motivating.

Primary schools should build students' fluency in a range of procedures and maths facts, including:

- addition facts up to 10 + 10 and related subtraction facts;
- multiplication facts up to at least 12 x 12 and related division facts;
- prime, composite, and square numbers (up to 100);
- unit conversions (e.g. 100cm = 1m);
- common decimal, fraction, and percentage benchmarks (e.g. 0.25 = ¼ = 25%);
- the formal, written algorithms for addition, subtraction, multiplication, and division;
- applying the operations above to decimals and fractions;
- fraction, decimal, and percentage increase and decrease (i.e. discount) procedures; and
- applying the order of operations.[7]

Do

- Consider using evidence-informed digital apps to gamify practice and ensure students are practising skills they are not yet fluent with.
- Ensure students can see their progress – perhaps in a graph – and celebrate success along the way.[8]

Don't

- Don't keep students continually practising skills they are already fluent in, rather than moving them on to new skills or application opportunities.
- Don't wait to get started on procedural practice, even if students may not yet have a full grasp of the underlying maths knowledge (for example, an ability to describe or visually depict the underlying concept, and explain how it connects to others). Mastery of a procedure reinforces – and sometimes precedes – students' understanding of the 'why'.

[7] This list goes beyond the expectations of the Australian curriculum and state variants. Examples of mastery goals by grade level in the US can be found here and here.

[8] See Codding, R. S., Chan-Iannetta, L., Palmer, M., & Lukito, G. (2009). Examining a classwide application of cover-copy-compare with and without goal setting to enhance mathematics fluency. *School Psychology Quarterly*, 24(3), 173–185. https://doi.org/10.1037/a0017192; and Sides, J. D., & Cuevas, J. A. (2020). Effect of goal setting for motivation, self-efficacy, and performance in elementary mathematics. *International Journal of Instruction*, 13(4), 1–16.

Box 5: How to help students become fluent with maths facts

Automatic recall of facts (e.g. that 6 + 7 = 13) is essential for success in maths. 'Automatic' means that students can respond without hesitation. Benchmarks for automaticity vary by age and skill: for example, one Grade 3 times tables benchmark is at least 40 digits correct per minute.

To develop this, students should do short, daily bouts of fluency practice. Even just four minutes per day can make a big difference.

When students are first learning maths facts, they should be taught strategies to derive those maths facts. For example, they might learn 6 + 7 by counting up or using near doubles (i.e. 6 + 6 + 1 = 12 + 1 = 13).[9]

But always relying on strategies is inefficient, which is why teachers need to plan for students to progress to a point where the fact is securely stored in – and rapidly retrievable from – long-term memory.

When students are still committing facts to long-term memory, teachers can ask students to:

- use flashcards, splitting facts into 'known' and 'unknown' piles. This can work well with students testing each other in pairs;
- use cover, copy, compare – a method where students look at the problem (e.g. 3 x 7 = 21), cover it up, and try and write it down from memory; and
- use incremental rehearsal, so students are only practising one unknown fact at a time.

When students have the facts stored in their long-term memory, but still need more practice building their recall speed, teachers can get students to:

- race against the clock to answer as many questions from a worksheet as they can within a time limit (such as 2 minutes). Students can then self-correct (or correct a peer's work) and chart their progress; and
- compete against the teacher or a recorded audio tape to try to be the first to say aloud the answer to a maths problem.

A student at The Entrance Public School.

[9] See Morano, S., Randolph, K., Markelz, A. M., & Church, N. (2020). Combining explicit strategy instruction and mastery practice to build arithmetic fact fluency. *Teaching Exceptional Children*, 53(1), 60-69; and Morano, S., & Aigotti, S. (2022). How to build declarative and procedural fluency simultaneously using complementary independent practice strategies. *Beyond Behavior*, 31(1), 53-64.

Source: The ideas in this box are adapted from Stokke, A. (2024). How to build automaticity with maths facts: A practical guide. *Chalk & Talk*.

2.4 Generalisation: Applying learning in new contexts

Once students are accurate and fluent with a maths topic, they are ready to apply this knowledge flexibly to more complex or novel problems.

At this stage, teachers should give students tasks that require them to discern when to use a skill. One way to achieve this is with sets of questions that involve a mix of question types (this is called 'interleaved practice').[10] Questions should be designed to require students to discriminate between problems and choose appropriate strategies. Often this means the questions have minimally different surface features (i.e. they are written to be as similar as possible) but require different solution methods. In the example below, students must choose whether to use addition or subtraction:

> *Kevin ate 5 M&M's, and he now has 9. How many did he start with?*
>
> *Kevin ate 5 M&M's, and he began with 9. How many does he now have?*

These worded problems are important for students to see maths in context and apply what they know (see Box 6).

At the generalisation phase, students also benefit from being challenged with non-routine problems, which are problems where the path to the solution is not immediately clear. These include open-ended problems; problems that present the maths skill in a different context; and problems that involve multiple components, requiring students to draw together various maths skills they have mastered. See examples here and rich tasks here (free login required).

Do

- Schedule cumulative reviews that span the different topics students have learnt and require them to select appropriate strategies for each question.
- Provide opportunities for students to apply their skills to new scenarios and more complex application tasks.

Don't

- Don't set tasks which involve a lot of extraneous elements, such as excessive cutting and pasting. Activities like these may divert students' attention from the mathematical thinking the task is intended to elicit, and also take up a lot of time without necessarily providing much instructional benefit.
- Don't let 'maths-lite' games dominate class time.

[10] Teachers should be cautious about interleaving questions when students are still struggling to accurately execute a skill (that is, when students remain in the 'acquisition' stage of learning). When guiding practice as part of explicitly teaching a new skill, it is best to provide students with questions similar to the worked examples (this is called 'blocked practice'). This approach allows students to focus on executing the target skill accurately, rather than also needing to decipher questions and determine which skill to apply. See discussion on page 11 in this interleaving guide.

Box 6: All students should be taught how to decipher worded problems

Worded problems help students to decipher a scenario and apply the maths they know in context – a core goal of learning maths. See this guide for more information on effective methods to teach mathematical problem solving.

Do

- Equip students with 'attack strategies' (often in the form of mnemonics), that give students a series of steps to follow to make sense of worded problems.
- Teach students to identify the underlying structure (or schema) of a problem (for example, a 'combine' problem involves putting together two or more parts).
- Show students how to use diagrams, such as bar models, to organise the information in worded problems.
- Have a whole-school approach to effective reading instruction so students can decode and comprehend worded problems. Explicitly teach maths vocabulary as part of this approach.

Don't

- Don't reserve worded problems for 'extension' or high-achievers only. Worded problems are an essential part of a healthy maths diet for all students.
- Don't associate key words with maths operations. For example, teaching students that 'altogether' indicates addition falls apart if students need to answer the question, *'Ali bought 3 packs of textas, with 4 textas in each pack. How many textas does Ali have altogether?'* For more on the dangers of this approach, see here.

2.5 Maintenance: Retaining proficiency

Students forget information over time unless they review it periodically (this is sometimes called the 'forgetting curve').

A systematic approach to teaching maths includes 'retrieval practice': practice in which students revisit previously learnt information. This type of practice helps students strengthen their long-term memory, identify gaps in their learning, and transfer what they know to novel situations.

Retrieval practice should be designed so that questions are appropriately challenging and should feel effortful for students – this should include questions that require students to apply knowledge (going beyond simple recall).[11]

There are no hard-and-fast rules for the optimal interval of time before revisiting previously learnt topics. What matters most is that students are retrieving information they have already been taught; that some time has passed since that information was taught; and that retrieval practice is spaced out, rather than concentrated in one lesson (such as a 'cramming session' before a unit test or end-of-term review).

Do

- Use a whole-school curriculum plan to space out when you revisit content. See example here.
- Consider including retrieval practice as part of short, fast-paced lesson warm-ups (sometimes called a 'daily review').
- Use tools such as mini whiteboards to ensure all students respond and the teacher can easily identify and correct misconceptions and wrong answers.

Don't

- Don't only include retrieval questions that focus solely on factual recall.
- Don't allocate too much time to retrieval, losing the class time needed to cover new material.

[11] AERO. (2022, January 21). Spacing and retrieval. Australian Education Research Organisation.

3. What schools need for systematic maths teaching

A coordinated, whole-school approach is needed to ensure students receive best-practice maths teaching across all seven years of primary school.

