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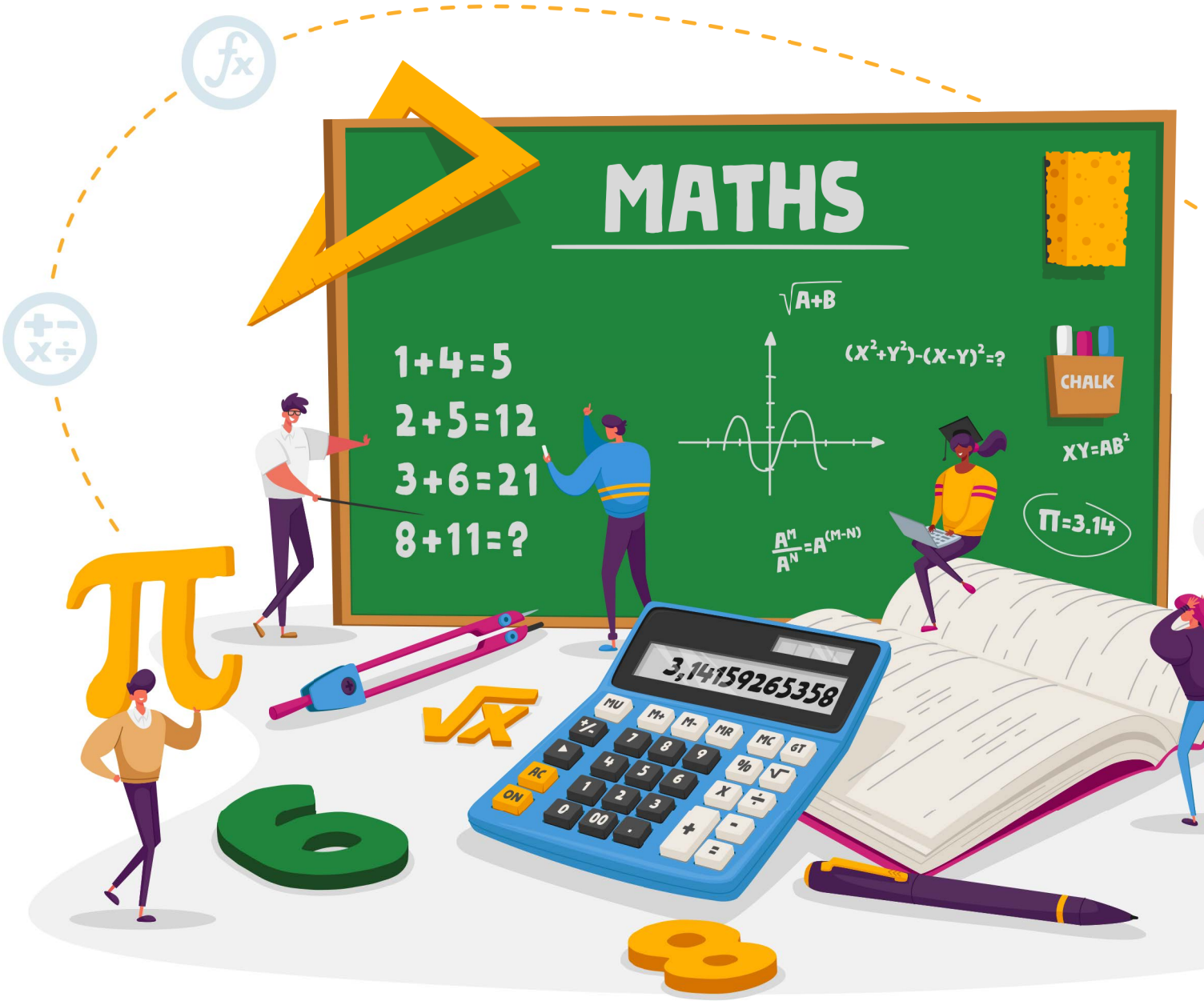
Bulletin



Numbers, Awards, and Extraordinary Stories

From the President

Geoffrey Ongley

I am both honoured and excited to be leading LDA into its 60th year! We remain dedicated to empowering educators through our outstanding publications, professional learning opportunities and relevant resources. Our mission to enhance teacher practice directly transforms the lives of countless students, making a lasting impact on the future of Australian education.

As we begin our new council year, I would like to share some highlights and a bit of a review of the past 12 months or so.

To start, about a year ago, we released our new 'on-demand' platform for professional learning. In more recent times we've added a curated list of professional learning for our members under 'My Courses', including free individual member-only professional learning! You now get even more out of your membership, and you can expect this curated catalogue to evolve further throughout 2025.

We've also held several highly successful events over the past 12 months, and are looking forward to new professional learning being made available in 2025, including a special 60th anniversary professional learning event later in the year.

Our publications continue to be exceptional. Our highly regarded *Australian Journal of Learning Difficulties* that has been expertly edited by Dr. Alison Madelaine, and continues to deliver on its promise to offer highly relevant research, intervention studies and academic insights. The *Bulletin*, skillfully curated by Laura Glisson, remains an indispensable resource for teachers, and bridges the gap between research and practice.

I'm also pleased to share that the LDA Council and Executive remain stable and continue to do a wonderful job to support and manage LDA as an organisation. We've worked to reduce LDA's operating expenditure while increasing revenues, improving LDA's financial performance overall, and changing its trajectory. We expect this positive trajectory to continue into 2025.

I am excited to welcome two new members to Council, Justin McRae and Jen Robin. It is wonderful to have you on board! I would like to also thank and acknowledge our continuing members of the Executive and Council, Dr. Robyn Wheldall, Elaine McLeish, Steph Murphy, Iain Rothwell, Dr Anne Bellert, Felicity Brown, Laura Glisson, Dr. Alison Madelaine, Eleanor McMillan, Erin Rollason, and Dr. Damon Thomas; who work together from all across the country volunteering their time to support LDA. Your contributions mean so much, and also simply make this such a great organisation to be part of. Thank you!

I also want to once again send my congratulations to the winners of our 2024 LDA Awards: Emeritus Professor James Chapman, Dr Emily Jackson, Jenny Baker, and Caitlin Stephenson. If you missed any of their engaging and insightful presentations, I encourage you to watch the replays which are available now on the LDA website.

In conclusion, I would finally like to thank all our members for their continuing support of LDA. Serving LDA and its members is an honour, and I truly look forward to serving you in my second term as President as we head into 2025.

Geoffrey Ongley
President, LDA
president@ldaustralia.org

Geoffrey Ongley is the Co-founder, Director and CEO of Training 24/7, as well as the CEO of Get Reading Right. Educationally, he has completed a Bachelor of Computer Science, Master of Business Administration (Finance), and GradCert in Professional Legal Studies.

AGM Round-Up

The LDA Annual General Meeting took place online on October 14th. The year 2023-24 marked a period of consolidation for LDA, as highlighted by continuing President Geoff Ongley. Geoff celebrated the achievements of the 2023-24 Council, Iain Rothwell, Treasurer, provided a financial update for 2023-24.

The event concluded with a celebration of award recipients, honouring their ongoing contributions to the field of learning difficulties. Each recipient shared insights into their work, research, and advocacy, highlighting the vital impact of individuals within our LDA community.

Congratulations to our 2024 award winners – we extend our gratitude for their time and commitment to presenting.

AJLD Eminent Researcher Award – Emeritus Professor James Chapman

AJLD Early Career Researcher Award – Dr Emily Jackson

LDA Tertiary Student Award – Caitlin Stephenson

LDA Mona Tobias Award – Jenny Baker

LDA Awards 2024

AJLD Eminent Researcher Award

The Eminent Researcher Award is sponsored for LDA by Routledge - Taylor and Francis, publishers of the *Australian Journal of Learning Difficulties*. The award is presented by invitation to a researcher whose career has involved major contributions to the field of learning and learning difficulties. LDA is honoured to announce that the 2024 Eminent Researcher Award was accepted by Emeritus Professor James Chapman.

Professor Chapman has a long history researching and publishing in the area of learning difficulties and other related areas, including looking critically at Reading Recovery.

James Chapman is Professor Emeritus of Educational Psychology at Massey University, New Zealand. He received his M.A. in Education from Victoria University of Wellington, New Zealand and his Ph.D. in Educational Psychology from the University of Alberta, Canada. He joined Massey University in 1980. During his 40+ years at Massey he served for 8 ½ years as Head of the Department of Learning and Teaching, and 10 years as Pro Vice-Chancellor of the College of Education.

He has published over 150 journal articles, book chapters and books on learning disabilities, literacy learning difficulties, early literacy development, and motivational factors in academic achievement. In 1999 he was co-winner of the International Reading Association's Dina Feitelson Award for Excellence in Research. Professor Chapman is a Science Advisor for the Better Start Literacy research at the University of Canterbury, and was on the Ministry of Education Common Practice Model Contributors' Group.

Congratulations, Emeritus Professor Chapman!

AJLD Early Career Researcher Award

The *AJLD Early Career Researcher Award* is sponsored by Routledge - Taylor and Francis, the publishers of our journal. This award is open to researchers who have completed their PhD within the last six years and are currently engaged in research which has the potential to make a significant contribution to theory or practice in the area of learning difficulties. The Early Career Researcher Award involves the submission of a paper in a form appropriate for publication in the *Australian Journal of Learning Difficulties*.

LDA is pleased to announce that the 2024 Early Career Researcher Award went to Dr Emily Jackson from the School of Allied Health at Curtin University.

Dr Jackson has submitted a paper entitled *'Developing teachers' knowledge and confidence for supporting students with speech, language, and communication needs in Flexible Learning Program classrooms'*. The study described in this paper is part of a larger program of research and will lead to the evaluation of in-class interventions for students with speech, language, and communication needs in Flexible Learning Programs.

Congratulations, Emily!

Mona Tobias Award

The LDA Mona Tobias Award is presented to a person who has made an outstanding contribution to Australian education of people with learning difficulties, in the areas of leadership, research, practice, teacher and community education.

It is with great pleasure that LDA announces that in 2024 the Mona Tobias award went to Jenny Baker.

Jenny is recognised for her contribution to the education of school aged children with Specific Learning Disorders and Developmental Language Disorders. Jenny has fostered a professional practice that is dedicated to improving the communication and literacy skills of individuals across all ages

through her commitment to highly explicit and evidence-based teaching strategies while providing support and development for the speech pathologists in her private practice.

Jenny is also recognised for her generosity in giving up her time to present for Learning Difficulties Australia on a number of occasions and other organisations such as Speech Pathology Australia, DSF SPELD and Think Forward Educators, sharing her knowledge of literacy and language with educators and speech pathologists around Australia.

Jenny is also involved in the clinical education of speech pathology students, equipping them with the knowledge and experience required to operate in school-based settings. She has been actively involved in the development of literacy programs across several metropolitan primary schools where she collaborates with teachers to develop evidence-based scopes and sequences in literacy.

Congratulations, Jenny!

Tertiary Student Award

The LDA Tertiary Student Award is presented in recognition of academic excellence and significant research which advances the understanding of theoretical and practical issues in the field of learning difficulties, carried out by a student in the course of their tertiary level studies.

In 2024, we are pleased to announce that the Tertiary Student Award went to Caitlin Stephenson.

Caitlin is completing research towards her ongoing doctoral studies at La Trobe University (Victoria), on a thesis entitled: "Mapping the role of Australian SLPs for working on reading, writing and spelling with school-aged children and adolescents: A mixed methods, multidisciplinary investigation."

Caitlin's research is highly relevant in the area of improving interdisciplinary collaboration and service delivery for students with learning difficulties. The outcomes of her research have great potential to positively contribute to the field of learning difficulties, and a major strength of her PhD research is the multi-perspective and multi-disciplinary nature of the data gathered across her four studies.

Congratulations, Caitlin!

The Bruce Wicking Award

There was no recipient for this award in 2024.

The Rosemary Carter Award

There was no recipient for this award in 2024.

LDA Awards: Celebrating our professional colleagues

Would you like to see formal recognition of a colleague who has a career history that involves valuable contributions to the area of learning and learning difficulties through research and practice, innovative programs or excellent work as an LDA Consultant? Named in honour of our predecessors in the field, the LDA Mona Tobias, Bruce Wicking and Rosemary Carter Awards are all designed for this purpose.

Would you like to celebrate a university student who is doing excellent research and producing publications in the area of literacy or learning difficulties? Let them know that they can apply for the LDA Tertiary Student Award.

Would you like to see special recognition of a researcher in the field who is still in the early stages of their career? The publishers of LDA's Australian Journal of Learning Difficulties (AJLD), Taylor & Francis, provide a generous and prestigious Early Career Researcher Award to recognise research which has the potential to make a significant contribution to theory or practice in the learning difficulties area. This award is based on an article submitted for publication in the AJLD. If you know researchers who have recently completed their PhD and are continuing to work in research relating to learning and learning interventions, you can inform them about this opportunity.

Would you like to have the chance to applaud a successful researcher whose work has made an important difference to you in your own career supporting children with learning difficulties? Taylor & Francis have available a generous Eminent Researcher Award, awarded by invitation of the AJLD Editor/s.

Acceptance of the award involves the submission of an article to the AJLD, and these articles always provide an excellent bonus for the readers of the journal. Please contact LDA if you would like to put forward a suggestion for an eminent researcher who you would like to see considered for this award.

Award recipients are presented with their awards at the LDA Annual General Meeting each year. Criteria and nomination procedures for all awards, and lists of current and previous recipients, are available on the LDA website. See *https://www.ldaustralia.org/about/awards/*

Nominations for the 2025 awards will be due in early 2025 (details to come). Contact *enquiries@ldaustralia.org* for more information.

An LDA Consultant's story: Cristal Flood

I began my journey in education in 2002, studying early childhood education at The University of Melbourne. I had dreamt of becoming a primary school teacher ever since I was a little girl. I was thrown into fieldwork almost immediately and did rounds at a local kindergarten and two childcare centres. After completing my rounds at those three facilities, I began to question whether working in education was right for me. Was it too restrictive? What if I wanted to change careers? Would an early childhood degree hold me in good stead long term?

I made the decision to change paths and complete a degree in business, majoring in accounting. Bold move for the girl who hated maths at school! After completing my degree with the Dean's Award for Academic Excellence in Business Economics and Statistics, I worked as a tax accountant in the city. Alas, I would sit at my computer all day dreaming about being a teacher. I did not regret broadening my horizons at university, but knew with absolute conviction I was to return to studies to become a teacher.

Growing up, my mother was an adult literacy specialist who tutored students at our dining room table. My uncle ran a thriving tutoring business in Albury for decades and my sister is an assistant principal. So you could say I was following in the family tradition by returning to education.

Getting my first classroom job was the best feeling in the world but immediately I ran into my first hurdle. Where were the resources to support the attainment of reading in the early years? If, per the school planner, I were to teach the /b/ sound to Foundation, where were the books that contained the /b/ sound? At that time, schools had a huge range of levelled texts but they did not seem to align with the school's planning documents. Secondly, I continued to observe a small number of students fail to progress in their reading in my own class and others'. Why was this? We tailored our instruction to the students' needs, implemented recommendations from assessment reports, and put in place interventions we could reasonably implement in class sizes of 25 students or more. I just knew there had to be another way for these students.

After many years of encountering and struggling with the same question, *"Why do some children learn to read while others do not?"*, I began to take action. It was not a conscious choice, but a calling.

I learned about synthetic phonics which changed my perspective on teaching literacy. I commenced training in Multisensory Structured Language Education and subsequently became a member of the Australian Dyslexia Association. I learned what constitutes a Specific Learning Disability in Reading (formerly referred to as Dyslexia) and learned best teaching practices for children with learning difficulties. I also completed the Sounds~Write training.

My next big step was to put everything I had learned into practice. I decided to take a year off teaching and focus on working with children, providing Tier 3 intervention in a one-to-one capacity. I converted my spare bedroom into my teaching space. It was a transformative year – Cristal Literacy Learning Centre CLLC was born.

