

## A PRIMARY TEACHER'S GUIDE TO THE 'NEW' MATHEMATICS SYLLABUS K-6

CATHERINE MYSON-FOEHNER

*Catherine Myson-Foehner provides a guide to the new Mathematics Syllabus K-6...*

### THE PRICE OF DOING THE SAME OLD THING IS FAR HIGHER THAN THE PRICE OF CHANGE.

Education is evolving rapidly, driven by a strong faith in the 'magic' of research. Inside the classroom we keenly feel this maelstrom, with seemingly constant changes to not only what students learn, but how, why and where they learn. In 2023, all NSW primary teachers are either trialing, or implementing, the reformed mathematics syllabus. Being given a new road map to your job in any field of work is a stressful and confusing time. It takes energy because things that ran on automatic pilot now demand attention to detail and thoughtful interaction. And change takes from teachers that one resource which is always in shortest supply – time. As teachers, we have a broad set of mandated goals. We must improve student achievement, but also take the lead in tackling social problems such as poverty, inequality, complex fast-paced change and fragile mental health. The new tasks thrust upon us require new approaches, new understandings, and above all, a closer relation between practice, research and theory. And therein lies the story of our new syllabus.

### WHY CHANGE THE SYLLABUS?

There are three main drivers of syllabus reform. Firstly, we are failing to meet our own national education goals. In 2019, Education ministers agreed on a vision of education for all young Australians under the Alice Springs (Mparntwe) Education Declaration (Education Council, 2019). The first goal is: 'The Australian education system promotes excellence and equity.' This means a commitment to 'provide all young Australians with access to high-quality education that is inclusive and free from any form of discrimination' (Education Council, 2019). And yet in our schools and classrooms, academic achievement is still tied to wealth, to gender, to indigeneity. By Year 9, students from the lowest quartile of socioeconomic advantage are roughly 3 years behind

students from the highest quartile. And startlingly, for each 25% of wealth and social capital, you lose a year in mathematical achievement. Moreover, how is it possible that in 2021 the gender gap in Year 3 NAPLAN numeracy was the widest yet of any test in favour of boys at 2.52 months? (Thomas, 2021)

Secondly, the NSW Curriculum review (Department of Education NSW, 2022) voiced concern that Australian students' level of mathematical achievement appears to be in decline. Analysis of PISA data suggested that Australian students have slipped from being some of the highest performers in mathematics to being near the OECD average. Reforming the curriculum was seen as essential step in ensuring all students are challenged and engaged to maximise their individual capabilities and potential.

Thirdly, and crucially for us as teachers, a major driver of syllabus change was our own feedback to the NSW Curriculum Review – that the curriculum 'contains too much clutter, with not enough time to focus on deep learning' These three factors, contextualized by the fast pace of educational and social change, brought about an inevitable reform to our curriculum. It is essential we reflect on the 'why' of the reform as we implement these changes because, as teachers, its success rests in our hands. The syllabus always was, and always will be, the basis for all teaching and learning programs. Until it is enacted in our classrooms, the attempts to support higher achievement, to untie educational destiny from socio-economic status, gender and indigeneity, and to (eventually) reduce our workload, will fail. We are mandated to carry out the reform and we can use it to illuminate possibilities for the way mathematics is taught and learnt in our classrooms.

### THE KEY CHANGES

The structure and content of the syllabus was adapted to reflect current evidence on what makes good teaching and learning. The key changes are:

- clearer, more explicit outcomes for what students are to know, understand and do,
- more deliberate and careful sequencing of content K-6 with a reduction of content and repetition, and a focus on connecting knowledge
- greater emphasis on mathematical reasoning, with one overarching Working mathematically outcome K-6
- increased opportunity for students to apply their knowledge.

The syllabus now sits in a purpose-built, digital portal. Online links provide continuously updated resources such as teaching advice, vocabulary guides, assessment resources, and content examples. This framework of support is essential viewing because it provides context and support for teaching and learning. A resource tab provides tailored support such as work samples, professional learning opportunities, and parent/carer guides.

***Explicit goals for what students are to know, understand and do.***

To make it easier to identify what students need to know, the Mathematics K-10 syllabus has been streamlined and the content described in simpler, more precise language. Stage statements have been removed, reflecting the fact that content within a stage of learning represents what students 'typically' know, do and understand. The change acknowledges that students can have different learning trajectories and teachers are best placed to make decisions on student learning goals.