3.1 Key features of a whole-school approach

To implement the evidence base on systematic maths teaching, our case study schools adopted a coordinated, whole-school approach. This had six key features (see Figure 5).

Figure 5 – Features of a whole-school approach to systematic maths teaching

A shared vision for effective teaching that ensures all students get systematic instruction and adequate time for practice

A high-quality whole-school maths curriculum so students can comprehensively master all new concepts and skills

Shared instructional routines for engaging and responsive teaching

High-quality assessments to keep track of students' progress and monitor instructional effectiveness

Extra support for struggling and excelling students, so each can reach their potential

An effective approach to building teacher expertise so teachers have the knowledge and skills to teach maths well

3.2 A shared vision for effective teaching

Our case study schools had a shared vision for best-practice maths teaching, strongly grounded in the evidence base. They were committed to prioritising maths teaching and ensuring all students achieved success. Maths was regularly discussed during strategy planning days and was a core focus of professional learning. Principals and other school leaders felt personally responsible for maths results and ensuring teachers had the skills they needed to teach it confidently and effectively.

As part of their commitment to students' success in maths, school leaders made sure to schedule enough time for maths and protect it from the encroachment of other activities.

When Bentleigh West Primary School overhauled its maths approach, school leaders also had to change attitudes. The principal told us:

> *Maths was always the first thing to drop here, particularly if something came along such as an excursion or swimming. It was never English that was dropped.*

To emphasise the importance of maths, leaders introduced a subject timetable, with 90 minutes for maths every day, and established 'Maths Mondays'. A leader explained:

> *We wanted to really change the culture around maths, and we made maths first thing on a Monday morning. Usually it's English every morning for the first block. We changed it to Maths Monday.*

Our case study schools also had an agreed view on how a maths lesson should run, so that time scheduled for maths was used purposefully. Box 7 explains the flow of a standard maths lesson at Wattle Grove Primary School.

A teacher with students at The Entrance Public School.

A teacher with students at Wattle Grove Primary School.

Box 7: How Wattle Grove uses a common lesson structure to ensure effective use of class time

Wattle Grove Primary School serves a diverse and growing outer suburb of Perth.

Since 2010, the school has used explicit instruction when teaching new content in maths. This includes a common lesson structure, with an indicative timing guide for each maths lesson.

- **Daily review** (5-to-10 minutes) – fast-paced activities to refresh students' memory of maths topics learnt previously (i.e. retrieval practice), and build fluency in basic maths facts and procedures.
- **'I do'** (10 minutes) – teacher explanation of the key concept (for example, adding money) and modelling how to do it.
- **'We do'** (10 minutes) – whole-class guided practice in applying the key concept, with teacher providing feedback.
- **'You do'** (15 minutes) – independent student practice, alone or in small groups.
- **Plenary** (5 minutes) – whole-class review of the key concept.
- **Mental maths** (5-to-10 minutes) – further practice to build fluency and for retrieval of content learnt previously.

Teachers vary timing based on their students' needs. Similarly, the structure may vary across a unit, with more 'I do' at the start of a unit, and more 'we do' and 'you do' towards the end. But the common structure creates a clear routine for teachers and students, and ensures every minute counts.

A Wattle Grove maths leader described the lesson structure as a key ingredient in the school's success:

> *We're on. They're on too. If you're fast-paced and there is rigour, you're moving knowledge from their short-term to long-term memory, you're reducing behaviour management issues in the class, because there is no time wasting, and we're able to then get more content in and teach above where the students need to be.*

3.3 A high-quality, whole-school maths curriculum

An effective, systematic approach to teaching maths requires a carefully sequenced maths curriculum from Foundation to Year 6, and detailed lesson plans that reflect the evidence of how to teach maths.

A whole-school approach is best for students, and can significantly reduce teacher workload.

3.3.1 Whole-school curriculum planning is key

A high-quality, whole-school curriculum should map out when new maths concepts and skills are taught, and provide opportunities for fluency practice, application, and regular retrieval, so knowledge and skills are mastered and stick in students' long-term memory. A whole-school approach also supports consistency between classrooms and year levels, which helps students learn effectively with different teachers.

Using high-quality, shared curriculum materials can boost student learning by up to two months in a single school year, and reduce teacher planning by three hours per week.[12]

3.3.2 Key features of high-quality curriculum materials

Whole-school maths curriculum materials should be:

- **rigorous and systematic**, covering the key elements of the maths curriculum in a logical sequence and broken into manageable chunks to avoid cognitive overload. For example, materials might introduce adding fractions with common denominators (e.g. ⅓ + ⅓) before adding fractions with different denominators, and might include practice problems such as ½ + ¼ before attempting problems that require students to work with mixed numbers, find two equivalent fractions, or simplify the result;
- **aligned to the evidence base** on effective maths teaching, with all new material broken down into small chunks, ample problems for student practice, exercises that build fluency, and well-designed application questions; and
- **comprehensive**, including everything a teacher needs for the classroom: from year-level and unit plans, to lesson materials, and assessments.

Bentleigh West's maths curriculum illustrates these principles in practice. At Bentleigh West, school leaders first developed a whole-school scope and sequence for maths. This identifies the specific maths concepts, skills, vocabulary, and facts that students need to master, in much more specific detail than the Victorian Curriculum. It also incorporates additional content not included in the Victorian Curriculum, such as the bar model for diagrammatic problem-solving. Leaders then broke down this content into lesson-by-lesson chunks, that were sequenced across year levels (see Figure 6 for an example weekly sequence). Careful attention was given to pacing and providing enough practice time to master content. For example, students memorise their times tables between Years 1 and 3.

Teachers then developed shared lesson materials aligned to the curriculum sequence. These include a short daily review – or lesson warm-up – focused on fluency and retrieval practice, an explanation of new content, worked examples, and practice questions to bring the sequence to life in all classes.

Bentleigh West designed its timetable to devote time each week to different strands of maths (see Figure 6). Extra time is set aside for problem solving, recognising that the ultimate goal of maths teaching is for students to be able to apply maths skills in context. Bentleigh West has a structured approach to maintaining maths knowledge. Previously, topics such as 'time' were visited once a year. Now the curriculum spirals, so students revisit topics in more depth each time. For instance, now in Week 1 of Term 1, Year 4 students learn to read analogue clocks to the nearest second, explain time zones, and convert between 12- and 24-hour time. Later in Term 3, they learn to calculate the duration of events and the difference in days between dates. And in the intervening weeks, students don't forget what they have learnt thanks to daily reviews, which include 15 minutes for fluency and retrieval at the start and end of each lesson. The payoff has been huge. One teacher told us that students 'retain the information because we're constantly revisiting it'.

Bentleigh West's Friday 're-teach' lessons act as a 'pressure valve' for their ambitious curriculum, allowing teachers to revisit content their students found tricky.

[12] See Hunter, Haywood, and Parkinson (2022), *Ending the lesson lottery: How to improve curriculum planning in schools*, Grattan Institute.

Bentleigh West's base curriculum is now embedded, but is further refined each year and adapted for the needs of each cohort of students. As teacher and student capability has grown, teachers found students could master the curriculum in less time, allowing Friday's re-teach lesson to be shortened to 45 minutes.

3.3.3 Materials can be developed from scratch, or adapted from external sources

Creating comprehensive, high-quality maths curriculum materials is no mean feat. Some schools – including Bentleigh West, Ballarat Clarendon, Wattle Grove, and Charlestown South – manage to do this themselves.

But it is a huge amount of work, and not feasible for others without overburdening teachers. For these schools, adopting and adapting externally-created curriculum materials makes good sense.

St Bernard's uses curriculum materials developed by Ochre, a non-profit organisation (see Box 8). Similarly, The Entrance and Budgewoi draw on curriculum materials developed by the Explicit and Systematic Teaching (EAST) network, a grassroots network which exists to champion explicit teaching in NSW government schools.

A common fear: 'Using shared instructional materials takes the joy out of teaching'

Common fear: When teachers use materials developed by others, their professional satisfaction may suffer if they enjoy lesson planning. They may also become deskilled as curriculum planners.

Reality: Teachers exercise professional judgment by adapting shared materials. Just as worked examples benefit students, high-quality materials help teachers develop curriculum expertise. Experienced teachers can then guide colleagues in effectively adapting and unpacking these shared resources.