However, I still felt as though something was missing, so I sought advice from Alison Clarke who runs Spelfabet. She was aware of my journey thus far and encouraged me to look into Learning Difficulties Australia. This put a fire in my belly and provided me direction.

After going through the application process in 2023 to become an LDA

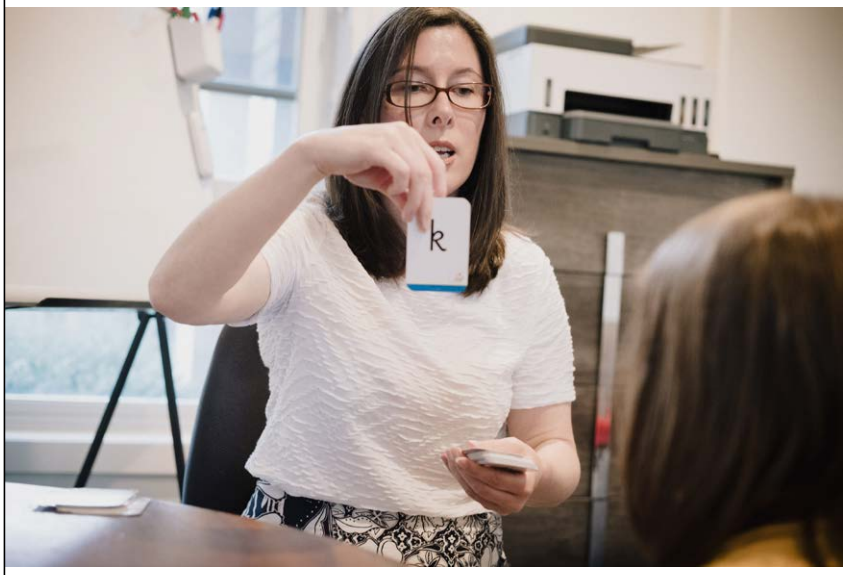


Image 1. Cristal from Cristal Literacy Learning Centre CLLC. Image by Brett Scapin, School Days Photography.

Image 2. Cristal and a student using letter-tiles to support word building and reading. Image by Brett Scapin, School Days Photography.

consultant member, I was informed that there was a next step. A 10-week mentorship program with an experienced LDA consultant, Juanita Lee. I am a learner for life, so I jumped at the opportunity!

My first impressions of Juanita were how warm she was. She was the ultimate professional with an infectious laugh and I knew it was going to be a great partnership. We devised a plan for success and went about the next 10 weeks implementing it. Juanita coached me through the entire process of assessing a new student, analysing the results to create a tailored program for the student and adjusting my approach to respond to the child's learning needs throughout the term. It was an intensive 10 weeks; a very thorough and meaningful approach to initiate a new member into the rigours of becoming a consultant member.

Underlying my approach to teaching children are the following values:

- **Compassion and care** – for the helplessness many families feel when their child has difficulty learning to read and write
- **Listening** – to what each child needs
- **Learning** – on the cutting edge of how to best teach children who struggle with Literacy
- **Celebration** – of each child's individuality and success

I feel a great sense of pride working with children who have learning difficulties. When I was a teacher in the classroom, I noticed that children who were behind their peers in reading and writing were often the hardest workers. Consequently, they would suffer exhaustion and fatigue, almost akin to burnout. Following this were feelings of anxiety and disengagement.

I honour these children's work ethic by providing rigorous individualised learning programs and a kind and caring approach to teaching. My trusted side-kick, 'Bella the Toy Fox Terrier', is often in the room while I teach. The children LOVE her and she loves them, often providing light comic relief… and a few licks.

Teaching children to read provides them the gift of dignity, especially as adults. While I teach other curriculum areas, my love for literacy is the strongest for that reason. What keeps me passionate about education, especially teaching children with a diagnosed Specific Learning Disability, is hearing stories about how Tier 3 intervention transformed someone's life, enabling them to fulfill their post-school goals, and contribute to society in meaningful ways.

I am blessed and honoured to work with families, and witness their children grow in confidence as their reading, writing and maths abilities progress. I am humbled when children 'graduate' from CLLC as they have fulfilled their goals, and thrilled when I am informed by a parent that their child, who previously never read, is now reading for pleasure. I am grateful to LDA for enabling me to transition so seamlessly from the classroom into a specialised field where I can do what I love. It is challenging and thoroughly worthwhile.

About the author

Cristal Flood is a primary school teacher of 10 years and the founder of Cristal Literacy Learning Centre CLLC (www.cllc.com.au) where she provides specialist Tier 3 intervention to children with literacy difficulties. Cristal is trained in Multisensory Structured Language Education and Sounds~Write, and is a member of the Australian Dyslexia Association and a Consultant Member of Learning Difficulties Australia.

Conflict of interest

The author is the founder of a business mentioned in this article, and receives financial benefits related to this work. Copyrighted images have been reproduced with permission. The author did not receive funding from public, commercial, or not-for-profit sectors to write this piece.

Image 3. Cristal and a student reading a decodable text. Image by Brett Scapin, School Days Photography.

In this issue of the Bulletin...

Laura Glisson, Editor, LDA Bulletin

I am pleased to bring you the third edition of the Bulletin for 2024 and it is a special edition of mathematics entitled *'Numbers, Awards, and Extraordinary Stories'*. We bring you 9 excellent articles written by classroom teachers, school leaders, researchers and speech pathologists, plus two award winner recipient speeches from our 2023 LDA Awards Ceremony. A sincere thanks to our contributors for this special issue. We appreciate you generously sharing your knowledge, expertise and stories of success.

Our feature article for this special edition is by Reid Smith, titled, *'Daily Review in mathematics'*. In this article, Reid explores the concept of Daily Review in mathematics, emphasising its foundation in spaced, interleaved, and retrieval practice to enhance student learning and retention. Highlighting the approach developed by Ochre Education, it details the structured use of fact fluency and skill rehearsal slides, fast-paced engagement, and formative assessment to reinforce key concepts while addressing misconceptions efficiently.

The second article, *'What exactly is Place Value?'* by Dr Ange Rogers, underscores the foundational importance of place value in mathematics, highlighting its role in understanding numbers, operations, and broader mathematical concepts. She introduces six key aspects of place value—naming, counting, representing, comparing, renaming, and calculating—and advocates for comprehensive teaching approaches and assessments to address gaps and misconceptions in students' understanding.

Of equal interest is *'Screening that Counts: Why Australia needs early numeracy screening – Research Snapshot'* by Kelly Norris, which advocates for the introduction of universal early numeracy screening in Australia, focusing on key components of number sense: number, number relations, and number operations.

The next article is by James Dobson, an experienced classroom teacher, school leader and instructional coach. In this piece, James shares 10 practical tips for building number sense in young learners, emphasising the foundational role it has on future mathematical success. From teaching counting patterns and one-to-one correspondence to fostering skills like subitising, partitioning, and number flexibility through games and concrete materials, these strategies help children develop a robust understanding of numbers and their relationships.

Our second feature article, *'Instruction for all abilities in the mathematics classroom'* is written by James Dixon. Here, James outlines a sequential approach to teaching in primary mathematics, emphasising clarity, explicit instruction, and scaffolding to meet the needs of all students. Key strategies include setting clear learning intentions, reviewing prior knowledge, using progressively layered examples, and employing well-structured visuals that minimise cognitive overload. Success criteria, frequent checks for understanding, and fostering small, incremental wins are highlighted as essential to building student confidence, motivation, and achievement.

Next, we have an article titled, *'Think of a number'* from Kate Palmer, Lead Speech and Language Therapist, Fairley House School in London. Here, Kate explores the "Reading Comprehension for Maths" program, designed to support students with speech, language, and communication needs in overcoming challenges with math word problems.

The theme of mathematics is wrapped up by Erin Rollosan, who provides a summary of a recently published meta-analysis by Lin et al. (2020). The findings of this meta-analysis emphasise the importance of explicit vocabulary instruction, cognitive skills development, and tailored teaching strategies to improve math outcomes, particularly for students from lower socio-economic backgrounds.

In her article titled, *'Rethinking Tier 1 spelling instruction'*, Dr Alison Madeleine explores the critical role of spelling in writing, reading, and life beyond school, highlighting its connection to effective communication and literacy development. The article emphasises the need for systematic and explicit spelling instruction that integrates phonological, orthographic, morphological, and etymological knowledge to improve spelling outcomes and support diverse learners.

Next, Elvira Kalenjuk, the 2023 LDA Tertiary Student Award recipient, provides a summary of her research on dysgraphia, an often-overlooked learning difficulty. Through her doctoral studies, Elvira explored the lived experiences of children, parents, and educators, highlighting the need for greater

awareness, tailored interventions, and systemic reform to support students with writing challenges. Congratulations, Elvira, for your impressive body of research on this topic!

To finish, we have the acceptance speeches from two of our 2023 LDA award winners - Julie Phillips (2023 LDA Mona Tobias Award Winner) and Julie Mavlian (2023 LDA Bruce Wicking Award Winner). Read about two inspiring members of our LDA community.

If you are interested in contributing to a future edition of the Bulletin, I'd love to hear from you! You can contact me at bulletin.editor@ldaustralia.org. Wishing you all a safe and happy end to 2024.

Laura Glisson, Editor, LDA Bulletin

Laura is a Certified Practising Speech Pathologist (Speech Pathology Australia) with over 14 years experience working with school-aged children and young people with speech, language and literacy difficulties. Laura works as the Co-director and Co-founder of Tracks to Literacy, where she provides professional learning to educators and clinicians on oral language and literacy instruction, intervention and assessment. Laura also works clinically with upper primary and secondary-aged students with language, literacy and associated mental health difficulties, and is a Clinical Coordinator and lecturer in the Curtin School of Allied Health at Curtin University in Perth.

Daily Review in mathematics

Reid Smith

One of the key challenges faced by teachers in all subjects, but particularly mathematics, is helping students to first master and then retain knowledge and skill over time. In an article published in 2020, the fabulous David Morkunas (2020) discussed the key principles that underpin the use of Daily Review in mathematics. The aim of this article is to briefly review these key principles, discuss how the Daily Review concept is conceptualised by Ochre Education, and then report on some of the things we have learnt about the creation and use of Daily Reviews.

In his article, Morkunas (2020) describes three key principles that underpin the use of Daily Reviews:

- **Spaced Practice** – the act of spreading out opportunities to practise over time, instead of cramming practice into a single session, or over the course of a single week. The spacing of practice allows students more opportunities to retrieve skills and knowledge, more firmly embedding these skills into long term memory (AERO, 2022; Carpenter, 2012; Cepeda et al., 2006; Roedinger, 2011).
- **Interleaved Practice** – the act of studying a range of topics in a single session, as opposed to studying a single topic or domain in a blocked session. This interleaving of practice initially seems more difficulty for students, but results in greater retention over time (Firth et al., 2021; Paschler et al., 2007)
- **Retrieval Practice** – The act of using skills or knowledge stored in long term memory. The frequent retrieval and use of skills enables them to be more readily accessed in the future (AERO, 2022; Adesope, 2017; Roedinger, 2011).

As Morkunas describes, the use of a daily, low-stakes quiz (the Daily Review) that provides time for students to retrieve skills, to practise them interleaved with other skills, and to encounter them spaced over time, can provide significant benefits.

Ochre Education Daily Reviews

Ochre Education is a national not-for-profit organisation, committed to advancing student outcomes and closing the disadvantage gap by supporting teachers to teach, and enabling all Australian students to access a high-quality curriculum. We do this by working with practising teachers to share their knowledge and expertise via high-quality, evidence-based curriculum materials and adaptable lesson resources that are made freely available for all schools and teachers to adopt and adapt.

Daily reviews are most effective when retrieval of concepts and skills are carefully scheduled across the course of a term or a year

Daily Reviews are the most frequently used element of the Ochre Education offer. The Daily Reviews are presented as slide decks designed to support the practice of key skills and concepts, and are formatted in such a way to reduce unwanted distractions. Each Daily Review slide deck is designed to run for approximately 10-20 minutes, usually at the start of the maths session. The timing is particularly relevant if Daily Review content is retrieving prior learning relevant to the upcoming lesson content. Alternatively, additional Daily Review can occur at appropriate times during the day or week, whenever you have a few minutes to utilise, and maximise learning time.

Types of concepts and skills covered in Daily Review

There are two main types of Daily Review slides in the Ochre decks: fact fluency, and skill rehearsal.

- **Fact fluency practice** involves the recall of key math facts and knowledge, such as numeral recognition, subitising, addition and multiplication facts, and recognising features of shapes. Fluency practice works best when these facts have been committed to long term memory. However, there is a place for the fluency Daily Review slides to be used as a learning tool, as the frequent repetition over time can help embed knowledge and increase fluency.
- **Skill rehearsal** slides involve the use and application of more complicated maths skills. These slides address more complicated elements of mathematics, such as two-digit multiplication, perimeter calculations and reading a calendar. These skills tend to require more than a recall of a fact; instead they usually involve the application of mathematical knowledge.

In order to satisfy the key Daily Review element of fast pace as indicated by Morkunas (2020), Ochre Daily Review slides are designed to allow for quick student responses and easy teacher identification of misconceptions. The Daily Review is not the appropriate setting for lengthy, involved investigations. Therefore, the most common response methods in Daily Review are choral responses and

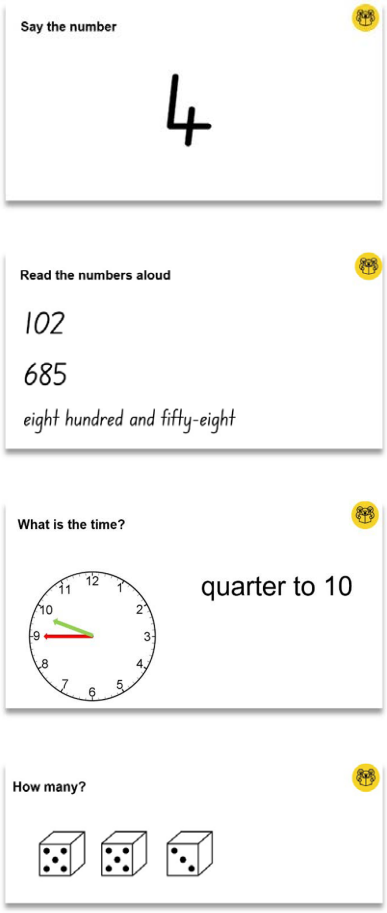


Image 1-4. Daily Review fluency slides with rapid response techniques

written responses, usually involving mini whiteboards.

Choral responses involve all students responding verbally with a single expected answer. It is a quick and effective way to provide multiple opportunities for students to retrieve and practise key facts. Rapidity of response can vary depending on the class; in some cases, the response can be almost instantaneous, while in others, teachers may provide a little wait time (1 – 3 seconds) before cuing

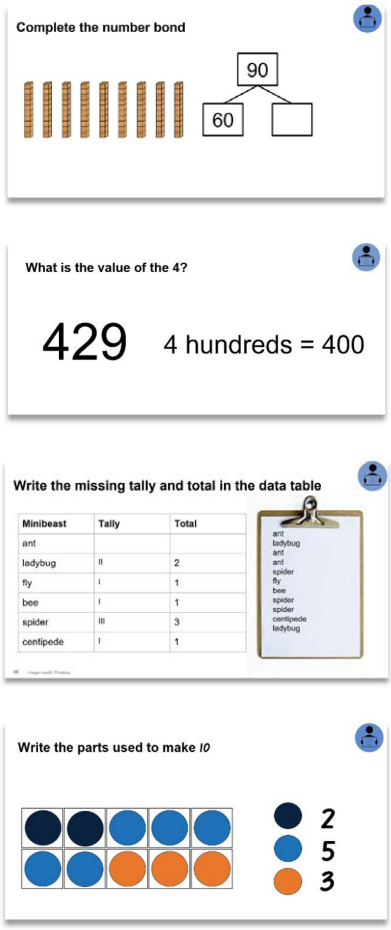


Image 5-8. Daily Review slides requiring written responses

a response. All students are expected to respond to the cue. For students who are not yet able to respond quickly or accurately, it is a low-stakes situation for them to hear the correct response and practise their own. Often taking just a few seconds per slide, students can have many opportunities to practise and increase fluency.