Syllabus content remains organised into three conceptual areas: 'Number and algebra', 'Measurement and geometry' (previously 'Measurement and space') and 'Statistics and probability'. There are clearer expectations for students' developmental progression in relation to foundational concepts such as place value, additive and multiplicative relations, and fractions. Focus areas have been renamed to make the learning content more explicit. For example, in K-2, Addition and Subtraction has been replaced with 'Combining and separating quantities', moving to 'Additive relations' in Years 3-6. This shifts the focus from treating addition and subtraction as two separate mathematical processes to examining the relationship between them. Similarly, Multiplication and Division is now 'Forming groups' in K-2, moving to 'Multiplicative relations' in Years 3-6.

Each focus area is also accompanied by teaching ad-

vice to assist with programming and lesson design. The advice covers aspects such as possible misconceptions, developmental progression, and interrelationships with other mathematical concepts. To clarify teaching and learning goals, appropriate content points have drop downs which provide unambiguous examples.

Student goal setting is supported through a tight integration of assessment resources. The K-2 syllabus has key progression point tasks in Representing number, Combining and separating quantities and Forming groups. To provide a direct link between observable behaviours and syllabus outcomes, National Numeracy Learning Progression V3 (ACARA, 2020) are tagged to syllabus content from K-10. Teaching advice supports the development of assessment tasks by helping teachers understand where students are on the trajectory of learning. Linked assessment resources provide a range of strategies to monitor student progress and identify areas where additional support may be needed. Underlining a strong focus on equitable outcomes, sample access points are integrated for students with complex disabilities who are working towards Early Stage 1 outcomes.

***The content is more deliberately sequenced and connected.***

The new syllabus draws on contemporary research to redesign the way we identify, introduce and progress key concepts. Content within, and across, focus areas has been realigned and sequenced to improve the progression of learning and build stronger schemas of understanding. Purposeful connections have replaced isolated repetition. For example, in Measurement and geometry, content relating to time and mass now fall together under Non-spatial measure, emphasising the different conceptual approach required to measure things we can't see or touch. Volume now falls under Three-dimensional spatial structure as a natural connection to how we describe and quantify objects.

Many of the changes reflect that 'skills and knowledge for focus areas often develop in an interrelated manner and can be addressed in parallel' (NESA, 2022). For example, patterning is a basic mathematical skill that enables students to sequence, see order and make predictions. It underpins all mathematical relationships from the memorisation of the counting sequence to spatial thinking and geometry. Being able to identify the repetition of a unit is the basis of multiplicative thinking. Therefore, it

just makes sense to liberate 'Patterns and Algebra' from its isolated outcome in the 2012 syllabus and entwine it in all focus areas.

Fractions are another (particularly striking and important) example of how making connections explicit can drive changes to the way we teach, and students learn. We know that almost all students find fractions challenging, and almost all teachers find fractions challenging to teach. Research suggests 'a student's proficiency with fractions is directly related to the conceptual and procedural interweaving they make over a long period of time' (Australian Government Department of Education, 2022).

To support this, the 'Fractions and Decimals' outcome from the previous syllabus has gone from K-2, and fractional understanding is woven into Forming groups and Geometric measure. The emphasis is on conceptual understanding of the whole, and its relationship to the parts, rather than on fractions as a number. Of the three different fraction models - linear (partitioning a length or line), area (partitioning whole shapes or areas) and discreet (partitioning a collection) - the area model is the most challenging. The parts must be equal ('exactly equal'), and students must understand that a shape or object has many different attributes and that only some of them contribute to the measurement of area (for instance - not colour, not orientation, not position). K-2 students are slowly building their ability to estimate and compare area by superimposing shapes, using indirect comparison and, finally, by using grid overlays. Introducing fractions through halves and quarters of shapes assumes students already have a deep understanding of this challenging concept. Indeed, the typical objects we halve (apples, pizzas, leaves, playdough) are often not halves in terms of their mass or volume, and only 'about half' in terms of their size. We are inadvertently contributing to the misconception that one out of two pieces is a half, rather than focusing on the equality of the parts and their relationship to the whole.

The new syllabus, therefore, introduces halves through collections when forming groups, and half (and about half) of lengths in Geometric measure. Students are then introduced to the focus area Partitioned fractions (or fractions as parts of things) in Stage 2, in preparation for representing quantity fractions (or fractions as numbers) in Stage 3.

All of these changes are framed by an increased focus on reasoning. Opportunities for students to reason are tagged to relevant content, and teachers are supported to engage students in mathematical reasoning activities through linked teaching advice. Research suggests that 'children's mathematical reasoning might be the mediator between social background and children's mathematics' (Nunes et al, 2009). If we are serious about closing the equity gaps in mathematical achievement, this is the place to start.