Teachers also bring materials to life with individual flair. For example, one Ballarat Clarendon teacher was known for his booming voice and theatrical poses, while an experienced teacher at Bentleigh West revelled in deliberately showing non-examples for students to gleefully correct.

Figure 6 – How Bentleigh West schedules maths

Example weekly maths curriculum schedule for Year 4, Week 12

	Monday (90 mins)	Tuesday (90 mins)	Wednesday (90 mins)	Thursday (90 mins)	Friday (45 mins)
Daily focus (curriculum strands)	Number and Algebra	Number and Algebra	Measurement and Space; and Probability and Statistics	Worded problems and problem solving	Assessment/ Re-teach
Learning intention	Rename decimal fractions using decimal squares	Solve vertical addition involving tenths and hundredths (no renaming)	Compare different sets of data on the same topic using bar/ column graphs	Singapore bar model - Unit A Lesson 4 *Example: Mary had 4,580ml of coffee. She poured the coffee into 2 identical jars and 5 identical mugs. The 5 mugs had an equal volume of coffee. Each jar had 1,450ml more coffee than each mug. Find the total volume of coffee in the 5 mugs.*	Weekly 'independent content review' (test) and re-teach lesson

Note: Allocation of maths curriculum strands to days of the week applies for the duration of the year.
Source: Bentleigh West Primary School.

A teacher and students at St Bernard's Primary School.

Box 8: How St Bernard's uses Ochre resources

In 2024, St Bernard's Primary School adopted the comprehensive curriculum resources created by the not-for-profit Ochre, with funding support from Catholic Archdiocese of Canberra and Goulburn Education.

Ochre's maths materials are freely available and include a scope and sequence mapped to the Australian Curriculum, slide packs for teaching, daily review materials, student worksheets, in-built assessments, and re-teach lessons to consolidate learning.

Previously, St Bernard's teachers developed their own materials. Now, the workload is more manageable. According to one teacher, 'We've got the structure now; it's just the small adjustments we're making.'

Adopting external materials also lifted the quality of teaching. One instructional leader explained that because the new materials are detailed and thoughtfully ordered, they give teachers a 'step-by-step' guide on how to cover each topic in the best sequence.

Teachers also liked how the Ochre resources provided different levels of challenge (see the Year 6 example below).

Find 10% of these numbers

10% of 7.84
7.84 ÷ 10 = **0.784**

10% of 25.4	10% of 4.63	10% of 0.056
2.54	0.463	0.0056

Notes: Green gauge: at the expected level for the lesson; all students should be able to do these questions. Yellow gauge: a small increase in difficulty from the expected level. Red gauge: extension–increased difficulty.
Source: Ochre Education (2024).

3.4 Shared instructional routines

A high-quality curriculum provides a strong foundation for systematic maths teaching, but high-quality teaching is needed to bring the curriculum to life in the classroom. Shared instructional routines can build positive classroom cultures for maths, make lessons fast-paced and engaging, reveal students' thinking, and ensure every student is an active and successful participant (see Box 9).

Box 9: How St Bernard's uses engaging practices to ensure all students learn

Teachers at St Bernard's use various participation strategies to make maths engaging and to gain a steady stream of data on each student's learning.

Teachers ensure every student is actively engaged by using different participation techniques, such as:

- whole-class read-alouds and choral repetition (i.e. call-and-response) of new information;
- pair-shares, where students discuss a question with the student next to them;
- cold-calling, where individual students are randomly called on to answer a question (this keeps students' attention, so they are prepared to answer if asked); and
- getting students to write their answers on mini whiteboards, so teachers can quickly check the understanding of every student.

These participation routines keep learning active, playful, and inclusive. And as the then principal noted, 'teachers are getting more data from their lessons than ever before', which helps them adapt their teaching to the needs of their students.

If a teacher sees many incorrect answers on mini whiteboards during guided practice, it signals they may need to re-explain a concept or step through another worked example. If a teacher sees many correct answers, they can have greater confidence that the class is ready to move on.

The ability to see in real time if students grasp a new concept or skill is an essential part of improving results.

Consistent classroom routines also help teachers better manage student behaviour. One primary teacher told us:

> *The way that we're delivering curriculum is consistent. The kids know what's expected. The pace is very good; they haven't got a chance to disengage too much.*

Another told us:

> *There are kids coming here who are hungry and who might have had a traumatic situation. But the nature of this teaching really does help with regulation. When we previously used groups and rotations, that actually added to the busy-ness in the room, and for someone who is struggling with learning, it was a lot to track, and they were required to be more independent. This new approach is, 'Right, here we all are together. This is the learning that we're doing.'*

Common routines provide enough consistency across classrooms for students to know what to expect. But they still allow teachers to 'put on our playful hats' (as one teacher described it) – with each teacher's unique personality and flair shining through.

3.5 High-quality assessments

The main source of information on students' learning in maths comes from in-the-moment assessment teachers do in class (formative assessment). Teachers can also get data on learning from end-of-unit maths tests or tasks (summative assessment). At The Entrance, for example, every five weeks students in Years 2 to 6 sit summative quizzes designed by teachers. All students in the same year level sit the same test. The results provide a chance to celebrate success, give students feedback on their learning, and flag to teachers any content needing to be re-taught or improvements that may be needed in how a topic is taught.

But schools need robust external assessments too. These assessments help schools check how students are tracking against grade-level expectations and national benchmarks, expose gaps in a school's maths curriculum, flag whether particular students are at-risk and need extra support, and assess if intervention programs are working.

Most schools already use external assessments that sample questions from across the curriculum and provide a broad indication of how students are tracking against grade-level expectations and national benchmarks. NAPLAN is one example.[13]

But schools need to supplement general outcome measures with assessments of students' mastery of foundational sub-skills – such as the ability to count, compare quantities, and fluently add and subtract (see example fluency assessments here and here). These assessments will include:

- **Universal screening assessments**, which flag students who might not be on-track with their maths. They are called 'universal' because they are administered to all students. They typically assess a small subset of maths skills shown to be highly predictive of broader maths achievement, and are very quick to administer. Screening assessments in maths are typically administered three times per year and as new students enter the school (see example here). The best screeners compare students' results to data collected from a large group of students of the same age or grade. Students whose results fall below a minimum benchmark (usually defined by the test) would be likely to benefit from targeted intervention.
- **Diagnostic assessments**, which identify the specific difficulties or knowledge gaps of students flagged as not on-track. They are typically administered only to students receiving – or about to receive – targeted or individualised support (see section 3.6.1). Their purpose is to show what intervention students might need. They are often administered as interviews aimed at understanding students' thinking. They are typically narrow and target specific maths skills to reveal persistent sources of error. This means teachers may need to use a range of different diagnostic assessments to identify a student's particular issue.
- **Progress monitoring assessments**, which allow schools to evaluate how students are responding to intervention. For students receiving targeted support, it is best to monitor progress fortnightly. Sometimes this might take the form of students completing a quick (two-minute) probe focussed on the skill being targeted during intervention (see example here).

Bentleigh West Primary School collects a range of data to paint a rich picture of student progress that can be used to adjust the curriculum and teaching approaches.

Each Friday, students sit a teacher-designed test on content learnt previously (and some of that week's content). Results are entered into a colour-coded spreadsheet, enabling teachers to see which topics require greater focus in the daily review at the start of each lesson, and in the re-teach lessons each Friday.

In addition, a range of standardised assessments help Bentleigh West teachers monitor student progress and determine who needs additional support or extension (see Figure 7).

[13] NSW check-in assessments are another example. Schools also sometimes use commercial assessments that are general outcome measures.