In contrast, some Daily Review slides require written responses on mini whiteboards. These slides provide opportunities for teachers to carry out formative assessment, to address misconceptions and to correct errors immediately. They can also be used for longer or more complex responses. If mini whiteboards are not available, laminated cards or stiff white paper inside plastic pockets can be used to collect responses. Having pre-printed number lines, ten-frames or other templates can support responses that reduce cognitive load and focus on the target skills or knowledge.

Scheduling the Daily Review

Daily Reviews are most effective when retrieval of concepts and skills are carefully scheduled across the course of a term or a year. Trying to assemble a series of Daily Review decks in an ad hoc fashion, without reference to a scope and sequence or what has been reviewed in the past, is unlikely to be as effective as a carefully considered scope and sequence.

Working from your school's scope and sequence should be the starting point for the Daily Review sequence. There should be some massed review soon after the initial teaching of a concept, and then gradual increases in the length of time between the review of the skill or concept. At Ochre, we recommend the following cadence:

- Straight after teaching
  - Review the concept for 3-4 days straight after the initial teaching of the concept or skill. Note that, on the first day of review, you may need to quickly reteach the concept. Ochre provides Reteach decks, designed to run for 5 – 10 minutes, as a starting point.
- 3 weeks after initial teaching
- 6 weeks after initial teaching

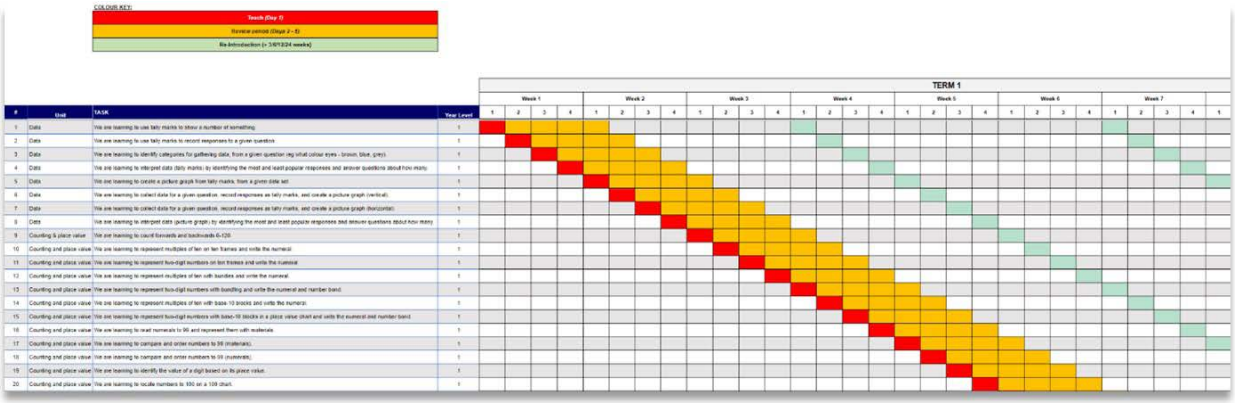


Image 9. Suggested Daily Review schedule, including spaced retrieval practice

- 12 weeks after initial teaching
- 12 week delays thereafter

It is important to note that there may be some skills that are included far more often than this suggested cadence. These might include multiple and addition fact fluency, operations and other core number skills that are leveraged across all of the strands of mathematics.

Ochre Education has a sample Daily Review schedule available for the Victorian Curriculum 2.0, which can be used as a starting point for schools. As with all Ochre resources, this can be adapted to suit your school scope and sequence. Topic decks and year level master decks of slides are also available to help assemble bespoke Daily Review decks.

Making a Daily Review deck

Feedback from the use of Daily Reviews in classes has informed some of the key principles to ensure that individual Daily Review decks will be more suitable for learning:

- **Start easy** – the Daily Review should start with content that every student in the class knows and can correctly respond to quickly and easily. This helps students see the Daily Review as an activity in which they can experience success, and also allows for the class to develop a rhythm and pace.
- **Modulate the difficulty throughout the review** – although there will be points in the review which some students may find difficult, or may not finish a question in an allotted amount of time, this should be infrequent and spread through the review. As a general principle, the review should not start easy and end hard. Instead, the majority of the slides should be well within the capability of the students (it is a review after all) and then the concepts that might be more challenging can be sprinkled throughout. Students should not get a feeling that there is a point in the review where they can no longer participate, and they should opt out.
- **Bunch written response questions together** – this means that students are not constantly shifting between modes of response and requiring manipulation of mini-whiteboards. This is particularly true of students in the younger years.

Teaching using the deck

Before teaching a Daily Review deck, make sure to read each of the slides to familiarise yourself with the content and the concepts being reviewed. This check should be performed through the lens of what students in your class know and are able to do. There is little point in addressing skills and knowledge in a review that students have not yet learnt, or is presented in a vastly different way to their previous experiences. This is particularly true when using materials prepared by someone else. Intellectual preparation, thinking about your class and their potential response to the Daily Review, is a critical element in running an effective Daily Review.

Moving at a sustained, rapid pace during the Daily Review is crucial to maintaining student engagement and utilising the time effectively. In the initial stages of implementation, students (and teachers) unfamiliar with Daily Review practices will need time to implement and improve practice norms and expectations, so the pace and amount of content may be lower to begin with. You may find that you are not able to get through many slides initially, but the total time should still be capped.

an element of teaching and learning that can provide a high level of return for effort, and is engaging and fun for students

One of the most frequent questions asked about Daily Review is what to do when it becomes obvious that a significant proportion of the students do not know the concept or skill, or are making errors in their application. In some cases, if the difficulty is fact fluency, the response might be to schedule more opportunities for the students to rehearse these facts, either in the body of the main maths lesson or in future reviews. It is more challenging when the difficulty sits in skill rehearsal.

Our advice is dependent on the time required to remediate the problem. In some cases, where there is a common misconception or the skill is a relatively constrained one, the misconception can be addressed in under a minute. This might involve a brief reminder of some key steps of a procedure, pointing out what a common incorrect response might have meant students had done incorrectly, or a very brief reteach of the concept before the students try again. The one-minute fix maximum is a good guide to the very upper limit to the time allocated to the reteach.

If the remediation will take longer than one minute, or the Daily Review session already looks like it will run over time, it is best to schedule an extended reteach of that concept in future lessons. Teachers can point to that fact by saying something like *"I notice a lot of us had the answer X. The correct answer here was Y. We will return to this question later this week and talk through why the answer was Y."* It is important that students know whether their answer is correct or not – no student should be left not knowing that their response was not correct, just as it is important to know that you will return to it. This could be a comprehensive or cursory refresher, depending on the knowledge levels and needs of the students. Teacher judgement comes into play here – if your students have a lot of knowledge gaps, you will need to prioritise the content that is more important. For example, focusing on addition facts or strategies, in preparation for upcoming lessons on vertical addition, rather than estimating with informal measurements, will be more beneficial in terms of student achievement. If students know how to do something but just lack fluency, you can increase the number and frequency of practice over the next few days or weeks, then reduce the frequency once you assess that students have improved their recall and fluency. These sorts of teacher judgements will become easier with time and practice.

As teachers look for ways to improve their teaching practice in mathematics, Daily Review can be a good place to start. It is certainly an element of teaching and learning that can provide a high level of return for effort, and is engaging and fun for students.

About the author

Reid is a founder and co-CEO of Ochre. He taught and led curriculum in a 3 year old to Year 12 school for over two decades, and brings those experiences to his role at Ochre. Reid is a member of La Trobe University's Science of Language and Reading (SOLAR) Lab, and was the recipient of the LDA Tertiary Student Award in 2021. He is experienced in developing coherent curriculum across a range of year

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Conflict of interest

The author declares that they have no conflicts of interest. Images used with permission.

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What *exactly* is Place Value?

Dr Ange Rogers

Place value knowledge has been described as important as the framework of a house, such that if a student's knowledge in this area is shaky, his/her understanding of mathematics as a whole is affected (Major, 2011). An understanding of place value has been shown to be closely related to students' sense of number (McIntosh, Reys, & Reys, 1992), understanding of decimals (Moloney & Stacey, 1997) and comprehension of multi-digit operations (Fuson, 1990a). Furthermore, it is seen to underpin almost every aspect of the mathematics curriculum, from counting, estimating, money, addition, subtraction, multiplication, division and measurement through to percentages and scientific notation. Every educator would agree that place value is fundamental to a student's ability to experience success in mathematics and, as such, is an integral part of the Primary School syllabus. Yet, ask teachers to explain precisely the content they cover when teaching 'place value' and you are met with a range of responses. Reading, writing, ordering and representing quantities with base ten materials are typical foci, but is this content enough to develop a deep conceptual understanding of place value?

This article aims to clearly define place value and presents a structure to guide teaching in this critical construct.

Background

In terms of history, it wasn't until relatively recently that our current Hindu-Arabic system was adopted. This system, with 'zero' used to represent a null numerical value (Anthony & Walshaw, 2004), was developed by the Hindu people in India between the fourth and seventh century and introduced into Europe by Arabic traders around 800 CE (Gundlach, 1989). Our place value system is base ten and consists of 10 symbols (0,1,2,3,4,5,6,7,8,9). Each symbol represents a different value depending on its position in a numeral. For example, in 404, the symbol (4) is used twice, but because of its location, it represents both 4 hundreds and 4 ones. Its value depends on its place. While our place value system appears incredibly simple, it takes much experience to master and requires carefully considered instruction.

Place value properties

In essence, our place value system is based around five important properties which we coordinate when reading, saying and recording numbers (Ross, 2002).

1. **The positional property** suggests the value of each digit is indicated by its relative position in the numeral. The positional property is unique to a place value system. If we think of a chair in a classroom, that chair can be placed anywhere in the room, and it can still be labelled as a 'chair'. However, in place value, the symbol '3' could represent different values depending on its location in the numeral. For inexperienced learners this can be a challenging idea.

   In early years mathematics classrooms, we may ask students to count a collection of three items and record the numeral '3' to represent this collection. However, when we introduce two-digit place value, students must understand that if we place a '3' in the tens column, it does not represent '3' individual items, but 3 units of ten items. This complex idea requires an appreciation of ten as an abstract composite unit (Cobb, 1995). A significant conceptual jump is required when students move from a unitary view of numbers, to one where they are required to appreciate ten as a unit (Ross, 1989).

2. **The multiplicative property** allows the calculation of each digits' value. For example, in 36 the face value of '3' is multiplied by its place value (tens), meaning its value is '3 tens' or '3x10=30'. Multiplicative thinking has been shown to develop slowly and pose significant difficulties for students (Clark & Kamii, 1996; Siemon et al., 2006). The challenges associated with introducing a multiplicative system to inexperienced additive thinkers should not be underestimated.
3. **The additive property** states that the quantity represented by a numeral is the sum of the value of the individual digits. For example, 56 is 5 tens + 6 ones or 50 + 6. Students must begin by identifying the value of the column in which a digit sits, then multiply the digit's face value by the value of the column. They must repeat this process for each digit in the number. Each value must then be added together. This process requires a deep appreciation of our place value system, multiplication and addition.
4. **The base-ten property** describes the idea that each place value unit is ten times the value of the place value unit to its right. For example, in the number 33, 3 tens are ten times larger than 3 ones. This is known as the "recursive multiplicative structure" (Thomas, 2004, p. 311) that continues throughout our base-ten numeration system. In essence, a base indicates the grouping size used to organise and represent a

collection. Students need repeated opportunities to count and group in tens to appreciate this grouping size is key to our place value system (Baroody, 1990).

5. **The zero property** states that in place value we use zero (0) to represent the absence of a quantity. Without this symbol, the place value system would be unworkable. For many young students, zero may have been introduced as meaning 'nothing'. Yet in the context of place value, zero means everything. It is quite literally the key to our place value system. To ignore, omit or add extra zeros in a numeral can cause the value of the number to change. Zero is an abstract idea which further adds to the complexities of place value.

While these five properties underpin place value, a more precise definition of the construct is required to support teachers to provide comprehensive place value instruction. The following section explores how we can define place value using six distinct aspects.

Defining place value

A close analysis of the literature associated with place value suggests it is a broad term used in a number of contexts. To summarise the information already presented in this article, place value can be defined as:

> *the property of the base-ten numeration system, by which the numerical value represented by each digit of a written multi digit symbol is equal to the product of the digit's face value and the power of 10 associated with the digit's position in the numeral (Miura & Okamoto, 1989)*

Yet this definition does not support teachers to know what to teach in place value– an observation also noted by Major (2011):

> *place value is an ill-defined concept in terms of teaching components. Its place in mathematics is clear, but how that translates to what should be taught, and how, is not. (p.16)*

A lack of clarity associated with the content required to be covered in place value can lead to inconsistent and superficial teaching of the construct, (Rogers, 2014). Teachers may over-emphasise necessary but superficial skills such as reading, writing, making and ordering numbers, at the expense of more complex skills such as renaming and using number lines. For this reason, it is critical to have a working definition which breaks down place value into its key aspects.

From a comprehensive review of the literature associated with place value I was able to identify six key aspects (Rogers, 2014) or content areas within place value. These aspects apply to both whole numbers and decimal place value. The six aspects provide a 'shared language' and structure to guide the assessment, teaching and learning of place value. Below is a short explanation of each of the six aspects.

Image 1. The six aspects of place value

1. Name/Record

The most obvious component of place value is reading and recording numerals. Being able to read and record numbers allows students to interact with and represent quantities. Yet while reading and recording errors often indicate a lack of place value knowledge (for example recording one hundred and five as '1005' as shown in Image 2), as Thompson (1982) notes; in isolation, robust reading and recording skills are not indicative of a fully developed understanding of place value.

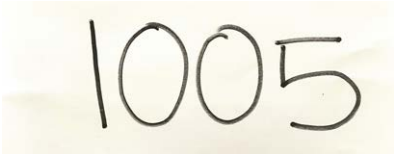

Image 2. Example recording error - one hundred and five as '1005'

Thus, while these skills form an important component of place value, they are just that, one component. Akin to learning 'blends' (i.e., "ch" and "sh") in a literacy context- reading and recording numerals in place value is an essential building block, but not one that can be used to indicate a deep level of place value *comprehension*.

My definition of Name/Record is: Reading and recording a number in words and symbols (e.g., 75 is written as 'seventy-five'). Naming the place value columns (the hundreds column is next to the tens column) and determining the value of a digit (the digit 7 in 75 has the value 70).

2. Count

Jones et al. (1994) describe counting as the "pivotal component" (p.121) in place value. They note the importance of students developing an appreciation of the structure of the number system through counting forwards and backwards both in whole numbers and decimals. While the link between place value and counting for researchers and teachers appears clear, many students fail to see this link (Kamii, 1986; Thomas, 2004) and thus struggle with tasks such as bridging and co-ordinating a count of multiple place value units (Wright, Ellemor-Collins & Tabor, 2011). Counting allows students to experience the patterns inherent in our number system. For example, noticing that to count from 100-199, we simply repeat the numbers from 1-99, but say "one hundred and…" in front of each number, supports students to appreciate the recursive nature of our system. Another important part of this aspect is appreciating the meaning of words such as before, after, more, less and between. These words require instruction related to their meaning, as well as an understanding of their application in relation to the forwards and backwards number sequence.

My definition of Count is: Counting forwards and backwards in place value parts (e.g., 45, 55, 65 is counting using the unit ten). Bridging forwards and backwards over place value segments such as decuples and centuples (e.g., 995 and one more ten requires bridging forwards over hundreds to thousands). Applying language such before, after, between, more, less.

