

Don't underestimate the value of practice in maths education

By Annie Facchinetti

It is often easy to assume that because students appear to have understood an idea or demonstrated a skill on a particular day, they have mastered the associated concept. However, research is increasingly confirming the importance of practice in embedding learning in long-term memory.

The adage 'practice makes perfect' is proving particularly relevant in the field of neuroscience, where studies show that exposure to repeated experiences of a topic are more likely to build lasting neurological pathways. Hohnen and Murphy (2016, p. 79), for example, found that repetition or practice results in what they call 'myelination of that circuit' (myelin is described as the insulating sheath around many nerve fibres, which increases the speed at which impulses are conducted), resulting in students developing greater efficiency with the target skill.

Practice, with a view to mastery, therefore underpins the spiral approach used in the *Maths Plus* program, both within and across year levels. In a 2007 report, Pashler et al. concluded, 'Research has shown that delayed re-exposure to course material often markedly increases the amount of information that students remember. The delayed re-exposure to the material can be promoted through homework assignments, in-class reviews, quizzes, or other

instructional exercises' (p. 5). *Maths Plus* offers students the opportunity to revisit mathematics topics at different points in the year, supported by the extra practice afforded by the *Mentals* and *Homework Books*.

The *Maths Plus* Teacher Dashboard also provides access to a range of resources that will enable students to experience mathematical concepts in a variety of different ways. These include digital interactives to introduce and explore topics, as well as support, extension and reflection activities. Problem-solving challenges included in the *Student Books* allow for skill application in a variety of contexts.

The final step in the *Maths Plus* program is assessment. Another of Pashler et al.'s (ibid., p. 21) findings was that, '... the act of recalling information from memory helps to cement the information to memory and thereby reduces forgetting. By answering the questions on [a] quiz, the student is practicing the act of recalling specific information from memory'. The comprehensive post-assessment components available as part of the *Maths Plus* program help consolidate learning, and allow teachers to gauge student understanding, while the simple marking system provides evidence for A–E grading.

“ The idea that practice assists with the retention of knowledge is not a new one, but our understanding of the importance of practice in learning has been deepened by neuroscientific research. ”



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According to the UK's National Centre of Excellence in the Teaching of Mathematics, 'All pupils should become fluent in the fundamentals of mathematics, including through varied and frequent practice, so that pupils develop conceptual understanding and are able to recall and apply their knowledge rapidly and accurately to problems (NCETM 2014). The Practise, Master, Assess approach used in *Maths Plus* covers all these aspects, using proven strategies to help students develop the knowledge and skills.

Maths Plus:

- provides spiralling content where concepts are explored, then built on throughout the year and across year levels. This helps learners make connections over time, supporting recall and fluency.
- offers varied learning experiences such as interactive concept exploration, learning, practice and consolidation activities, problem-solving tasks, extra support and extension activities, and mental and homework activities.
- includes Assessment Books (bundled with Student Books) that provide post-assessment tests that are simple to use and quick to administer, and allow teachers to track and review student learning.

- is explicitly aligned to the new Victorian Curriculum, as well as the Australian Curriculum and New South Wales syllabus.

Further reading:

Bruner, J 1960, *The Process of Education*, Harvard University Press, Cambridge, Mass.

Hohnen, B & Murphy, T 2016, 'The optimum context for learning; drawing on neuroscience to inform best practice in the classroom', *Educational & Child Psychology*, 33(1), p. 79.

National Centre of Excellence in the Teaching of Mathematics 2014, 'Mastery Approaches to Mathematics and the New National Curriculum', Sheffield, United Kingdom.

Pashler, H, Bain, P, Bottge, B, Graesser, A, Koedinger, K, McDaniel, M & Metcalfe, J 2007, 'Organizing Instruction and Study to Improve Student Learning' (NCER 2007–2004). Washington, DC: National Center for Education Research, Institute of Education Sciences, U.S. Department of Education. Retrieved from <http://ncer.ed.gov>. [Accessed 19 July 2016]