Figure 7 – The schedule of maths external assessments at Bentleigh West

Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10
Term 1									
Prep (Foundation) assessments 10-minute Foundation Detour in Maths Online Interview to check early skills such as counting and matching numerals with quantities						NAPLAN (Years 3 and 5)			
					Acadience (All year levels)				
Term 2									
		Essential Assessment (All year levels)			Acadience (All year levels)				
Term 4									
PAT Maths (All year levels)		Essential Assessment (All year levels)			Acadience (All year levels)				
As needed throughout the year: The 15-to-30 minute GL Dyscalculia Screener									

Acadience

Prep
3 x 1 minute tests on beginning quantity discrimination, number and next number fluency

Year 1
5 x 1-2 minute tests on advanced quantity discrimination, number identification fluency, next number and missing number fluency, and computation

Years 2-6
2 tests on computation (2-6 minutes) and concepts and applications (5-16 minutes)

Essential Assessment
~45 minute tests for each strand

PAT Maths
<60 minutes, sample across curriculum, norm-refenced

Notes: External assessment tools used for literacy and social-emotional needs are not shown. Bentleigh West Primary School is revising its maths assessment schedule – this version is accurate as of April 2025. There is no external maths assessment scheduled in Term 3. The Prep assessments mostly check essential early number skills, such as students' ability to distinguish between quantities, match numerals to amounts, order shapes or colours into patterns, and understand ordinal numbers (e.g. 'second', 'third'). PAT = Progressive Achievement Test. PAT and NAPLAN are both adaptive tests that sample questions from across the curriculum and can be used to benchmark students against age-group norms. Essential Assessment offers curriculum-aligned, maths assessments – Bentleigh West uses Essential Assessment to monitor students' progress in the various strands of the maths curriculum. Bentleigh West uses an early form of the Acadience assessments which were then part of the DIBELS Maths suite. These are short assessments of subskills as well as a concepts and applications assessment. The GL Dyscalculia Screener is computer-administered and consists of five short, timed sub-tests.
Source: Bentleigh West Primary School.

3.6 Extra support for struggling and excelling students

Most students will succeed in maths if they are given high-quality, whole-class teaching. But some may need more support or additional challenge.

3.6.1 A tiered support model helps struggling students catch up

To avoid students falling behind in maths, schools should screen students early and often, and provide extra support to those struggling to keep up.

A multi-tiered system of support (MTSS) framework sets out a tiered approach to providing support.[14] All students should receive high-quality classroom instruction ('Tier 1'). But some students may also need extra teaching 'doses', often in small groups, to keep up ('Tier 2'). A small proportion of students may need intensive, ongoing support ('Tier 3'). This support should ideally supplement (not replace) Tier 1 classroom teaching. Careful use of assessment data can ensure teachers identify which students need extra support, the exact skills to target, and whether the support is making a difference (see section 3.5).

As part of high-quality whole-class instruction, case study school teachers provided additional scaffolds to support struggling students. For instance, at The Entrance, students each had on-hand a 'maths pack' of laminated supporting materials they could use as they needed, with contents tailored to year levels. For example, Grade 1 and 2 packs include number lines, number charts, and their 'friends of ten' addition facts up to 10.

Charlestown South Public School has had significant success with the intensive support it provides to students who are well behind in maths (see Box 10).

Before Bentleigh West adopted its new approach, new maths concepts were rarely taught explicitly. Many students struggled and were withdrawn from class for extra support sessions where they were explicitly taught maths. The success of the support program was a catalyst for introducing explicit teaching as part of the whole-school approach in Tier 1. Now that explicit teaching is fully embedded across the school, far fewer students require Tier 2 or Tier 3 support.

Ballarat Clarendon College, a large school, provides intensive support through its Tier 1 model. Ballarat Clarendon groups students who benefit from a slower pace in maths and more time to consolidate learning in an 'earlier progress' class. This class covers the same curriculum and essential maths questions as the other classes, but spends longer on teacher explanation and guided practice, and less time on independent practice. A small number of students (for example, about 5 out of 120 Year 5 students) need additional Tier 2 or Tier 3 support.

A common fear: Whole-class teaching only caters to the middle. Workshop-style lessons are the best way to meet all students' needs.

Common fear: It is hard to meet a broad range of student abilities through whole-class teaching. This might motivate teachers to set up workstations, where the class is split into ability groups, and students work on different maths problems pitched at their level.

Reality: Workstation lessons can divide teacher attention and support, risking behaviour challenges and growing learning gaps. In contrast, whole-class teaching enables the teacher to monitor all students' attention and meet a broad range of student needs with carefully planned supports (such as partially completed solutions) and challenges (such as early finisher questions).

[14] See Sonnemann, J., Hunter, J., & Stobart, A. (2023). *How to embed small-group tuition in schools: A guide for school leaders*. Grattan Institute.

A teacher at Charlestown South Public School

Box 10: How Charlestown South supports students who fall behind

Charlestown South Public School is a small, relatively advantaged primary school in suburban Newcastle, with about 250 students.

A small number of students—currently around 10—require extra maths support. Leaders prioritise Year 1 and Year 2 students, because early intervention reaps significant benefits. A trained teacher provides catch-up support to these students 2-to-3 times a week in groups of up to four students. If needs are particularly acute, support is 1:1.

Using student data and classroom observations, teachers identify which strategies the student is confident using or requires support with. They then develop an intervention plan with goals that are monitored over a 5-week cycle. For example, the sessions may focus on key skills that hold a student back, such as counting forwards and backwards, and making 10 (e.g. '2 plus what makes 10?'). Alternatively, a lesson may focus on literacy and maths vocabulary where this is identified as a barrier, particularly for students speaking English as an additional language.

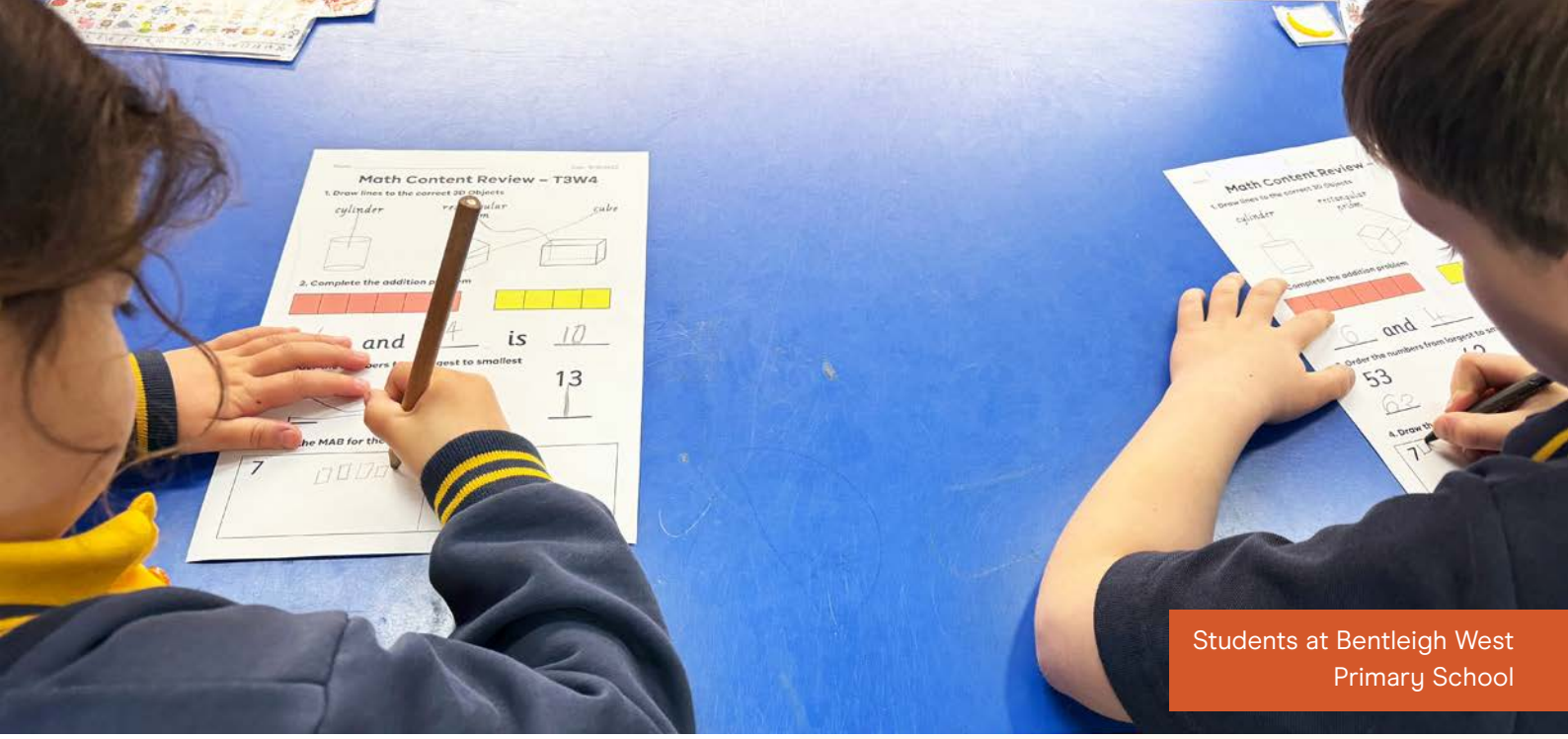
A consistent lesson structure builds student confidence and reduces cognitive overload. This involves shortened daily reviews, the use of concrete materials, and use of conversation and whiteboards to help students explain their thinking and strategies, and demonstrate their understanding.