3. Make/Represent

Manipulatives have long been used to support learning in mathematics.

Essentially, they can provide a concrete representation of an abstract mathematical concept such as place value. Baroody (1989) points out that place value manipulatives are not 'magic' and they do not come with guarantees. A wide variety of manipulatives can be used for teaching whole number place value, however in Australia, it is 'common practice' to use base-ten Multi-base Attribute Blocks (MAB), (Dienes, 1960). Base ten blocks are a proportional place value model. On a practical level, proportional models become cumbersome to use in the upper primary school when students are working with 5- and 6- digit numbers. Non-proportional models, such as place value discs (see Image 3) are more appropriate to represent large numbers, however, it is important to note that non-proportional models are a more abstract representation compared with proportional models.

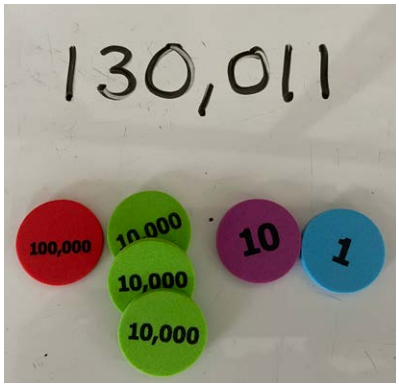

Image 3. Non-proportional model (place value discs) representing a large number

When working with place value manipulatives it is important to explore both canonical and non-canonical arrangements. Ross (1986) describes canonical groupings as those that followed the convention of no more than nine objects representing any place value position: for example, 4 tens and 5 ones. Non-canonical groupings involve more than nine objects from any one place value position: for example, 3 tens and 15 ones. Non-canonical representations require students to have a much deeper understanding of place value than canonical representations as they necessitate that students understand the need to rename 10 ones as 1 ten. The student shown in Image 4 has recorded the numeral as 315 as they have not recognised the need to rename the 15 ones as 1 ten and 5 ones.

My definition of Make/Represent is: Make, represent or identify the value of a number using a range of materials or manipulatives. These may be proportional (e.g., base-ten blocks), non-proportional (e.g. coloured discs) and be presented as canonical (e.g., 3 tens and 9 ones is 39) or non-canonical representations (e.g., 2 tens and 19 ones is 39).

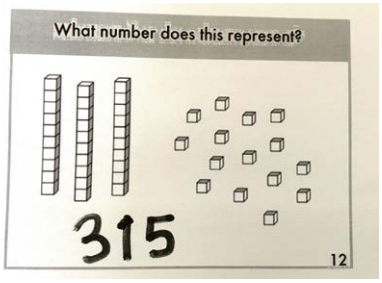

Image 4. Example error when recording the numeral for a non-canonical number representation – student has not recognised the need to rename the 15 ones as 1 ten and 5 ones

4. Compare/Order

A task commonly used when working on place value is placing numbers in ascending or descending order. Whilst on the surface, ordering numbers appears to require an understanding of place value, Poltrock and Schwartz (1984) warn that students often experience success in this area by treating numerals as a string of concatenated digits rather than a quantity (for example, they may learn 'rules' like 'a longer number is larger', which becomes problematic when applied to decimal fractions). Parallels can be made to the Literacy task of placing words in alphabetical order. A student who correctly places words in alphabetical order, does not necessarily understand the meaning of these words, they are simply following a process. Similarly, being able to compare and order numbers may not be indicative of a student's understanding of place value.

A form of number comparison which does require a deep understanding of place value is "multiplicative comparison" (Siemon et al, 2011, p. 357). Multiplicative comparison requires children to apply the knowledge that adjacent place value columns increase by a power of ten from right to left, for example, 'what number is ten times larger than 44?'.

Another sophisticated application of comparing and ordering numbers involves the use of number lines. Both Gervasoni, Parish, Hadden, Turkenburg, Bevan, Livesey & Crosswell. (2011), and Booth and Siegler (2008) suggest a strong link between place value knowledge and working with number lines. Van den Heuvel-Panhuizen (2001) and Siemon et al. (2011) describe the skill of sequencing or positioning on a number line, for example, 'Identify where 62, 34 and 17 are on a 0-80 number line', as requiring a deep appreciation of place value and the relative magnitude of the numbers.

My definition of Compare/Order is: Compare numbers to determine which is larger or smaller using an understanding of the relationships between numbers. Compare numbers in a multiplicative manner, for example ten times larger than 54 is 540. Place numbers in descending or ascending order and locate numbers on empty, partially marked or complete number lines.

5. Rename

My PhD research identified renaming numbers as the most important aspect of place value to teach and learn (Rogers, 2014). One reason students struggle to rename is that many come to develop 'independent column thinking' (Rogers, 2014). Independent column thinkers believe that each place value unit lives in its own column. For example, tens 'live' in the tens column, hundreds 'live' in the hundreds column etc. Renaming requires students to see the link *between* columns. Therefore, they are required to see that in 234, there are actually 23 tens (3 in the tens column and 20 'hiding' in the hundreds column). When asked how many tens are there altogether in 234, independent column thinkers will immediately answer '3' as they are accustomed to focusing solely on the tens column.

Renaming is one of the most difficult skills for students to develop in place value as it requires flexible multiplicative thinking (Clark and Kamii, 1996; Siemon et al., 2006). Renaming requires students to understand composite units and the idea of units within units. Renaming also has important links with the formal algorithm. Often the act of renaming is referred to as 'trading', 'borrowing' or 'regrouping'. The use of these terms can hinder students from making important connections between the process followed in the algorithm, and their place value learning.

My definition of Rename is: Rename numbers in multiple ways in terms of place value parts without the use of manipulatives (e.g., 260 is equivalent to 26 tens or 2 hundreds and 6 tens or 260 ones).

6. Calculate

Without doubt place value plays a critical part in students learning to compute in all four operations. As noted by Hiebert and Wearne (1996), it is students' poor knowledge of place value that creates difficulties for them in understanding multi-digit addition and subtraction algorithms. Yet, as suggested by Fuson (1990b), one questions whether a switch in focus towards developing an understanding of calculation *through* place value instruction would be more effective. Clements and Samara (2009) note, conceptual knowledge "of the base-ten system influences how students understand, learn and use algorithms" (p. 91). As such, students' difficulties with multiplying by factors of ten are typically related to the rote learning of procedures such as "add a zero" (Ball, Lubienski, & Mewborn, 2001, p. 444) rather than through an explicit focus on place value.

My definition of Calculate is: Apply knowledge and understanding of the place value system when completing calculations using the four operations (e.g., 45 multiplied by ten is 45 tens, 45 plus 100 is 145, 120 divided by ten is 12)

Why the six aspects are important

The identification of the six aspects of place value is an important step forward in place value teaching and learning. Teachers can use the six aspects as a framework to ensure they are addressing all the necessary skills required for place value competence. Teachers from all year levels can use the six aspects, providing an opportunity for a whole school approach to be taken to place value instruction.

The work of Ross (1989) and Chan, Au & Tang (2014) suggests that many typical place value assessment items fail to expose common student misconceptions, observing that "many students appear to know more than they actually do" (Ross, 1989, p. 50). If teachers are to support their students to develop a deep understanding of place value they need to be able to accurately identify gaps in their knowledge and understanding. One of the constraints of place value assessments is that they do not cover all six aspects of place value. It is often said that what we measure we can improve. In the case of place value assessments, it is critical that any assessment we use comprehensively covers the six aspects of place value. Armed with accurate data, teachers can use this information to guide instruction.

Conclusion

An understanding of place value plays an essential part in almost every aspect of primary school mathematics. Yet for this construct to be taught comprehensively, it is critical teachers are provided guidance on exactly what content they need to teach. Currently the research literature provides somewhat ambiguous definitions of place value, resulting in superficial and inconsistent teaching of the construct. This article provides teachers and researchers with a concise definition of the six aspects that are critical in place value teaching and learning.

The PVAT assessment I developed in my PhD research, based on the six aspects of place value, is available for free download from *www.numeracyteachersacademy.com/PVATFormA*

About the author

Dr Ange Rogers is an experienced primary school teacher and Numeracy Leader. Ange is a passionate presenter who regularly facilitates Professional Development for teachers and schools across Australia. In 2014 she completed her PhD in Mathematics Education focusing on the assessment and teaching of whole number place value in Years 3-6. In her PhD she developed the Place Value Assessment Tool (PVAT) and has since created a suite of teaching resources to support this assessment. Ange currently lectures part-time to pre-service teachers at RMIT University in Melbourne and mentors teachers and leaders through her online website the Numeracy Teachers Academy.

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Conflict of interest

The author declares that there is no conflict of interest regarding the publication of this article. Copyrighted images have been reproduced with permission.

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Screening that Counts: Why Australia needs early numeracy screening – Research Snapshot

Kelly Norris

This research snapshot is a summary of the full Centre for Independent Studies report *Screening that counts: Why Australia needs universal early numeracy screening* by Kelly Norris (June 2024), which can be freely accessed at *https://www.cis.org.au/publication/screening-that-counts-why-australia-needs-universal-early-numeracy-screening/*

Universal screening in schools is recognised as best practice to identify students at risk of struggling with essential and foundational skills in literacy and numeracy. Screening involves assessing all students to predict those most likely to need extra support through additional intervention. Early intervention can increase the probability of such students succeeding at school. Over the past few years, Australia's education policymakers have introduced a Phonics Screening Check that is used to identify students at risk of struggling with reading.

Major reviews of Australia's education systems have warned that equivalent screening for early numeracy is not yet widely or effectively used. This is because current approaches to maths assessment were not designed as 'universal screeners' and hence do not accurately and efficiently collect data reflecting risk for future maths difficulties. This compromises the ability of schools to identify and intervene early enough to improve students' outcomes.

A nationally consistent and evidence-based screening tool, focused on early Number Sense, and delivered for all Year 1 students, should be a priority. Combined with appropriate educational intervention, this would improve the outcomes of struggling students and lift overall achievement in maths.

Many students struggle with maths and need extra support to catch up

Around 400,000 Australian students per year — or 10% of students — require additional support or are below the international benchmark in mathematics. More than 25% of 15-year-olds are low performers in the subject, according to international testing. Only around 20% of students who fall behind in maths ever catch up. This indicates a need to improve accuracy in identifying struggling students early and intervening more effectively to lift achievement. Disappointing outcomes cannot be attributed to a lack of money or instructional time. Australia spends around 23% more per student per year than the OECD average and requires the highest number of compulsory instructional hours in general education in the OECD.

Early difficulties in maths can result in a 'failure cycle' — where students who struggle with the subject can go on to suffer from a negative, cumulative spiral that puts students at greater educational risk. This cycle can be prevented when difficulties are identified and addressed early.

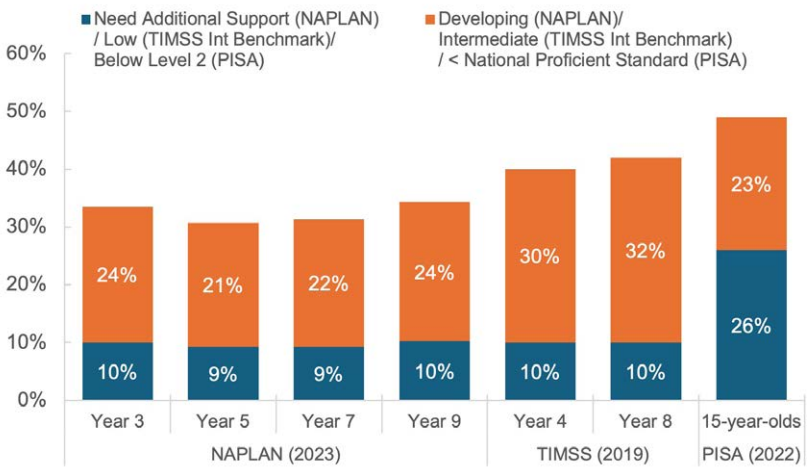

Image 1. Proportion of Australian students achieving at levels below proficiency in domestic and international tests of numeracy and mathematical literacy.

Image 2. Representation of the failure cycle applied to mathematics

Students at risk of struggling with maths can be identified early with effective screening

Students who struggle with maths can often be identified through effective screening as early as when they first start school. Though NAPLAN testing is available to all students, it is not carried out until Year 3. This is far too late to screen students for risk of difficulty with maths.

It would be viable to conduct screening and monitor progress in Year 1 of schooling. This would:

- Allow students who need help to be identified early enough and to receive the support they need before falling irrevocably behind.
- Complement the current efforts in many school systems to screen for literacy difficulties by phonics screening checks.

Universal screening tools are most effective when they form part of a systematic process for collecting and acting upon data to ensure every student receives the level of education support appropriate for their needs.

Major reviews of Australia's education systems have warned that equivalent screening for early numeracy is not yet widely or effectively used

The goal of a numeracy screening tool must be to measure children's acquisition of skills and knowledge that **predicts future maths difficulty**. Screening tools administered to whole populations of students also need to be **efficient**, yield **reliable** scores, **make accurate predictions** about who is likely to struggle without further support and **lead to particular instructional actions**.

Maths screening should occur within a multi-tiered framework (particularly that of Multi-Tiered Systems of Support (MTSS); see Figure below), which includes systematic processes for assessment and instruction at three tiers. Existing tools should be realigned to this framework, and progress-monitoring tools developed.

Australian school systems do not effectively screen students in maths

Broad processes for identifying students struggling with maths in Australia generally rely on the use of individual interviews or standardised achievement tests.

- **Interviews** involve mathematical tasks being posed to the student one-to-one, whilst the interviewer (usually a teacher or education aide) notes the student's responses and strategies.
- **Standardised achievement assessments** involve administering paper or digital tests that score students on correct responses across the maths curriculum, and commonly classify students into levels of achievement.

Australian schools and teachers currently lack systematic, accurate and efficient approaches to identifying students at risk of maths difficulty and providing the evidence-based intervention that would set them on the right track for school success.

Current tools used by schools do not possess many of the characteristics that would make them effective 'screeners'.

- Most tools currently in use to gather data across all students are time-consuming individual interviews and/or don't adequately target and measure the domains of knowledge and skill that predict future maths difficulties
- Most do not clearly identify students 'at-risk' or necessarily lead to instructional actions that are likely to improve outcomes for identified students.
- Though current tools may be useful for diagnostic and summative assessment purposes, they do not have the features required of screeners.

Recommendation: Early numeracy screening to focus on three components of early 'number sense'.

Three factors support early numeracy success — those comprising early 'number sense': **number**, **number relations**, and **number operations**. These three components are all necessary for success in early mathematics. See image 4.

1. **Number** involves understanding about number symbols and non-symbolic representations (such as dots), the ability to count items accurately, and read, write and say numbers. It also includes

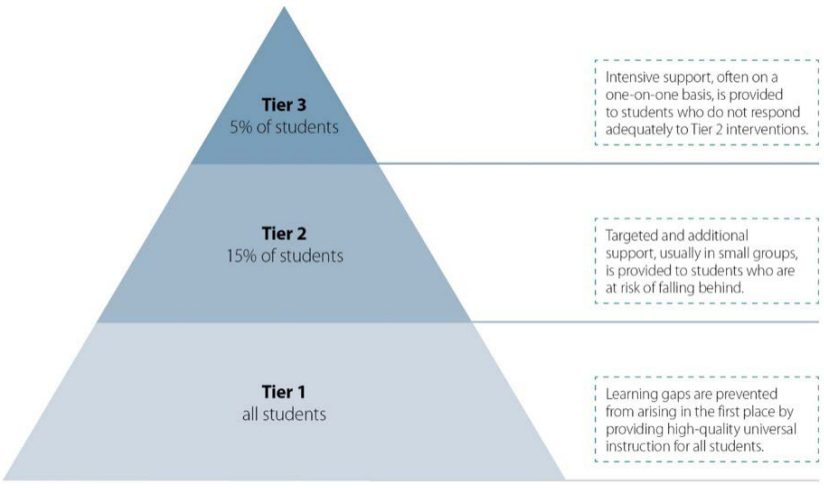

Image 3. MTSS model showing a coordinated system of increasingly intensive support offered in three 'tiers'. Source: Improving Outcomes for All: The Report of the Independent Expert Panel's Review to Inform a Better and Fairer Education System

early understandings about the properties of numbers such as place value (understanding numbers as composed of their place value parts, e.g. 45 as 40 and 5).