The focus on reasoning informs the move to a single, overarching Working mathematically outcome. It emphasises the interrelationship of the processes that make up working mathematically - understanding and fluency, problem solving, reasoning, and communicating through mathematical language and models. When teachers feel pressured, they often revert to more traditional teaching methods which don't address mathematical reasoning. It seems like a more efficient way of getting through the content. Yet having students listen to, share, and make sense of their classmates' reasoning is vital to building and maintaining a focus on mathematical understanding. For example, learning multiplication facts by rote can be helpful but many students are never able to recall them all accurately. In a classroom where reasoning and communicating is expected, students have to clarify and organise their thinking about the multiplicative relations underlying fact families. This helps them identify important mathematical connections and build fluency through understanding. That most incorrectly remembered multiplication fact,  $6 \times 8$ , can then be accessed or checked through more familiar facts such as  $(6 \times 4) + (6 \times 4)$ , or  $(7 \times 6) + (1 \times 6)$ .

### IMPLEMENTATION SUPPORT

There is no shortage of support for teachers to engage with the new syllabus. NESA has an online learning portal, [NESA Learning](#), which deals with all aspects of the new curriculum. The NSW Department of Education has a wide range of professional development opportunities, as well as on-demand support through Statewide staffrooms and Curriculum networks. A complete set of sample units for Mathematics K-2 Syllabus can be downloaded from the Universal Resource Hub. A selection of sample units for Stage 2 and Stage 3 are also available, with the rest being released in a phased manner into

2024.

However, after all the professional learning is done and all the resources are downloaded, the most important thing will be those discussions in stage meetings, in the staffroom, in classroom doorways and at student desks. It is here that we, as teachers, will really begin to 'work mathematically', exploring, connecting, choosing, applying, reasoning, and communicating newly acquired syllabus content knowledge, reflecting on our beliefs about successful teaching practices and illuminating our own way forward.

The best advice I have? A cut and paste from Jenny Williams' and Mary-Ellen Betts' words of wisdom for teacher approaching a previous 'new syllabus' in 2014: "Open the syllabus and read it"

#### REFERENCES:

Australian Curriculum, Assessment and Reporting Authority [ACARA] (2020). *National Numeracy Learning Progression Version 3*. <https://www.australiancurriculum.edu.au/resources/national-literacy-and-numeracy-learning-progressions/version-3-of-national-literacy-and-numeracy-learning-progressions/> accessed 20 May 2023

Clinton, W. J. (1994). *Public papers of the Presidents of the United States, William J. Clinton*. Washington, DC :Office of the Federal Register, National Archives and Records

Department of Education NSW (2022). *About the Reform*. NSW Government <https://education.nsw.gov.au/teaching-and-learning/curriculum/nsw-curriculum-reform/about-the-reform> accessed 20 August 2023

Education Council (2019). *Alice Springs (Mparntwe) Education Declaration*. <https://www.education.gov.au/resources/alice-springs-mparntwe-education-declaration> accessed 22 August 2023

NSW Education Standards Authority (2022) *Mathematics K-10 Syllabus* <https://curriculum.nsw.edu.au/syllabuses/mathematics-k-10-2022?tab=course-overview>

Nunes, T, Bryant P, Sylva K and Barros, R (2009) *Development of Maths Capabilities and Confidence in Primary School*. University of Oxford.

OECD (2019). *Programme for International Student Assessment Results PISA 2018: Australia*, [website], accessed 28 February 2023

Thomas, D. (2021). *NAPLAN 2021: Making sense of the reading, numeracy, and writing results* <https://readwritethinklearn.com/blog/naplan-2021-results/> [web-site], accessed 14 June 2023.

Australian Government Department of Education (2022) *reSolve: Maths by Inquiry* [website], accessed 12 August 2023.

Williams, J and Betts, M (2015) *How Goes the New K-6 English Syllabus?* Journal of Professional Learning, Centre for Professional Learning, S1, 2015

#### ABOUT THE AUTHOR

Catherine Myson-Foehner has held classroom teacher and executive roles in NSW schools. She is currently employed by the NSW Department of Education as a Teaching and Learning Officer within the Educational Standards Directorate. She assists in the development, implementation and evaluation of innovative approaches to planning, programming and assessment for primary mathematics teachers.

Catherine has a strong educational interest in curriculum development and its impact on student equity. She worked on the K-2 and 3-6 writing teams for the K-10 Mathematics syllabus and delivers professional learning for teachers on syllabus implementation, including workshops at the Centre for Professional learning.