The model has had a big impact. One school leader told us:

> *There was one Year 2 student who could not count. So we withdrew her every day and we did the same thing for a number of weeks. We did things like counting backwards from 30, and repeating it. We made it fun and engaging and when she could finally 'count back' and 'count on', we moved onto friends of 10. Now she can certainly hold her own in Year 4.*

Another teacher told us about a Year 1 student who struggled to name the number of fingers on one hand. With targeted support, the student has improved significantly. Their teacher said:

> *We differentiate well, but I never would have been able to give them that much dedicated support in the [Tier 1] classroom.*



Students at Bentleigh West Primary School

3.6.2 Options for extension so more students can achieve excellence

Higher-achieving students who master new maths content quickly may benefit from extension activities.

Bentleigh West builds extension exercises for early finishers into regular maths classes (see Figure 8). In Friday review lessons, about a quarter of students complete extension activities while the rest participate in a re-teach lesson. High achievers are also invited to join extension classes with challenging, open-ended tasks, drawing on resources such as Cambridge University's NRICH suite.

At St Bernard's, high achievers in Years 5 and 6 are offered three combined extension classes per week. Students in these classes participate in the Maths Pathway program, with a teacher providing individual and small-group assistance as needed.[15] Younger high achievers can also use Maths Pathway while their class completes daily review.

Figure 8 How Bentleigh West extends high achievers

Example materials from Year 4 daily review.

WHOLE-OF-CLASS ACTIVITY
You have 5 minutes

A

X	7	6	9	8	4
7					
6					
9					
3					
8					
10					
4					
5					
2					

B

X					
	49				
		36			
			81		
					12
				64	
	70				
					16
				40	
		12			

Challenge variant: Write in the questions and answers

FAST FINISHER ACTIVITY:
How many ways can you make 87 with the numbers below?
You can use addition, subtraction, multiplication or division.

C

20	6	3
7	2	4
12	5	10

Notes: A is the standard times tables sheet given to most students. Students write in the product of the row and column multiplicands. B is a version of the times tables sheet providing extra challenge for students who need it. Students write in both the multiplicands and the answer. C is an early finisher task providing another level of challenge. It has multiple possible solutions.

Source: Bentleigh West Primary School.

[15] Maths Pathway is a platform that provides individualised learning pathways for students based on a diagnosis of what they can do in maths and gaps in their knowledge.

3.7 An effective approach to building teacher expertise

Our case study schools used a range of supports to help teachers bring the maths curriculum to life.

3.7.1 School-wide professional learning and induction

Providing professional learning to all teachers at once can help build a shared commitment to effective practice.

At St Bernard's, school leaders drew on external expertise when they were getting started. This included school-wide training in explicit teaching (including its application in maths), delivered by external coaches.

At Ballarat Clarendon College, leaders run several whole-staff learning days each year. These involve pre-readings, staff presentations and discussion, and planning time.

Even when an approach is well-established, teachers new to the school need strong induction. As a rapidly growing school, Wattle Grove relies on induction to get new staff up to speed quickly. New teachers complete a scheduled program of 30-minute professional development workshops, covering topics from cognitive load theory through to specific instructional routines used by Wattle Grove staff.

3.7.2 Investment in instructional leadership

Leadership played a critical role in driving strong practice at our case study schools. Principals found ways to ensure their maths leaders had time to visit classrooms and work directly with teachers. As a Wattle Grove leader told us:

> *Without visiting classrooms frequently, we might falsely assume that strategies are being implemented effectively.*

Dedicated leadership time is essential. Charlestown South's instructional leader works a four-day week with no teaching duties, dividing time equally between maths and literacy improvement. Instructional leaders at Wattle Grove, Budgewoi, and The Entrance also have no teaching duties (see Box 11). While developing their maths curriculum, several leaders at Bentleigh West had between one and three days per week of time released from class to develop, document, and implement lesson-level curriculum materials in maths.

3.7.3 Collaborative curriculum planning and evaluation

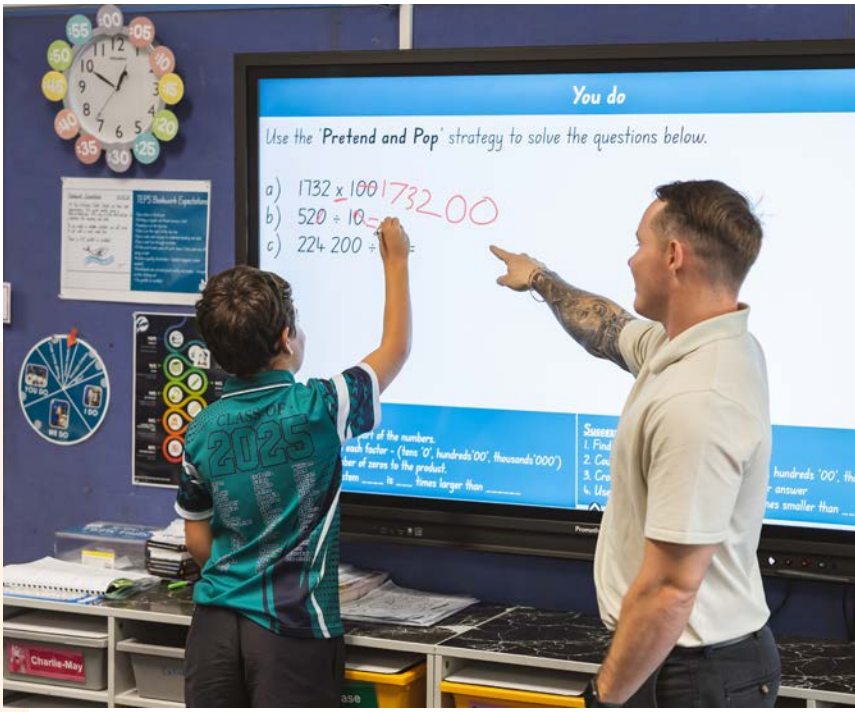
Shared curriculum planning time can also double as highly effective professional learning, by encouraging concrete discussions about the most effective ways to teach specific maths topics.

Ballarat Clarendon College has adopted a powerful approach to curriculum planning that is designed to 'ratchet up' quality over time (see Box 12). The Entrance uses broadly similar 'data days' to deliberate on what is working well and identify areas to improve.

Box 11: How leaders at The Entrance drive maths improvement

Maths improvement at The Entrance is driven by two dedicated assistant principals who have no classroom teaching responsibilities and focus full-time on instructional leadership. They lead the school's work to adapt and implement maths curriculum materials developed by EAST (which they also help to write). They create common assessments and lead 'data days' to analyse student performance. They also identify professional learning priorities and evidence-informed practices such as problem pairs. The assistant principals model and embed these priorities and practices through regular coaching.

The assistant principals spend time in classrooms each day, observing teachers, running demonstration lessons, or covering classes so teachers can observe colleagues. They aim to observe and provide feedback to each teacher every week. This intensive coaching model ensures consistent teaching across all classrooms while continuously building teacher capacity.



A teacher and students at The Entrance Public School.

Box 12: How teachers at Ballarat Clarendon College model best-practice to ratchet up teaching quality

At Ballarat Clarendon College there is a high degree of alignment in maths teaching underpinned by a common set of lesson slides, booklets, and assessments. This also provides a framework that supports powerful professional learning.

After every topic test, teachers conduct a 'Phase 2' meeting (named for the second phase of curriculum planning – refinement). Teachers unpack the assessment data question-by-question to find the class that fared best on each. That class's teacher then models how they taught the relevant concept or skill for that question.

This process helps reveal effective teaching strategies that are then incorporated into the lesson plans for the following year. It also enables newer teachers to observe strong practice and clarify their own understanding.

In a Phase 2 meeting we observed, teachers discussed the 'build up' strategy for subtraction, where students bridge the gap between two numbers in multiple 'jumps', and then add up the jumps to find the difference.