2. **Number relations** refers to understanding the magnitude of numbers. It includes knowledge of sequence (number before/number after; one less/one more) in addition to the use of a 'mental number line' which enables students to compare numbers in terms of their magnitude (e.g. which is bigger, 71 or 48?) and to have an accurate sense of where they sit on a number line in relation to other numbers (more than/less than/half way/closer to etc).
3. **Number operations** comprises understanding and knowledge about addition and subtraction. It involves understanding the operations in terms of combining, separating and adding to sets, understanding that numbers are comprised of other numbers, and knowledge about the composition of small numbers (e.g. 9 as 4 and 5 or 14 as 10 and 4).

Universal screening for number sense should occur in mid term 1 and early term 3 of Year 1, with the latter time point consistent across all Australian schools and data centrally collected. This data should be accessible to individual schools and to systems to assist with educational planning, program evaluation and student tracking. The final time point (end-of-year) should utilise an existing standardised test of achievement as it measures achievement and occurs after instruction.

About the author

Kelly Norris is Senior Research Associate in the Centre for Independent Studies Education Program, leading a project on early screening for mathematics difficulties.

Conflict of interest

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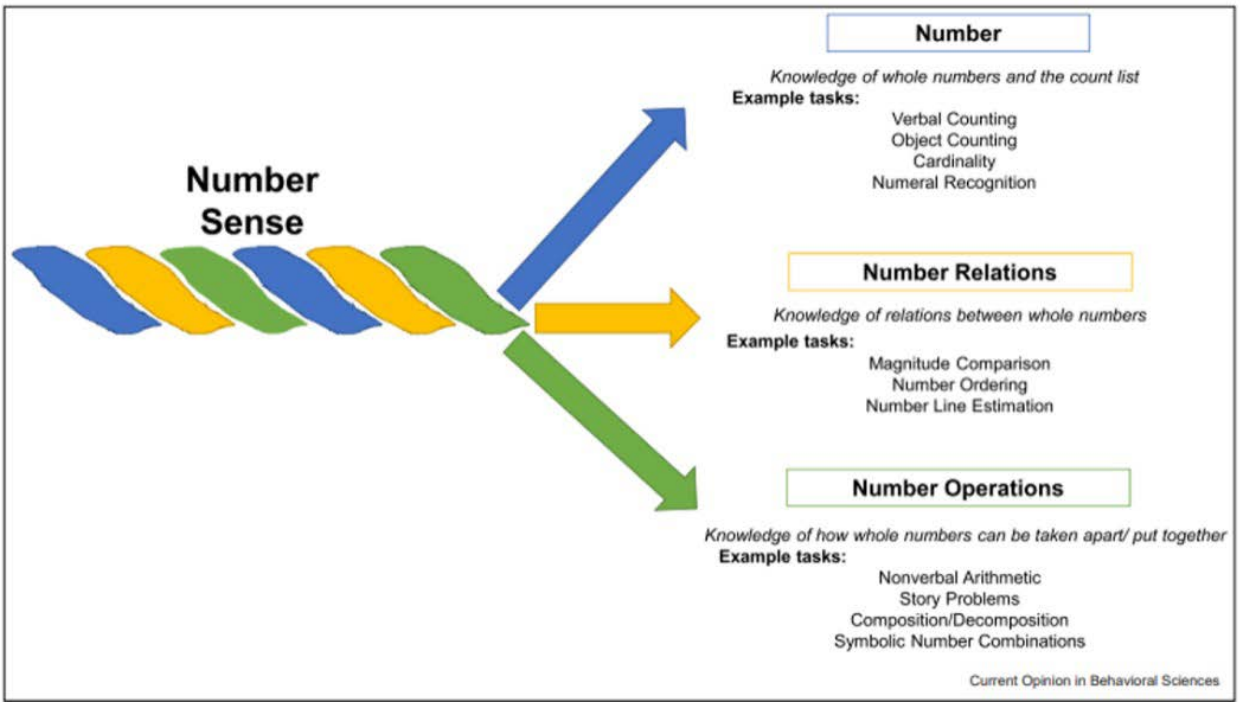

Image 4. Three factor model of number sense as visualised by Jordan, Devlin and Botello (2022)

James Dobson's 10 tips for building number sense

James Dobson

Number sense is a much-discussed topic in mathematics education. Teaching number sense in the early years of school is essential because it forms the foundation for all future mathematical learning. Children who possess a strong number sense are more likely to achieve lasting success in mathematics compared to those who do not. Nevertheless, number sense is challenging to define (Andrews & Sayers, 2014; Griffin, 2004). This ambiguity leaves educators struggling to work out how to best develop these skills with their students.

One definition of number sense is that it is an innate ability that all humans are born with. Animals also have a capacity for comparing quantities. This natural ability that emerges in infants and young children suggests a definition of number sense that is biologically primary (Geary, 2000). While aspects of number sense can be seen as an innate skill (Dehaene, 2011), we would be doing our students a disservice if we left its development purely to a natural trajectory. Instead, the development of number sense benefits from targeted and explicit teaching (Jordan et al., 2022; Sayers et al., 2016).

The view of number sense as a series of distinct but interrelated skills that go beyond what is innate, is sometimes distinguished by referring to it as foundational number sense (Sayers et al., 2016). This perspective of number sense and the foundational competencies that develop during the early years– including the separate, but connected, aspects of knowledge of number, number relations, and number operations with exact quantities– provides teachers with a framework that supports students' learning (Jordan et al., 2022). Educators must provide instruction to ensure all students develop strong number sense skills as it provides the foundation upon which more advanced mathematical skills can be built. Poor number sense skills are strongly correlated with difficulties in later mathematical abilities (Andrews & Sayers, 2014; Davis-Kean et al., 2022; Griffin, 2004).

> *"Foundational number sense is to the development of mathematical competence what phonic awareness is to reading, in that early deficits tend to lead to later difficulties." (Andrews & Sayers, 2014, p.19)*

Given the fundamental importance and complexity of number sense, it is an aspect that cannot be confined to a few lessons, or even the initial year of schooling (Yang & Li, 2008). Rather, the development of number sense should be deliberately taught over time in a variety of ways, with deliberate attention paid to the way in which the distinct elements of number sense connect with each other (Andrews & Sayers, 2014). The following practical tips are suggested for educators to help build number sense with children, particularly those beginning formal schooling.

1. Teach the pattern of counting

Most students arrive at school familiar with the basic pattern of counting. Children often recite numbers in a 'sing-song' way, frequently blending number names together, omitting, or mixing up numbers without realising their mistakes (Clements & Sarama, 2017/2019). Correct rote counting is a critical foundational skill supporting later understanding of more complex numerical concepts (Stein et al., 2017). To reinforce this, educators must model careful counting. Emphasising that each number name is a distinct word foreshadows that each word represents a distinct entity. Knowing the pattern of counting is an essential piece of knowledge that is vital for further mathematical learning (Gervasoni, 2003; Lipton & Spelke, 2005).

2. Make time to rhyme

Teaching numbers through rhymes is effective because rhymes combine rhythm, repetition, and fun, making learning more engaging for young children. The repetitive nature of rhymes helps reinforce number sequences, while the rhythmic patterns aid memory retention. Rhymes also encourage active participation, as children often move, clap, or sing along, which further enhances learning (Otchere-Larbi & Amoah, 2020). Additionally, associating numbers with stories or actions in rhymes helps children understand numerical concepts in a concrete, relatable way, fostering both their

Number rhymes that count forwards	Number rhymes that count backwards
One Little, Two Little, Three Little Fingers	Five Little Ducks
Once I Caught a Fish Alive	Five Cheeky Monkeys
One Potato, Two Potato	Five Little Candles
Here is the Beehive	
1,2 Buckle my shoe	

Table 1. Examples of rhymes that count numbers forwards or backwards

cognitive and linguistic development (Clements & Sarama, 2017/2019).

One important consideration when using rhymes to teach children about numbers is whether they are counting forwards or backwards. Many of the popular rhymes emphasise counting backwards. We need to consider how this could lead to confusion in our young learners. Of course, this can easily be overcome by ensuring that we take time to count how many ducks, monkeys, or candles remain before beginning a new verse.

3. Stop at error

When teaching children to count, it's crucial to manage their cognitive load. If a child makes an error, stopping and addressing it immediately is essential to prevent confusion (Stein et al., 2017). Allowing the mistake to go uncorrected can cause misunderstandings and hinder their ability to internalise correct number sequences. Once an error is corrected, it is useful to go back to a familiar part of the counting pattern so that students can retrieve the new information with minimal delay and ensure that we do not overwhelm students' working memory (Martin et al., 2014). By pausing to correct errors, we ensure the child develops a clear, accurate understanding of counting patterns and builds confidence as they are successful in progressing their learning.

4. 1:1 Correspondence

While rote counting is a good starting point, it's crucial to ensure that children count carefully, recognising that each number corresponds to a new object (Clements & Sarama, 2017/2019). This can be achieved through activities where students physically engage with the counting process, such as touching each object as they count or drawing lines while saying each number (Stein et al., 2017). These practices help solidify the concept of one-to-one correspondence, ensuring children understand that each counted item is linked to a distinct number in the sequence.

5. Hide the amount

As children grasp the concept of one-to-one correspondence, we can introduce them to cardinality—the idea that the final count represents the total amount. For instance, after counting three marshmallows, they should understand that there are three without needing to recount each time. A simple way to build this trust is to have students count

Image 1. Multiple representations of four

Image 2. Example activity for teaching cardinality – Using marshmallows to count and hide the amount (Image generated by AI)

a set of objects, state the total, and then hide the objects. Afterwards, ask them to recall how many there were. When they provide the total, you can reveal the objects for a recount to verify their answer. This is further enhanced when we link the total number to the numerical representation.

6. Subitise

Another important number sense skill that works in tangent with cardinality is the ability to subitise accurately. Subitising is the ability to instantly recognise the quantity of a small group of objects without counting them individually. For example, when you see a dice showing a four, you can immediately recognise that without having to count each dot.

Developing a strong ability to subitise is crucial as it underpins a child's ability to work fluently with numbers. A child who can automatically recognise amounts is generally more easily able to do more complicated maths such as adding and subtracting later (Clements, 1999).

There are two types of subitising: perceptual subitising and conceptual subitising. Perceptual subitising is perhaps the more innate version of number sense where we seem to have a natural ability to recognise very small numbers of roughly 3-5. Conceptual subitising is where we recognise small parts and can automatically comprehend the whole. For example, when shown a 6 on a die we can see the two groups of three and recognise this as six virtually instantaneously (Sayers, 2016).

Conceptual subitising relies on effective mental models being introduced. Our mental models are why we can more quickly recognise a group of six dots on a die than a more random arrangement

of six objects. Other useful mental models include doubles, tens frames and abacuses.

Flashcards are an excellent tool for practising subitising, as they can be displayed for brief periods. This approach encourages children to trust their intuition about the quantity represented, rather than relying on counting each object individually. Flashing a card for the briefest moment means that children cannot physically count each object and encourages them to subitise.

7. Count from numbers other than 1

Another important skill in developing number sense and in developing a mental number line is being able to start counting at numbers other than one. Starting from different numbers helps learners recognise that counting is not limited to always beginning at one, reinforcing the concept of a continuous number line. It also aids in mental flexibility and prepares them for more complex mathematical tasks, like counting on, addition, and subtraction. This practice deepens their comprehension of number patterns and supports their overall number sense development.

8. Play games

Board games are a fantastic way for children to practice essential mathematical skills in a warm and engaging environment. One of the wonderful aspects of board games is how they captivate and motivate children. The fun, interactive nature games keep children involved, making it easy to revisit and reinforce important mathematical concepts.

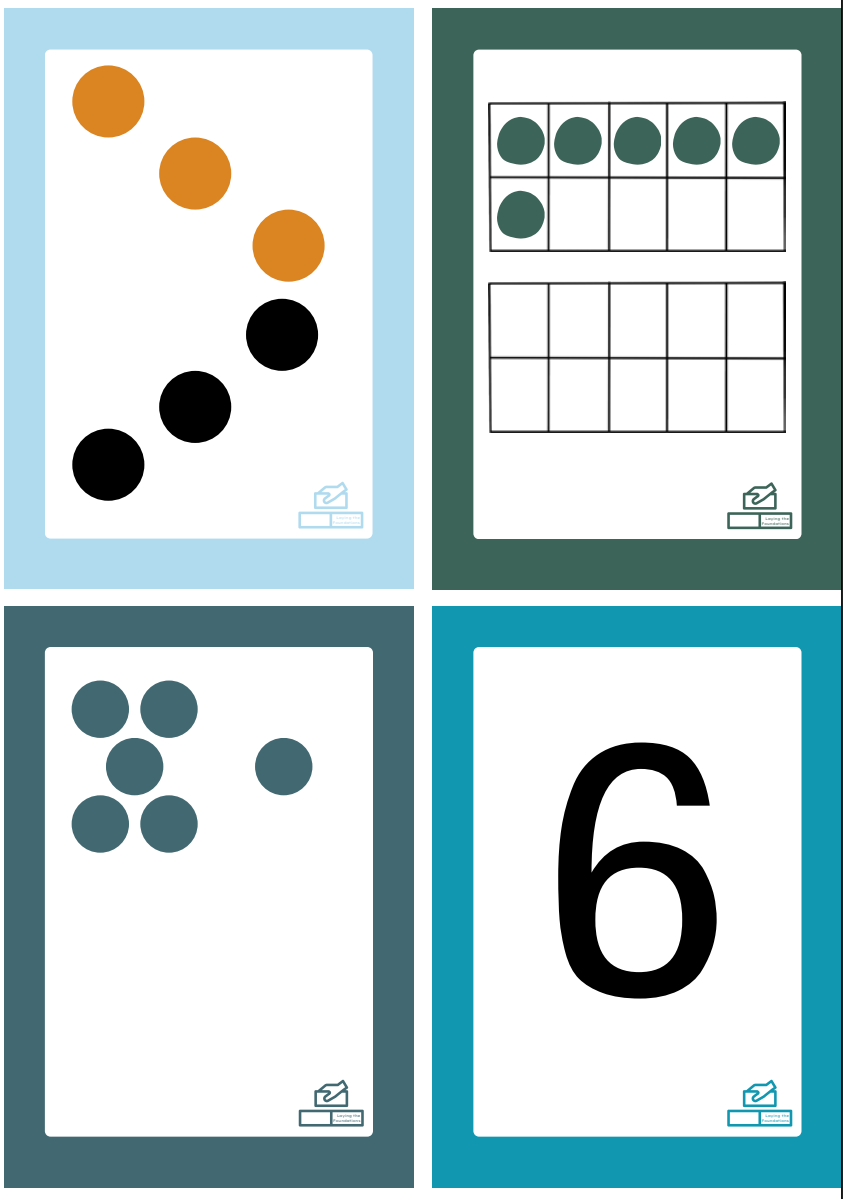

Image 3. Flashcards to promote subitising.
Available freely at https://www.layingthefoundations.net/resources.html

Many board games feature elements like rolling dice or drawing cards, allowing children to practise quickly recognising quantities without counting. This is particularly beneficial for developing subitising skills. As children count spaces, tokens, or points during gameplay, they naturally strengthen their counting abilities, helping to solidify their understanding of numbers and counting sequences (Maffia & Silva, 2022).

Moving game pieces often encourages children to engage in one-to-one correspondence, as they match each move to a specific space on the board. Additionally, as they track their scores or resources throughout the game, they learn that the final tally represents the total amount. This reinforces their grasp of cardinality meaningfully and practically (Gasteiger & Moeller; 2021).

9. Teach partitioning early

Being able to partition small numbers, like recognising that 3 = 1 + 2, is crucial in maths and is an important element of number sense (Sayers et al., 2016). Partitioning helps children grasp concepts like addition, subtraction, and other number operations. It encourages flexible thinking and problem-solving by allowing them to see numbers as combinations of smaller parts, which is essential for mental maths strategies, understanding place value, and performing operations efficiently as they progress to more complex mathematics.

One strategy to encourage children to understand that numbers can be partitioned is to watch the show Numberblocks (Blue-Zoo Productions, 2017–present). This show uses an engaging narrative approach to introduce the concept of partitioning by breaking numbers into smaller parts and demonstrating how they can be combined to form the original number. Numberblocks also provides lots of repetition and cleverly links the numerical symbols with visual representations as they tell stories.

10. Consider our concrete materials

A final tip for developing number sense is for educators to carefully select the concrete materials provided to students. While concrete manipulatives play an essential role in helping children understand abstract mathematical concepts, choosing materials that facilitate the transition to more abstract thinking is crucial. Instead of relying on highly representational items like teddy bears, animals, or dinosaurs, which

may reinforce a focus on the specific objects, teachers should prioritise more neutral manipulatives such as counters, popsticks, or cubes.

These simpler materials promote abstraction by encouraging students to focus on the numbers themselves, rather than the objects being counted. This shift is important because it helps children grasp the idea that numbers and operations are not tied to specific items but are universally applicable across different scenarios. For example, the number "3" remains constant whether it refers to three apples, three bears, or three counters. By bridging from concrete to abstract, students can better understand that mathematical operations, like addition and subtraction, apply universally, regardless of the objects involved (Clements & Sarama, 2017/2019; Andrews & Sayers, 2014).

Conclusion

Building number sense is a multifaceted process that requires thoughtful, sustained instruction throughout the early years of a child's education. The ten tips outlined offer practical, evidence-based strategies that can be applied to foster foundational number skills, from teaching counting patterns to incorporating games that encourage flexible thinking. By focusing on key components such as one-to-one correspondence, subitising, and partitioning, educators can support students in developing a robust understanding of numbers and their relationships. Laying this strong foundation facilitates early mathematical learning and equips students with the tools they need for future success in mathematics. Ultimately, children with well-developed number sense are better positioned to navigate the more complex mathematical challenges they will encounter as they progress through school and life.

About the author

James Dobson is a teacher, school leader, and instructional coach passionate about merging the science of learning with the art of teaching. Currently teaching Prep (foundation) and serving as a learning specialist at Campbells Creek Primary School and Guildford Campus in central Victoria, James is an expert in explicit teaching and an accredited Direct Instruction trainer.

With extensive experience in Victoria and the Northern Territory, James focuses on literacy, numeracy, and fostering positive learning cultures. He recently established Laying the Foundations Educational Consulting to empower educators to bring the science of learning to the art of teaching.

Conflict of interest

The author declares that there is no conflict of interest regarding the publication of this article. He did not receive funding from public, commercial, or not-for-profit sectors to write this piece. Copyrighted images have been reproduced with permission.

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Instruction for all abilities in the mathematics classroom

James Dixon

As a teacher, my primary focus is on ensuring equitable opportunities for all children and providing every student with the support they need to thrive. The following article outlines my sequential approach to meeting the needs of not only our lowest-achieving students but all students in the primary mathematics classroom during the explicit instruction phase of lessons.

If I were to summarise the goal of any teacher, in one word, that word would be clarity. When we are clear in every aspect of our teaching, we pave the way for children to succeed. Teachers might not be cognisant to this, but clarity is paramount in our work.

Learning intentions

Initially, it is crucial to clearly state our learning intention at the beginning of each lesson, followed by providing clear and precise instructions that cater to all learners. Setting a clear learning intention establishes the big picture, blue sky goal for our learners. Dylan Wiliam frequently uses an analogy (attributed to White, 1971) of a sailor to emphasise the importance of learning intentions: *without a clear direction for learning, it's akin to sailing aimlessly in the hopes of finding land—we would essentially be lost at sea, lacking clarity and direction*.

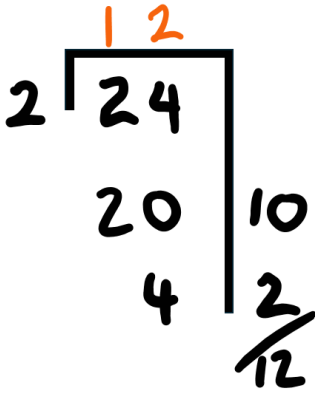
Reviewing prior learning

I strongly support Rosenshine's *Principles of Instruction* (2012), particularly his emphasis on reviewing prior learning, of which (for me) occurs after the launch of the learning intention. A review can take the form of low-stakes retrieval-based practice, examining exemplary student work from previous lessons, or a quick refresh of prior explicit instruction. I believe that the aim of a review of prior learning is to stimulate mathematical thinking by 'priming the pump' for learning and tapping into long-term memory.

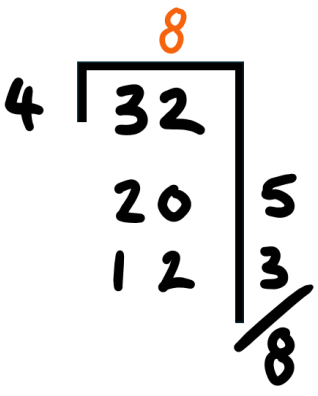
As educators, we recognise that some students (particularly those at risk or with lower achievement levels) may forget content from earlier lessons which is reflected in the forgetting curve. Therefore, it's crucial to check and review prior learning to establish a solid foundation for the upcoming explicit instruction. According to Rosenshine (2012), research shows that primary-aged students exposed to just eight minutes of daily review in an experimental group achieved higher scores than those who did not receive such review. This underscores the importance of reviewing prior learning for all students.

Explicit instruction

When considering explicit instruction, it's essential for teachers to recognise our own cognitive biases. One common bias is the 'curse of knowledge' – a cognitive bias where we unknowingly assume the understanding of others (in this case, our students). Before and during our planning for explicit

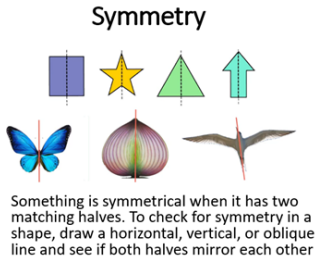


Example 1.

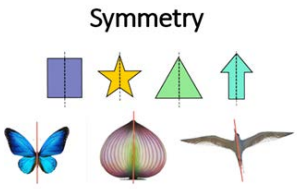


Example 2.

Image 1. Reducing element interactivity



Example 1. Slide with redundant information



Example 2. Slide with redundant information removed

Image 2. Removing redundant information

instruction, I believe we need to have at the forefront of our mind how a student would experience instruction and what they pay attention to during our instruction.

To ensure all students understand what they are learning, we should provide worked examples with a manageable level of 'element interactivity,' defined as 'elements that must be processed simultaneously in working memory because they are logically related' (Sweller et al., 2011). To accommodate all students, especially those who may struggle, we should begin with basic examples that involve low element interactivity. Then, we can progressively layer learning and build upon prior experiences.

…the goal of any teacher, in one word, that word would be clarity

As teachers, we've all encountered situations where a lesson was pitched too high, resulting in some students becoming lost along the way. A key takeaway here is that starting with simple examples never harms students, whereas examples that are too challenging can overload students cognitively. For instance, I recently worked with a Grade 3 class on the partial-quotients method for division. To begin the learning sequence, we started with problems where the divisor was equal to, or less than, the digit in the tens place value column (image 1). This approach is less cognitively demanding because students only need to rely on their knowledge of doubles (two facts). Additionally, each part of the dividend can be halved, which involves understanding standard place value partitions (such as knowing that 24 = 20 + 4). In contrast, example 2 is more challenging because it involves facts related to 4, the tens digit in the dividend is smaller than the divisor, and therefore requires students to understand non-standard place value partitions (such as knowing that 32 = 20 + 12).

We know that strong worked examples are effective. A recent meta-analysis confirms this, stating that "the worked examples effect yields a medium effect on mathematics outcomes whether used for practice or initial skill acquisition" (Barbieri et al., 2023).

So, what does a good worked example look like?

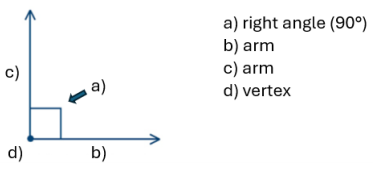
PowerPoint has often been criticised in educational circles, with the common phrase 'death by PowerPoint' expressing a negative sentiment. While yes, a PowerPoint with 20 slides is excessive, I would argue that a well-structured and organised presentation can surpass off-the-cuff whiteboard instruction simply because it is planned and thought-out in advance. Teachers carefully consider and adjust their presentations, ensuring clarity and coherence. In contrast, ad hoc whiteboard teaching can vary greatly in quality, ranging from very effective to poorly executed. This raises concerns about consistency, especially in schools where multiple teachers may be teaching the same content. A planned presentation can help maintain consistency and provide a cohesive learning experience for students

To create effective, well-planned worked examples, I advocate for teachers to have a solid grasp of Allan Paivio's Dual Coding Theory. Specifically, teachers should understand key principles such as modality, redundancy, and split attention.

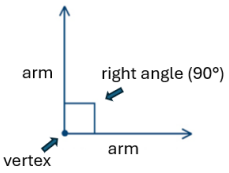
The modality principle emphasises that combining words and graphics enhances learning more than either element alone.

As a middle leader, I frequently emphasise this to teachers. When creating presentations, it's crucial to engage students interactively rather than having them passively view slides. In my view, this interactive approach is fundamental to effective teaching. Being a 'sage on the stage' is quite a frequent mischaracterisation of explicit instruction and I implore teachers to view Sigfried Englemans's 1966 instructional video, to view how explicit instruction is indeed interactive (Direct Instruction Archive – Arithmetic, 2013).

This brings us to the redundancy effect. It's important to eliminate unnecessary words on slides that can be explained verbally. For our low achieving students, processing both written and spoken words consumes considerable cognitive bandwidth and can overload. For instance, in example 1 (image 2), there is redundant information at the bottom that can simply be explained to students and does not need to be included. Removing unnecessary written explanations helps students to focus on the essential aspects of their learning. Research by Kalyuga and colleagues (2004) found that "simultaneous presentation of written and auditory material has deleterious effects on learning, as compared with sequential presentation modes." The key takeaway here is if you can say it, and it's not crucial to learning, leave it out.



Example 1. Information requiring integration



Example 2. Integrated information

Image 3. Integrating information

Next, the split attention principle states that we learn better when words and pictures are presented together rather than separately. As teachers, it's important to consolidate a student's attention into one focal point. Integrating information cohesively within a presentation can potentially reduce the cognitive load for our lower achieving students, making it easier for them to process and integrate information. In research by Chandler and Sweller (1992) it was found that "integrating instructions may reduce cognitive load and so facilitate learning."

Furthermore, I often encounter slides with unnecessary design elements like borders and excessive colour. While these may appear visually appealing and inviting to students, they can pose problems, particularly for our lowest achieving students, as they divide attention. While some teachers may find it challenging to simplify flashy slides, I urge teachers to reflect on the lesson's purpose: is it primarily for students to learn or to be impressed by our artistic flair?

Lastly, when presenting information, it's crucial to break it down into manageable chunks. This is where Visual Instruction Plans (VIPs), created by Dr. Fred Jones, play a crucial role. VIPs are step-by-step instructions that guide students through their thought processes. As teachers, we can get in the habit of providing worked examples that are what Dr Fred Jones refers to as 'summary graphics' left on the board for students to use. If we compare this with VIPs (image 4) students can refer back to previous steps in a manageable way to learn processes and procedures. A great analogy I use is the idea of a child playing with Lego. If children were given one picture (summary graphic) of how to build a model, it'd be a lot more challenging to build the model than the step-by-step instructions (VIPs) that aid them with guidance. VIPs work in this exact manner, they lay out step by step how to move from one instruction to the next.

Success criteria and checking for understanding

After instruction I co-create what success looks like. These are clearly defined parameters of what is required for students to have success in our lesson. As with any learning intention, the success criteria needs to be specific and pointed. While John Hattie has come under scrutiny in recent years, his view that each high impact teaching strategy tells a story rings true. Without having a goal to work towards students would be sailing on a rudderless ship. For our low achieving students, breaking up success criteria into manageable chunks provides clarity around what they need to do within a lesson to be successful.

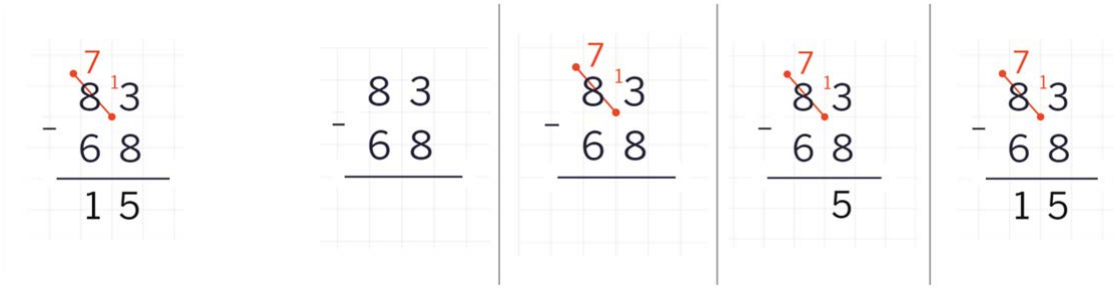
incremental success and development in self-concept leads to achievement

Lastly, the most important part of any introduction to a lesson is to check for understanding. Glenn Pearsal has been working with our school and I've implemented what he calls the traffic light system as a way of marking the end of instruction. After co-creation of the success criteria, I'll point to a set of traffic lights and ask the students, *'I'm at a red now so do I need to review anything?'* Students who need me to go back will place their hand up, however if the red light is clear I move to yellow light and say, *'Does anyone have any questions?'* if yellow light is clear I go to green and students begin their work. Checking for understanding reinforces to children that we're not moving ahead as a class until we're very clear on what is required. It is also a nice classroom management strategy because students know that when you get to a yellow light that is their time to ask for clarity around the requirements within the lesson.

A word on motivation

Well, you're probably thinking that the way I've explained instruction might sound dull, boring and not engaging. When we speak about engagement we're synonymously talking about motivation. For a long time, I thought that to engage students meant that mathematics lessons needed to be 'real world', 'engaging from the point of view of entertaining' and 'enticing'. To quote Professor Robert Coe, "engagement is a poor proxy for learning" (Coe, 2015). Essentially, we can make explicit instruction rather exciting, enthralling and enticing but does learning really happen? A question I would like teachers to reflect on is, are your lessons exciting at the expense of learning? Don't get me wrong, weaving in real world contexts and student's interests are a great way to entice children but it shouldn't be the leading factor in lesson planning, rather a secondary factor to the aim of the lesson.

Research indicates that success leads to motivation, the causal direction is from success to motivation and not motivation to success. What I mean here is that even if a lesson is motivating from external factors it might not lead to the development of self-concept. Marsh (2003) concluded that 'increases in academic self-concept lead to increases in subsequent academic achievement'. What this indicates, in layperson terms, is that incremental success and development in self-concept leads to achievement. If we enable students to have small progressive wins in their learning, this



Example 1. Summary graphic

Example 2. VIP where procedures are broken into steps

Image 4. A comparison of a summary graphic with a VIP example

will fuel self-concept and therefore motivate students into the future.