After teachers took turns demonstrating how they modelled solving 284 – 67 to their class, it became clear that there were two approaches. Some teachers identified all the jumps first and then summed them. Others tallied the jumps as they went. Teachers agreed the first method involved less task switching, and a lower cognitive load for students, and updated the lesson plan for the following year accordingly.

Solve 284 - 67 using the build up strategy.

67 → 70 → 100 → 200 → 280 → 284

3 + 30 + 100 + 80 + 4 = **217**

Students at Ballarat Clarendon College.

A teacher with students at Budgewoi Public School.

Box 13: Budgewoi's journey to explicit and systematic maths teaching

Budgewoi Public School shows what's possible for disadvantaged communities through focused leadership, sustained professional learning, and whole-school curriculum materials. Budgewoi's journey suggests that all students can succeed in maths, regardless of their background.

Serving a community with high proportions of Indigenous and low-income families, Budgewoi began its transformation in 2021, with the arrival of a new principal. During our 2024 visit, that principal explained that when he arrived, teaching was highly varied, with 'pockets of teachers doing different things'. Kindergarten (i.e. Foundation Year) teachers didn't know what Years 1 and 2 teachers were doing, and the approach to maths involved 'a lot of groupwork, discovery learning, and games'.

Budgewoi's instructional vision was inspired by visits to three nearby Hunter Region schools – Blue Haven Public School, Charlestown South, and The Entrance (just one year ahead in its implementation journey) – where explicit and systematic maths teaching had proven effective.

The principal chose to make maths the improvement focus because it was the area where the school had the worst results, and school leaders' experience suggested it is typically easier to establish explicit instruction in maths and then transfer it to other subjects.

Initially, many Budgewoi teachers were reluctant to embrace the principal's vision. As he explained:

> *We were a school that cared deeply about student wellbeing, but I gained the sense that student learning outcomes were not the focus. I developed the view that if we raised expectations of ourselves and our students, we were capable of much better results. I worked closely with our staff to change that mindset so we all understand the difference that improved literacy and numeracy results can make for these kids.*

Many teachers also resisted explicit instruction, based on misconceptions that it involved robotic chanting:

> *Some people just hear that and think, 'this is really regimented, like the army', and don't understand the cognitive science. I had to build the 'why' behind the practice. We're not doing it because other schools do. We're doing it because it's based on science and helps students to learn. Once teachers have the why, you can get into the what and how.*

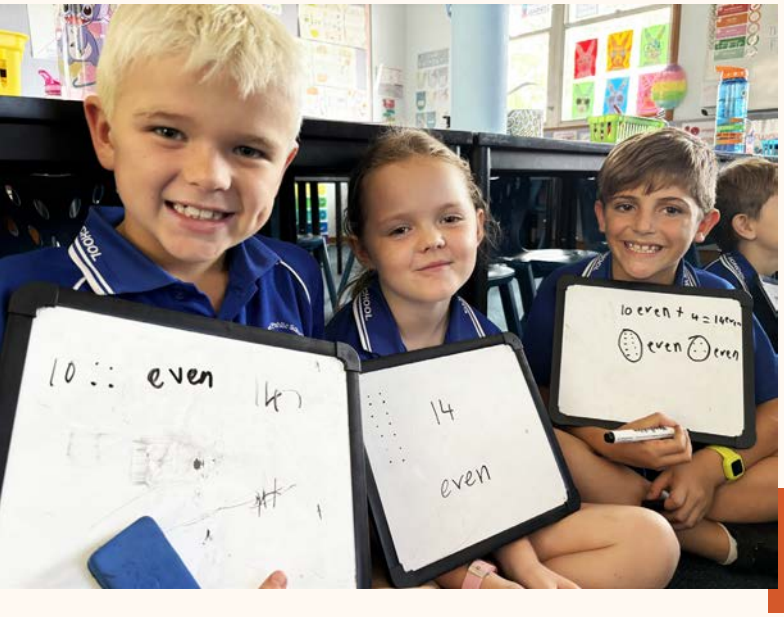
School leaders provided staff with professional

development on the science of learning. They started making the change by introducing daily review for maths based on explicit instruction techniques, giving teachers a controlled environment to master new routines. This also worked for students. As the principal explained:

> *We started low with the daily review, to give kids success, and lifted the standard from there. Learning has to be tailored to where kids are at. If you mess that up, it can be really hard to win students back. But as soon as they can do it, they're engaged.*

After creating materials for their maths daily review, Budgewoi staff attempted to create their own curriculum materials to support the teaching of new content, but they struggled. Staff were still developing their own maths curriculum knowledge, and school leaders found instructional coaching challenging.

A turning point came when Budgewoi's principal recruited two experienced maths leaders with expertise in explicit instruction. The principal says that was 'the best decision I made'. These leaders had to unwind some practices. For example, the daily review stretched on for up to 45 minutes, with little structure and purpose. The leaders developed training sessions on instructional practices, modelling these for staff, and established observation and coaching cycles to improve practice. They also introduced a new assessment schedule and tools, which now support a quarterly 'data week' focusing teachers' attention on the impact of their teaching methods.



Students at Budgewoi Public School.

Budgewoi's focus has now shifted to adopting, adapting, and implementing maths curriculum materials created by EAST. This has delivered big benefits for students and teachers at Budgewoi. As the principal explained:

> *A side benefit of using the EAST materials is that Budgewoi staff have built curriculum knowledge while unpacking the lesson plans into deliverables. The EAST materials have solved for consistent high quality. But the biggest benefit is that they eliminate a lot of the workload. Now teachers are focussed on 'will this benefit my students'. Next year we will have more capacity to focus on delivery.*

While Budgewoi's journey continues, teachers and students have made great strides in three years. Lessons are fast paced and 'kids have no time to waste'. The 2024 NAPLAN numeracy results improved on 2023, with Year 3 students performing 'well above' students in similar schools. The professional benefits are rewarding too. Some of Budgewoi's teachers have developed significant maths curriculum expertise, and are now contributing to the ongoing development of EAST materials.

Reflecting on the improvement journey, the principal told us:

> *I've made a lot of mistakes, and we moved quickly – maybe too quickly – but we've also made a lot of progress. Budgewoi's experience shows that good-quality teaching looks the same in the most disadvantaged and most advantaged schools, and all kids can learn maths if we teach the right way.*

A teacher and students at
The Entrance Public School.

4. How to get there

Implementing a systematic approach to maths teaching takes a lot of work, and it can be hard to know where to start. Drawing on the experiences of schools that have embarked on successful school improvement efforts, this section sets out the major steps principals can take, and some key issues to consider.[16]

4.1 Take stock of your school's current maths practice

Before making changes, it is important to build a detailed understanding of the current state of maths teaching in your school, including the school curriculum, instructional routines, assessment practices, additional support for students who need it, and professional learning. Box 14 includes some key questions to consider as part of a review.

Identifying the strengths and weaknesses of the current maths approach can help make the case for change and inform the priority areas for action.

Actions to consider

- Review your school's documentation of existing maths teaching practices, including shared principles for effective teaching, curriculum plans, sequencing and lesson materials, agreed instructional practices, additional support for lower and higher achievers, and maths-focused professional learning offered to staff.
- Conduct informal, no-stakes classroom walk-throughs across year levels, to build familiarity with current maths teaching practices, including the level of consistency and variations in approach, and alignment to school documentation.
- Analyse students' maths data to identify areas of strength and weakness compared to local and national benchmarks, trends in performance over time, and whether there are any data gaps. Consider learning progress for high achievers as well as struggling students.
- Ask teachers to provide input on the current maths approach, including their approach to curriculum planning, how well students are learning, any topics that students or teachers find particularly challenging, and the type of support likely to be required to implement a systematic, whole-school approach to maths aligned with research on effective practice.

[16] Further guidance on implementation can be found at Sharples, J. & Eaton, J., & Boughelaf, J. (2024). A schools' guide to implementation. Education Endowment Foundation: London.

A teacher and student at Ballarat Clarendon College.

Box 14: Key questions to ask about your school's approach to maths teaching

Protected time for maths

- How much time is dedicated to maths, in theory and in practice?

Curriculum and instruction

- Are the mandated curriculum requirements broken down into manageable learning intentions? Is it clear what the learning outcome is for each lesson? Are these sequenced logically over time and year levels?
- Are students explicitly taught new skills and concepts?
- Do students have the opportunity for short, daily practice to build fluency in core maths facts and procedures?
- Are students given opportunities to apply concepts and skills to novel problems at the appropriate stage of learning?
- Do lessons incorporate frequent reviews of learnt concepts to maintain learning?
- Which instructional routines are teachers using to check for student understanding? Are all students participating?