Key ideas from this article

- Use learning intentions for clarity around the direction for learning
- Review prior learning to 'prime-the-pump' for learning
- Start off with basic examples and layer learning progressively over several lessons
- Present information in a way that accounts for modality, redundancy and split attention
- Remove distracting and unnecessary elements from slides
- Provide visual instruction plans and not summary graphics
- Generate success criteria that is clear and manageable for all students
- Check for understanding so students are clear on the learning
- Successive wins fuel motivation, not the other way around

About the author

James Dixon is an Instructional Coach (Middle Leader), guiding the Numeracy Portfolio at Mount Waverley Primary School. He is passionate about Mathematics Education in Australia and how we can move all children forward in their learning journey. He can be contacted via his Twitter (X) account @MrDixonMath

Conflict of interest

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Think of a number

Kate Palmer, Lead Speech and Language Therapist, Fairley House School, London.

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Mathematician Sara Zahedi came to Sweden aged 10, fleeing the revolution in her native Iran. She said of her school experience at this time, "I didn't have any friends and I didn't know any Swedish. But math was a language I understood."

Many people think of maths as the most challenging school subject. Students with speech, language and communication needs (SLCN) can also experience maths difficulties (Cowan et al., 2005). However, for some students with language needs, such as developmental language disorder and specific learning difficulties, maths can have an appeal over subjects that emphasise verbal and linguistic information. Mathematics is a highly visual subject – from shapes and counters up to graphs and trigonometry. Additionally, there is an emphasis on methods, such as mental arithmetic and long division, rather than facts and vocabulary, as seen in subjects such as history and science.

Baron Cohen et al. (2001) looked at the presence of autistic traits in university students of different disciplines. They found that on average mathematics students had a higher level of autistic traits than those studying humanities. Referring to the part of the autism spectrum which was then known as Asperger Syndrome, they state, "This condition need not be any obstacle to achieving the highest levels in these fields [maths, physics and engineering]."

Anecdotally, students with autism spectrum disorders often report mathematics as a favourite subject. The appeal is clear. Mathematics favours literal language, objectively right or wrong answers and requires less social thinking than many other subjects. If mathematics offers opportunities for success for students with SLCN, is there anything Speech and Language Therapists can do to enhance this? The 'Reading Comprehension for Maths' program is a potential answer.

Many students consistently find 'word problems' the most difficult area of school mathematics. In maths, word problems are those presented linguistically rather than numerically. For example, a numerical problem would be '3 x 7 = ?', while an equivalent word problem would be 'Jenny, Kieran and Lucy each have to carry seven boxes to the van when they move house. How many boxes is this in total?'

Word problems therefore immediately remove the advantage of maths as a subject for students with SLCN – its emphasis on visuals over language. The vocabulary used in these problems frequently includes concepts such as 'more' and 'less' which are known to be difficult for students with SLCN (Farrugia & O'Keefe, 2011).

Reading Comprehension for Maths

'Reading Comprehension for Maths' is a program designed to develop reading comprehension skills for maths word problems, to support those SLCN students whose progress in maths is halted by their difficulties in reading comprehension.

Why do we need a separate reading comprehension program just for maths? Nathan et al. (1992) provide a model for how maths word problems are read successfully:

- **Step 1** – understand the text
- **Step 2** – understand the situation described by the text
- **Step 3** – convert the situation described into mathematical terms

To successfully achieve step three, the understanding reached at step two must be very precise – a level of precision that is not usually required, for example when reading fiction texts.

This presents comprehension difficulties even for a typical population. Common pitfalls include focusing on keywords and trying to translate these directly into mathematical terms e.g. treating 'fewer' as a code word for 'subtract' (Vula et al., 2017), skipping step two on the model above. This strategy is also explicitly taught by some teachers (Van de Wall & Lovin, 2006), despite being ineffective. For example, compare the role of the keyword 'fewer' in these two problems:

'Alice has 15 cards. Bob has five fewer cards than Alice. How many cards does Bob have?'

'Alice has 15 cards. Alice has five fewer cards than Bob. How many cards does Bob have?'

Precise reading comprehension is likely to be a particular challenge for SLCN students. In addition, these students will have difficulty with the very keywords that other students (and some teachers) use to attempt to manage the comprehension challenge.

Building on the evidence and model described above, 'Reading Comprehension for Maths' uses a two-pronged approach: 1. vocabulary work to support comprehension of the text; and 2. visualisation work to support understanding of the situation.

The program

The program was designed to be run weekly in school for six weeks by a learning support assistant (LSA). In a pilot program in Ealing schools, trial groups were run by LSAs or Speech and Language Therapists. We found schools were immediately interested in the program, because this area is a well-known challenge, particularly in exams. We trialled small groups of

Session 1: Vocabulary bombardment of key words to be used throughout the programme

Words such as 'more', 'less', 'fewer'. Games using these words, such as 'What number am I thinking of?', in which students ask each other questions like, 'is it less than 50?'.

Session 2: Introduction of visualisation exercises

Students were provided with pictures with related sentences and asked to find which sentences accurately described the picture. This session proved revelatory for one student with DLD, who in a lightbulb moment exclaimed *'Oh! If Bob has five more cards than Alice, that means Alice has **five** less cards than Bob!'*

Session 3: Introduction of independent visualisation

Students were provided with sentences and asked to generate a visual representation of the sentence. This begins with single statements only. For example, *'There are twice as many circles as squares'*. Later in the session the students generate a visualisation, which represents the information contained in a set of statements. For example, *'There are two more squares than circles. There are three fewer triangles than squares. There are two triangles'*.

Sessions 4-6: Word problems

Maths word problems were designed, starting with those that can be solved in a single 'step' (e.g. *'Last year Veer was 125cm tall. His height has increased by 9cm. How tall is Veer now?'*) and progressing to include greater numbers of steps, and less of the explicitly taught vocabulary.

Image 1. Overview of the 'Reading Comprehension for Maths' program

students from the speech and language therapy caseloads of four schools, in Years 5, 6 and 7. The program consists of six short workbooks, as above.

The outcome

A pre- and post-assessment gained initial impressions of the impact of the program. Assessment consisted of nine maths word problems, not seen in the program itself. On post assessment, improvement was seen in each of the scored areas (see Figure One):

- **Working** – students recorded more information in their methods, and created more of their own diagrams.
- **Answer** – students recorded more correct final answers.
- **Metacognition** – students were more accurate in their self-rating of whether they think they have answered correctly.

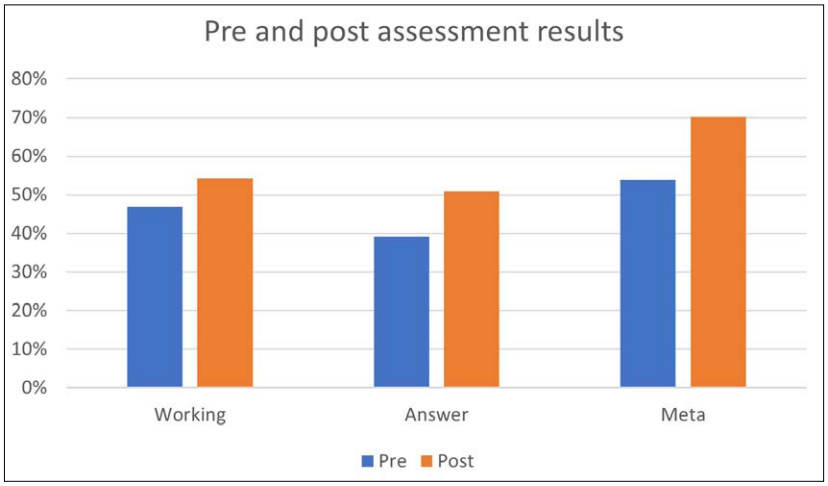

Image 2. Pre- and post-assessment results

Conclusion

More controlled evaluation would be necessary before stating conclusions from this. However, feedback from the groups has been positive, with students reporting enjoying the group and teaching staff observing progress in the classroom. It is hoped that as this group continues to develop, SLCN students will develop their reading comprehension skills to enable them to continue to progress in maths, a subject that offers them great opportunities for success.

About the author

Kate Palmer is Lead Speech and Language Therapist at Fairley House School in London, UK. Fairley House School specialises in working with children with specific learning difficulties in literacy.

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Research article summary – Understanding the relation between mathematics vocabulary and mathematics performance: A meta-analysis

Article summary by **Erin Rollason**

Review of Lin, X., Peng, P., & Zeng, J. (2020). Understanding the relation between mathematics vocabulary and mathematics performance: A meta-analysis. *The Elementary School Journal. 121*. https://doi.org/10.1086/712504

This meta-analysis investigated how understanding and proficiency in mathematics-specific vocabulary (such as terms like "fraction" or "divide") impact overall mathematics performance.

The authors used meta analytic structural equation modelling to explore the magnitude of the relationship between mathematical vocabulary and various types of mathematics tasks, including foundational and higher-order tasks. They also examine whether this relationship varies by age and type of task, and whether factors like comprehension and cognitive skills influence the link between mathematical vocabulary and mathematics performance. Overall, there is a strong correlation between maths vocabulary and maths performance.

Methodology

Following a systematic search of papers published between 1904 and May 2020 in the Communication & Mass Media Complete, Education Source, ERIC, PsycINFO and Medline databases, plus screening for inclusion criteria (at least one quantitative task assessing mathematics vocabulary and at least one quantitative task assessing mathematics performance, and report of either a correlation coefficient (*r*) between mathematics vocabulary and mathematics performance or the percentage of variance in mathematics performance explained by mathematics vocabulary (R^2), 40 studies were included in this meta-analysis – 27 peer-reviewed articles and 13 unpublished dissertations.

The 40 studies encompassed 55 independent samples and a total of 7,988 participants, most of whom were based in the United States. Among these participants, 684 were identified as having learning difficulties and 20 were diagnosed as Autistic.The age of participants ranged from 4.18 to 20.00 years, with a median age of 7.50 years.

The study controlled for covariates such as publication type, participant development status, and family socioeconomic status to minimise confounding effects on the relationship between maths vocabulary and performance. Moderators included task type (foundational verse higher order) and its interaction with age. Additional factors like general vocabulary, reading and listening comprehension, working memory, and nonverbal reasoning were also considered. Effect sizes were weighted based on sample size.

To ensure the quality of each selected study, Thompson and colleagues' (2005) quality indicator for correlational research was adapted by including scale items representing five quality indicators:

1. Effect sizes either reported or calculable for each outcome relevant to the review, including non-significant effect sizes.
2. Appropriate interpretation of structure coefficients.
3. Use of multivariate methods in the presence of multiple outcome variables.

4. Use of the highest available data scale (interval data were not converted to nominal scales unless justified).
5. Evidence that statistical assumptions (e.g., homogeneity of variance, normality, central tendency) were met.

Each study's score could range from zero (study addressed no study quality indicators) to five (study addressed all study quality indicators). Of the eligible studies chosen, 10 studies received a score of four; and 30 received a score of five.

Results

Key findings from this meta-analysis included:

1. Students with better mathematical vocabulary tended to perform better in mathematical performance (r = 0.49 with a 95% confidence interval).
2. The strongest correlation was between higher-order mathematics tasks, involving multi-step processes and complex reasoning (e.g. solving word problems (r = .58)) and mathematical vocabulary. Algebra (r =.44) and Fractions (r =.31) showed weaker correlations.
3. Foundational tasks, such as number knowledge had a positive correlation with mathematical performance (r = .47 with a 95% confidence interval). This finding was not expected, however, previous research by Purpura et al. (2017) referenced how early mathematics learning relies heavily on mathematics vocabulary.
4. The correlation between mathematics performance and mathematical vocabulary is stable across different developmental stages, indicating that mathematical vocabulary remains important as students progress through schooling.
5. The relationship between mathematical vocabulary and performance was moderate (r partial = 0.17- 0.41), highlighting that mathematical vocabulary plays a role beyond simple conceptual knowledge, and can aid in cognitive reasoning during mathematical learning.
6. The relationship between mathematical vocabulary and mathematical performance was stronger among participants from middle-or-above SES backgrounds than those from lower socio-economic backgrounds.

Implications for practice

Mathematical vocabulary instruction is crucial for improving mathematics outcomes. Lin et al. (2020), recommend explicit teaching of maths vocabulary, especially in later grades when higher-order tasks become more prevalent. They also emphasise the importance of incorporating comprehension and cognitive skills development into maths education, particularly for students from lower socio-economic backgrounds who may face greater challenges in connecting in mathematics performance and mathematical vocabulary.

Educators are encouraged to adopt instructional approaches that minimise cognitive load when teaching maths vocabulary. Strategies like visual aids, mnemonic devices, and explicit routines (introducing words, explaining meanings, and using examples) can support students' understanding and application of mathematical vocabulary; thus, promoting mathematical performance.

Future research directions

Lin et al. (2020) call for more research to further explore the specific categories of mathematical vocabulary and its impact on various mathematical skills. They suggest examining longitudinal data to establish causality and investigate the bidirectional relationship between mathematics performance and math vocabulary.

Conclusion

This meta-analysis underscores maths vocabulary as an essential component in mathematical learning that influences cognitive and problem solving processes. Ensuring robust mathematical vocabulary instruction across all grade levels and socio-economic backgrounds could enhance mathematical performance and understanding, particularly for complex and higher-order maths tasks (e.g., worded problems).

About the author

Erin Rollason is the Head of Personalised Learning – Inclusion and Diversity at a prestigious independent school in Melbourne, where she oversees programs from Foundation through to Year 12. In addition to her leadership role, she also teaches mathematics and numeracy skills. Erin holds a Bachelor of Science, a Post-Graduate Diploma in Secondary Education, and a Master of Learning Intervention.

With a strong focus on fostering student strengths and reducing school-based barriers, Erin is committed to enhancing inclusive educational practices. She is particularly passionate about supporting students with disabilities and additional learning needs, ensuring that every student has the opportunity to thrive in an equitable and supportive learning environment.

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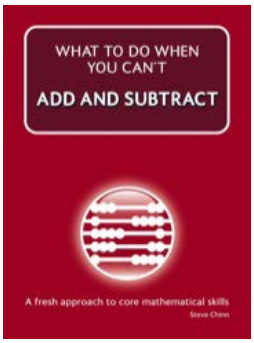
What to do when you can't add and subtract

Steve Chinn



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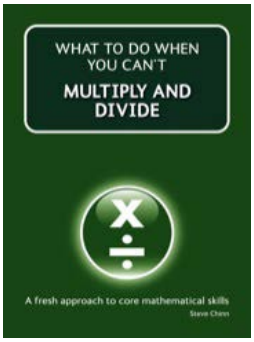
The new text for "What to do when you can't add and subtract" takes a fresh look at the basic skills of addition and subtraction and has a range of ideas to help pupils grasp the ideas of increasing and decreasing number values.

These highly accessible books are written for parents, older pupils, students and adults and offer a non-patronising, consistent and developing pathway through basic arithmetic.

Author Steve Chinn is one of the foremost authorities on dyscalculia with 24 years experience as Head of three schools for dyslexic pupils, plus many years experience teaching in mainstream schools.

What to do when you can't multiply and divide

Steve Chinn



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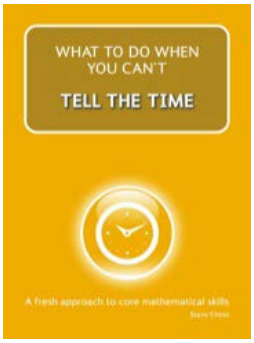
Once students have gained an understanding of addition and subtraction (See "What to do when you can't Add & Subtract"), then they can gain more skills using the strategies for multiplying and dividing numbers.

What to do when you can't tell the time

Steve Chinn



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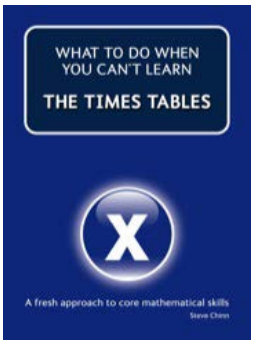
The tricky subject of time is something which many students, whether dyslexic or not, struggle to get to grips with. Steve Chinn discusses the language used, such as 'quarter to' and how to help students grasp the key concepts of time. With quotations about time from over the ages!