Assessment

- Are teachers using common assessments? How is assessment data used to inform teaching and strengthen the school's approach?
- How is progress monitored? How are at-risk students and high achievers identified?

Additional support

- How are low-achieving and at-risk students supported?
- How are higher achievers extended, both in class and through any targeted support?

Professional learning

- Do teachers have a shared understanding of effective maths teaching? To what extent are teachers familiar with each other's practices?
- How much professional learning time is focused on maths? Is the time set aside for teacher learning and collaboration protected?
- Does maths professional learning align with the evidence base? Are there major gaps?

A teacher with students at The Entrance Public School.

4.2 Establish a school-wide vision and make the case for change

Providing a compelling case for change is crucial. Begin by clarifying *why* change is necessary, to build staff buy-in. Successful leaders have pointed to the imperative to provide students with the opportunity to succeed, the strength of the research base on the most effective approaches to teaching maths, and the potential for increased professional satisfaction (see Box 15).

Finding opportunities for teachers to see strong practice in action in other schools, and identifying and celebrating early successes, can also be highly motivating. At Budgewoi, St Bernard's, and Wattle Grove, for example, senior teachers visited high-performing schools to observe effective practices first-hand – an experience that was instrumental in kick-starting change.

Senior leaders at Budgewoi also felt that, to drive teaching practice from the top, principals themselves need a strong understanding of effective maths teaching. They warned that without this, principals may struggle to lead change and justify improvement initiatives to staff.

Actions to consider

- Build teachers' motivation by describing a vision for a systematic, whole-school approach to maths and the benefits for both students and teachers.
- Where possible, support staff to visit high-performing schools that have successfully implemented effective maths teaching.
- Organise professional learning that unpacks the research on cognitive science and effective maths practices, such as explicit instruction for new concepts and skills, fluency practice of maths facts such as timetables, and retrieval practice to maintain learning over time.
- Share benchmark data and students' maths results, to show the need for change.

Box 15: School leaders from our 2024 case studies reflect on their 'why'

'There are all these other services that are going to support kids outside our school gates, but we're the only ones who are going to teach them. I think principals need to deeply understand the importance of that. It's teaching and learning that's going to make the biggest difference to the kids' lives. For us, maths was our worst-performing area – we were significantly below our statistically similar schools in NAPLAN – which is why we made it the focus of our turnaround journey.'

- Budgewoi Public School

'Our school vision is to add value to students, staff, and visitors in all areas, including maths. For maths instruction, we want children to be able to leave primary school literate and numerate, with those fundamental basic skills, so that they then can access maths at secondary school, and can go on to be successful mathematicians – regardless of their gender.'

- Bentleigh West Primary School

'We want to see improved outcomes in maths, a consistent and sequential approach to maths teaching using explicit instruction, and a connection to reasoning, understanding, and relating knowledge to a real-world context. With high expectations and a consistent approach, we create an environment where all students can achieve excellence in maths.'

- Wattle Grove Primary School

'Results were the catalyst for change for us. Our NAPLAN and school results had not been great for a while. While everyone was doing their best, it was clear there were gaps in our teaching that needed addressing. We realised we had to make a change. Now our focus is on student growth. We measure our success through the growth we see in our students, the consistent use of high-impact teaching strategies across the classrooms, regular checking for understanding, and students who are actively engaged in their learning. We've worked hard to become a school of choice, and we are proud of our achievements.'

- St Bernard's Primary School

'Our focus is on incremental improvements, every day – that's what produces long-term gains. And we believe a collective approach is in the best interests of the students. That means we teach maths systematically, make sure all students have access to the same essential content, and invest time in identifying and replicating highly effective practices.'

- Ballarat Clarendon College

'In 2019, we identified a critical need for improvement in maths achievement and student engagement. We were ranked near the bottom of Central Coast schools for maths performance, with significant challenges in behaviour and curriculum delivery. Our community context, including a high proportion of low-income families, Aboriginal students, and single-parent households, made it clear that urgent change was an equity imperative. Through a whole-school commitment to consistent, high-impact maths instruction, we quickly saw improvements in student learning, engagement, and behaviour. Within a year, our performance moved significantly above similar schools.'

- The Entrance Public School

'Our desire to have all students achieve their potential was the driving force behind change 10 years ago when we embarked on explicit teaching, developing daily reviews, and explicit lessons in maths. This continues to be our vision. Our community now shares our high expectations. Our focus is now ensuring we continually refine our teaching, following data analysis and ongoing professional learning. With a group of highly experienced teachers, we're building systems to ensure our achievements can be sustained through research-based best practice.'

- Charlestown South Public School

'Our job is to make all students believe they are mathematicians. No kid lands in high school and discovers a love of maths if they're not already proficient at it. Our goal is that students master and enjoy maths in primary school, so that in high school they feel they belong and can succeed in maths.'

- Maths program lead, EAST Network

4.3 Appoint and develop maths instructional leaders

It's important to have effective instructional leaders who can build and implement a systematic approach to maths teaching, and model effective practice for other teachers.

Maths leaders should have expertise in maths curriculum planning and assessment across Foundation to Year 6, and the ability to coach teachers in the classroom. Not all schools will have maths instructional leaders with these skills. Identifying highly motivated staff with the potential to develop may be an important first step. For some schools, it may make sense to work in partnership with others to develop and share maths instructional leaders.

School leaders also need to support and empower maths instructional leaders to embed school-wide improvement in each classroom. Instructional leaders will generally need some time release from their own teaching duties to deliver these responsibilities.

Actions to consider

- Appoint a suitable maths instructional leader or leaders and develop their expertise to drive effective maths teaching.
- Establish clear responsibilities for the maths leader or leaders and provide the time and resources needed to deliver them.

4.4 Commit to providing enough time for maths

Systematic maths teaching demands protected time – ideally at least an hour every day. Students need ample practice time to master new ideas and skills. Teachers also need adequate collaborative planning time to ensure consistency and quality of maths teaching, build capability, and keep workloads sustainable.

Actions to consider

- Timetable student learning time for maths to ensure adequate time is allocated.
- Ensure teachers have enough maths planning time to refine curriculum materials, review assessment data, and adjust teaching approaches.
- Develop systems to protect maths time, including catching up any missed lessons (e.g. due to excursions) and ensuring timetables are kept to (e.g. as part of leadership walk-throughs).

A teacher with students at Charlestown South.

4.5 Select curriculum materials and assessments, and agree on instructional routines

Building a consistent, high-quality maths program requires whole-school approaches to curriculum, assessment, and instructional routines so all students in the same year have the same opportunity to experience success. Careful planning and organisation are essential.

Some schools create all their own curriculum materials from scratch. But this is hard work, and relies on deep maths expertise and a lot of additional effort.

Adopting high-quality maths materials created by others can also be very effective. St Bernard's has adopted Ochre's maths curriculum materials, for example, while Budgewoi and The Entrance use EAST curriculum materials. This has eased the workload on teachers. But teachers still need to do the intellectual preparation necessary to use the materials confidently in their own classrooms and adapt them as necessary.

Robust assessments are needed to track student progress and identify at-risk students. Schools need assessment schedules that include general outcome measures (assessments that sample topics from across the curriculum) and measurements of subskill mastery (such as probes that test students' fluency with maths facts). Schools' assessments should include universal screening multiple times a year and screening on-entry for late enrolments, as well as judicious use of diagnostic assessments and progress monitoring assessments for students receiving or about to receive catch-up support.

Effective instructional routines are also essential to maximise students' participation and learning.

A teacher with students at Budgewoi Primary School.

Actions to consider

- Decide whether to build, buy, or share quality curriculum materials. These materials should include a scope and sequence for new content and daily review across all year levels, plus lesson plans and class materials.
- Select suitable diagnostic and screening assessments and develop a common, systematic assessment schedule.
- Identify common, evidence-informed instructional routines that all teachers will implement.
- Document your approach to maths teaching. Some schools create a shared instructional playbook (see an example here). This could include links to filmed snippets of teaching applying different aspects of the instructional model in the classroom, to support induction and ongoing professional development.

4.6 Build a culture of professional excellence

Teachers need time to learn what effective maths teaching looks like in practice, and how to deliver it. Building maths expertise requires a significant investment in professional learning and practice. Effective learning can include professional reading and workshops on evidence-informed maths teaching practices, opportunities to observe effective practice in the classroom, and coaching and feedback on teachers' own practice. New teachers joining the school will also require induction.

Actions to consider

- Invest in expert professional learning aligned to your vision for effective teaching, drawing on external specialists and/or exemplar schools where necessary.
- Establish clear norms for collaborative lesson planning, enabling teachers to develop and share expertise and improve consistency of practice across your school.
- Develop clear norms for regular leader and peer-level classroom observations and feedback to foster a culture of continuous improvement.
- Create an induction program for new teachers in your school's maths approach.

Students at St Bernard's Primary School.

4.7 Prepare for common challenges and sustain effort

During implementation, principals should anticipate and address emerging challenges. Figure 9 details common challenges our case study schools faced.

Some case study schools implemented systematic maths teaching in stages over many years, to manage staff buy-in or cope with workload pressures. Some introduced daily reviews first, or supported enthusiastic adopters to trial new approaches in their classrooms before rolling these out schoolwide. Some built their own maths curriculum materials, an arduous, multi-year process.

But with growing awareness of the benefits of systematic teaching approaches in literacy, as well as the increased availability of high-quality external maths curriculum materials, such as the freely available Ochre materials, many schools are now better placed to overhaul their approach to maths in a shorter timeframe.

Schools that invest in high-quality maths professional learning, including instructional coaching, and adopt and adapt high-quality external maths curriculum materials, can achieve significant improvement in classroom instruction in just a few years, as St Bernard's did. A faster rollout has the benefit of building a stronger professional culture more quickly, as well as the potential for improved student results sooner, itself highly motivating for the whole school community.

As implementation progresses, continuous refinements will be needed. In particular, expectations in the higher grade levels will probably need to ratchet up over time.

Actions to consider

- Establish agreed success measures for effective maths teaching, to help benchmark teaching practice, complementing success measures based on student assessment data.
- Expect to ratchet up expectations in the higher year levels over time, as students who have benefited from stronger teaching practices in the earlier years move through the grades.
- Establish leadership norms for monitoring practice, such as regular leadership walk-throughs.
- Regularly evaluate student data, teaching practices, and teacher feedback to identify early successes, pain points, and practices in need of refinement.
- Where appropriate, collaborate with local primary schools on professional learning and practice improvements, creating a broader community of practice focused on excellence.
- Work with local secondary schools, seeking their feedback on the strengths and knowledge gaps of students who graduated from your primary school.
- Document effective norms and practices as they emerge, to ensure teacher knowledge is captured and shared, and sustain practices despite inevitable staff turnover.
- Develop a succession plan for key maths roles and develop future maths leaders.

Figure 9 - Some common implementation challenges in our case study schools

Common challenges	Potential solutions
Change-fatigue, or teacher resistance to new teaching methods	• Use student data to make the case for change, and celebrate successes. • Arrange professional learning about the research underpinning new approaches, to build the case for change and help teachers understand how and why these approaches work. • Arrange for staff to visit high-performing schools, so they can observe effective classroom teaching. • Design, test, and commit to an implementation timeline with staff, to build buy-in and give teachers a sense of the plan. • Stage implementation, beginning with enthusiastic teachers, to build success and buy-in. • Commit to a clear direction, demonstrating to staff the long-term benefits of shorter-term changes.
High teacher workloads in the transition to the new teaching model or curriculum materials, and/or constraints on teacher planning time	• Adopt and adapt external materials, rather than building from scratch. • Stage implementation by subject (e.g. maths first), year level, or parts of a lesson (e.g. daily review or explicit lesson). • Purchase release time to ease pressure on maths leaders and enable teacher co-planning. • Timetable specialist classes carefully – see if you can create common planning time for maths teachers. • Clearly identify the practices and curriculum to be discontinued.
Lack of maths or leadership expertise to implement a new teaching approach	• Invest in professional learning to build teachers' and school leaders' understanding of the evidence base for, and implementation of, effective maths teaching. • Hire expert leaders / instructional coaches. • Draw on the expertise of school leaders who have led maths improvement, through mentoring or other professional learning. • Partner with local schools to pool resources for professional learning, such as a shared maths instructional leader.

CONTINUED OVERLEAF

Teething problems with executing a new instructional approach, such as daily reviews taking too long	• Implement maths teaching guidelines, e.g. timing guide, instructional playbook. • Give teachers time to observe effective teaching in other classes and/or high-performing schools. • Prioritise instructional leadership including modelling, coaching, walk-throughs, and timely feedback. • Monitor implementation and use student data and teachers' insights to make necessary adjustments.
Managing composite classes effectively within a systematic maths teaching model	• Select curriculum materials that support composites (e.g. Oxford Mathematics, Ochre, or materials designed for stages rather than year levels, such as EAST maths materials). • Plan out your composite classes' curriculum to deliver related content in the same lesson (e.g. in Year 1 and Year 2, students compare and classify shapes, but to different levels of complexity). • Where student numbers allow, move to straight year-level classes.
Low student literacy skills	• Implement more effective teaching practices for maths and literacy simultaneously. • Use targeted practices such as careful fading of concreteness, explicit teaching of maths vocabulary, and embedded supports (such as graphic organisers) in class materials. • Emphasise the success students with low literacy can have with numbers and symbols on maths whiteboards, slides, and workbooks, particularly in the early years.
Too many struggling students	• Prioritise filling gaps in key skills, including foundational number skills, and fluency in key maths facts. • Expect to spend more time in guided practice. • Allocate extra resources for catch-up support, if possible (e.g. disadvantaged schools using the extra funding provided to them).
Too many students not attending or poorly behaved	• Ensure instructional coaches help teachers to establish consistent classroom routines and participation tactics to support student engagement. • Implement best-practice attendance and behaviour strategies. • Use daily reviews and tiered supports to address critical learning gaps for low-attending students.

Some suggested further reading

Resource lists

- Dobson, J. (2025). From research to reality: A primary maths resource toolkit. *Laying the Foundations*.
- The Science of Math (n.d.). Resources.

General guidance

- Chapter 2 of Grattan Institute's 2025 report, *The Maths Guarantee: How to boost students' learning in primary schools.*
- AERO. (2024). *Developing maths proficiency*. Australian Education Research Organisation.
- Merlo, S. (2024). *The science of maths and how to apply it* (Analysis Paper 71). The Centre for Independent Studies.
- E4L. (2022). *Improving mathematics in upper primary and lower secondary*. Evidence for Learning.
- EEF. (2022). *Improving Mathematics in Key Stages 2 and 3*. Education Endowment Foundation.
- Powell, S. R., King, S. G., & Benz, S. A. (2024). *Maths practices you can count on* (Analysis Paper 62). The Centre for Independent Studies.
- Powell, S. R., Hughes, E. M., & Peltier, C. (2022). *Myths that undermine maths teaching* (Analysis Paper 38). The Centre for Independent Studies.
- Ofsted. (2021). Research review series: Mathematics.
- AERO. (2024). Using implementation strategies.

Teaching topics in the curriculum

- Norton, A (n.d.). *Teaching and Learning Fundamental Mathematics [Videos]*.
- NCTEM (2020). Mathematics guidance: Key stages 1 and 2. Non-statutory guidance for the national curriculum in England.
- Booker, G., Bond, D., & Seah, R. (2020). *Teaching Primary Maths*. ISBN: 9781488615597.
- NESA (2024). See teaching advice within the NSW Syllabus.

Supporting students struggling in maths

- Gersten, R., Beckmann, S., Clarke, B., Foegen, A., Marsh, L., Star, J. R., & Witzel, B. (2009). Assisting students struggling with mathematics: Response to intervention (RtI) for elementary and middle schools. *IES National Center for Education Evaluation Practice Guide*.
- Fuchs, L. S., Bucka, N., Clarke, B., Dougherty, B., Jordan, N. C., Karp, K. S., Woodward, J., Jayanthi, M., Gersten, R., Newman-Gonchar, R., & others. (2021). Assisting students struggling with mathematics: Intervention in the elementary grades. Educator's practice guide. WWC 2021006. *What Works Clearinghouse*.

Podcasts

- Knowledge for Teachers
- Chalk and Talk with Professor Anna Stokke
- The Mr Barton Maths podcast
- Thinking Deeply about Primary Education