What to do when you can't learn the times tables

Steve Chinn



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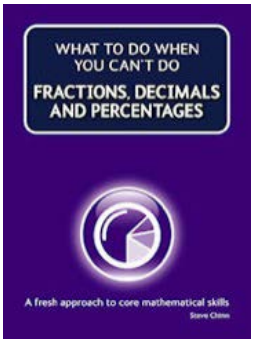
This best-selling title has been completely re-written and offers pupils the range of ideas in a fresh approach to tackling the times tables.

The work in this book is designed to give some meaning to the numbers in the times tables. It provides pictures and images to help you understand, work out or remember the times tables facts. The strategies are explained clearly and in detail so that as you progress you can shorten each method to produce facts quickly, accurately and with understanding.

What to do when you can't do fractions, percentages and decimals

Steve Chinn



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"What to do when you can't" collection

Steve Chinn

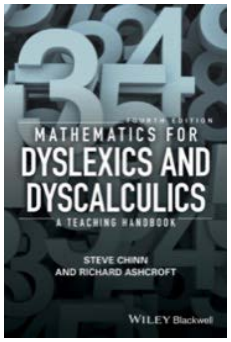
$169.95 (RRP- $186.75)

This set of five highly accessible books is written for parents, older pupils, students and adults and offers a non-patronising, consistent and developing pathway through basic arithmetic.

Author Steve Chinn is one of the foremost authorities on dyscalculia with 24 years experience as Head of three schools for dyslexic pupils, plus many years experience teaching in mainstream schools.

Mathematics for Dyslexics and Dyscalculics: A Teaching Handbook (4th Edition)

Steve Chinn and Richard Ashcroft



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A seminal handbook in the field for more than 20 years, this new and updated edition of Mathematics for Dyslexics and Dyscalculics contains the latest research and best practices for helping learners with numerical and mathematical difficulties.

- Provides a complete overview of theory and research in the fields of dyslexia and dyscalculia, along with detailed yet pragmatic methods to apply in the classroom
- Contains enhanced coverage of place value and the role of the decimal point, why fractions can challenge a developed logic for arithmetic, and the complexity of time along with new material on addressing anxiety, fear, motivation, and resilience in the classroom; and links to new resources including standardised tests and recommended reading lists
- Written by two mathematics teachers with 50 years of teaching experience between them, much of it in specialist settings for students with specific learning difficulties
- Offers effective teaching strategies for learners of all ages in a structured but accessible format

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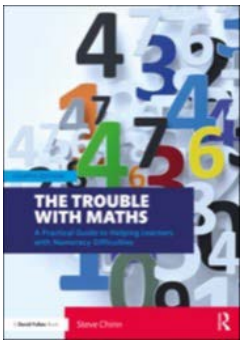
Steve Chinn



$59.95

Now in its fourth edition, with updates to reflect developments in our understanding of learning difficulties in maths, this award-winning text provides vital, pragmatic insights into the often-confusing world of numeracy. By looking at learning difficulties in maths and dyscalculia from several perspectives; for example, the vocabulary and language of maths, cognitive style and the demands of individual procedures; this book provides a complete overview of the most frequently occurring problems associated with maths teaching and learning. Drawing on tried-and-tested methods based on research and Steve Chinn's decades of classroom experience, it provides an authoritative yet accessible one-stop classroom resource.

Combining advice, guidance and practical activities, this user-friendly guide will help you to:

- develop flexible cognitive styles
- use alternative strategies to replace an over-reliance on rote-learning for pupils trying to access basic facts
- understand the implications of underlying skills, such as working memory, on learning
- implement effective pre-emptive measures before demotivation sets in
- recognise the manifestations of maths anxiety and tackle affective domain problems
- find approaches to solve word problems
- select appropriate materials and visual images to enhance understanding.

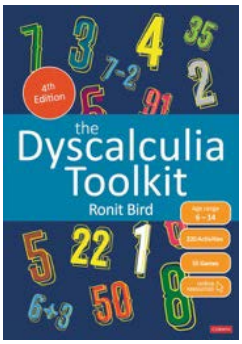
With useful features such as checklists for the evaluation of books and an overview of resources, this book will equip you with essential skills to help

you tackle your pupils' maths difficulties and improve standards for all learners.

This book will be useful for all teachers, classroom assistants, learning support assistants and parents.

The Dyscalculia Toolkit

Ronit Bird



$109

The new edition of the bestselling Dyscalculia Toolkit continues to meet the needs of specialist and non-specialist teachers working with learners aged 6 to 14 years, who have difficulty with maths and number.

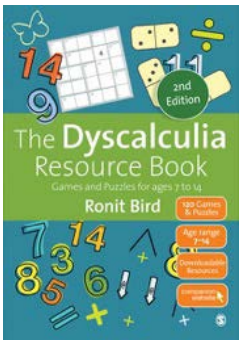
Now with over 220 activities and 55 games, new and improved illustrations, and an expanded list of recommended readings, useful websites & resources, the new edition also includes:

- more on dice and board games, multiplication and division;
- new downloadable and printable teaching materials (including tracking sheets, activity sheets, game boards and teaching resources);
- updated videos.

Packed full of practical, creative and innovative ideas and strategies this is the complete toolkit to help teachers and parents support learners with dyscalculia or those struggling with mathematics.

The Dyscalculia Resource Book

Ronit Bird



$96.99

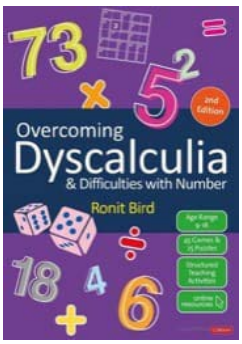
Written by a teacher for teachers, the second edition of Ronit Bird's The Dyscalculia Resource Book now comes with 120 games and puzzles and a brand new section on 'mixed operations puzzles' which require learners to switch mentally between addition, subtraction, multiplication and division.

The new edition also provides access to an accompanying website featuring demo videos of different games and puzzles and the option to easily download and print all the games and puzzles in the book!

Ideal for working with students 7 to 14 years old, this is the perfect companion to The Dyscalculia Toolkit, essential additions to every teachers' resource collection. The book will be valued by teachers in both mainstream settings and special schools, and the resources can be used to good effect with all children.

Overcoming Dyscalculia & Difficulties with Number

Ronit Bird



$102

In writing this practical book, Ronit Bird has drawn on her teaching and training experience to create teaching plans for key numeracy topics, aimed at those working with students aged 9-16. Activities and games are used to teach numeracy skills in these key areas: number components, bridging, multiplication, division and reasoning strategies.

She provides detailed strategies for teaching numeracy skills through a progression of practical activities and visualisation techniques which build the self-esteem of students who need extra help and give them a basic foundation in number. While the plans cover the National Numeracy Strategy, they can also be used in any setting where maths is being taught.

Topics covered include:

- games and puzzles for learning number components
- bridging
- multiplication
- division
- reasoning strategies

A bank of accompanying resources, games, activities and Su-Doku puzzles is available with the online resources included with this book.

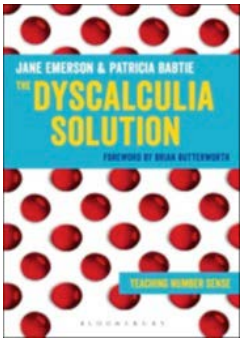
New to this edition:

- An updated Part I, improving the clarity and flow of the teaching ideas, including a table mapping games against specific teaching points
- More activities and guidance for multiplication and division
- A new Part V, consolidating new and existing teaching games in one place
- 4 new videos added to the online resources

This is an ideal resource for class teachers, SENCO (Special Educational Needs Co-ordinator) and maths subject leaders, and is equally useful for teaching assistants and learning support assistants.

The Dyscalculia Solution: Teaching Number Sense

Jane Emerson and Patricia Babtie



$79.99

This new book by authors Jane Emerson and Patricia Babtie follows on from their award winning book, the Dyscalculia Assessment. Once careful assessment has identified the particular numeracy difficulties your pupils may have, the Dyscalculia Solution provides a practical teaching guide for addressing and solving those difficulties.

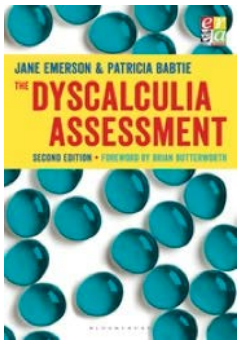
The Dyscalculia Solution includes step-by-step instructions on how to teach pupils to use whole numbers by talking and reasoning about them, and communicating their thinking in a verbal, diagrammatic and written form. The book includes scripts to emphasise the importance of using the correct language to develop numerical thinking, as well as teaching objectives, activities and games which are important for fostering a positive attitude to numeracy. Each new concept builds on previous understanding so that new facts are derived by reasoning from known facts.

The Dyscalculia Solution is ideal for use with primary school children, but can easily be adapted for older students, and is invaluable for SENCOs, TAs, educational psychologists and mainstream teachers, keen to support students with numeracy difficulties in their class.

Accompanying materials in both print and electronic formats to support busy teachers by providing lesson plans and worksheets are available with this book.

The Dyscalculia Assessment (2nd Edition)

Jane Emerson and Patricia Babtie



$79.99

The Dyscalculia Assessment is a tool for investigating pupils' numeracy abilities. It is designed to inform a personalised teaching programme for individuals or small groups of pupils who have difficulties with numbers. The assessment was devised at Emerson House, a specialist centre in London supporting pupils with difficulties in numeracy and literacy. The bestselling first edition of the book, written by Jane Emerson and Patricia Babtie, was the winner of the ERA Best Special Educational Needs Resource 2011.

This fully revised and updated second edition features a brand new design, making the step-by-step assessment even easier to navigate and use, whether by special education teachers or those with no specific special needs training. The suggested script for each stage of the investigation that runs alongside the photocopiable assessment sheets, make this book an extremely user-friendly, accessible teaching and learning resource.

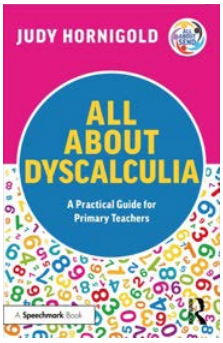
This book also includes:

- an introduction to dyscalculia and co-occurring conditions
- guidance on how to conduct the assessment, including tips on behaviours to look out for
- information on the equipment you need and how to use it
- instructions on how to interpret the results of each stage of the assessment and how to produce a personalised teaching plan
- games and activities to engage the pupils and reinforce numeracy skills.

The Dyscalculia Assessment is ideal for use with primary school children, but can easily be adapted for older students, and is invaluable for special education teachers, learning support teachers, educational psychologists and mainstream teachers keen to support students with numeracy difficulties in their class.

All About Dyscalculia: A Practical Guide for Primary Teachers

Judy Hornigold



$28.95

All About Dyscalculia is an accessible and informative guide for primary school teachers, designed to increase their knowledge and understanding of dyscalculia and provide practical strategies and advice to build the self-esteem and motivation of learners in their care.

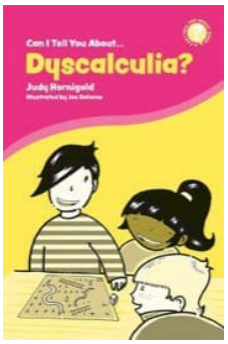
The book explores the indicators of dyscalculia, before detailing a range of teaching strategies that will support dyscalculic children and help them to develop their mathematical understanding and resilience. Throughout the book, there is an emphasis on creating an empathetic learning ethos in the classroom and school that will minimise maths anxiety and lead to a more positive outcome for all learners. All About Dyscalculia includes:

- A comprehensive introduction to dyscalculia and steps to help teachers identify children with dyscalculia in their classrooms.
- Practical strategies for building specific maths abilities, as well as broader problem-solving skills.
- Advice for teachers and parents on how to reduce maths anxiety and support the development of maths proficiency in learners.
- Easy to dip in and out of chapters with worked examples make this book accessible to all teachers and parents.

With suggestions for immediate impact, as well as ideas for more detailed interventions, this practical book will be essential reading for all mainstream primary teachers and SENCOs, as well as a helpful guide to supporting children with dyscalculia at home.

Can I Tell You About Dyscalculia?: A Guide for Friends, Family and Professionals

Judy Hornigold



$31.99

Dyscalculia is a learning difference affecting the ability to process numbers. It is a lifelong condition that affects 8% of people. This friendly illustrated guide tells readers about the causes, symptoms & effects of dyscalculia, providing children aged 7+ with the tools and confidence to understand the condition, discover helpful techniques, and seek additional support

Can I Tell You About Dyscalculia? guides parents and teachers on how to help at home & at school, and makes the condition more relatable to other children. It includes an extensive resource list.

Ideal for children aged 7+, friends, family, and professionals working with them.

Making Maths Visual and Tactile: A compendium of games and activities to teach key number skills

Judy Hornigold

$31.95

Judy Hornigold draws on her teaching and training experience to set out over 50 games and activities that can help build confidence in the all important early numeracy skills. Judy provides detailed strategies for teaching numeracy skills through a progression of practical activities and visualisation techniques which build the self-esteem of students who need extra help and give them a basic foundation in number.

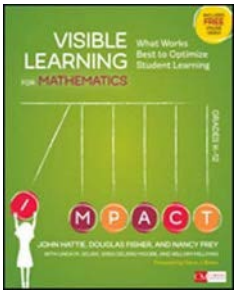
Topics covered include:

- using counters and cubes
- dice and dot pattern games
- five and ten frames
- playing with playing cards
- base ten materials
- using Cuisenaire rods, numicon, pattern blocks and virtual manipulatives

This is an ideal resource for both class teachers and maths teachers and is equally useful for learning support assistants working with small groups.

Visible Learning for Mathematics, Grades K-12: What Works Best To Optimize Student Learning

John Hattie, Douglas B Fisher, Nancy E Frey, Linda Gojak, Sara Moore, William Mellman



$83.99

Rich tasks, collaborative work, number talks, problem-based learning, direct instruction…with so many possible approaches, how do we know which ones work the best? In Visible Learning for Math, six acclaimed educators assert it's not about which one—it's about when—and show you how to design high-impact instruction so all students demonstrate more than a year's worth of mathematics learning for a year spent in school.

That's a high bar, but with the amazing K-12 framework here, you choose the right approach at the right time, depending upon where learners are within three phases of learning: surface, deep, and transfer. This results in "visible" learning because the effect is tangible. The framework is forged out of current research in mathematics combined with John Hattie's synthesis of more than 15 years of education research involving 300 million students.

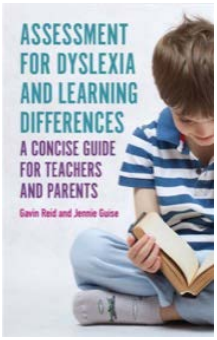
Chapter by chapter, and equipped with video clips, planning tools, rubrics, and templates, you get the inside track on which instructional strategies to use at each phase of the learning cycle:

- Surface learning phase: When—through carefully constructed experiences—students explore new concepts and make connections to procedural skills and vocabulary that give shape to developing conceptual understandings.
- Deep learning phase: When—through the solving of rich high-cognitive tasks and rigorous discussion—students make connections among conceptual ideas, form mathematical generalisations, and apply and practise procedural skills with fluency.
- Transfer phase: When students can independently think through more complex mathematics, and can plan, investigate, and elaborate as they apply what they know to new mathematical situations.

To equip students for higher-level mathematics learning, we have to be clear about where students are, where they need to go, and what it looks like when they get there. Visible Learning for Math brings about powerful, precision teaching for K-12 through intentionally designed guided, collaborative, and independent learning.

Assessment for Dyslexia and Learning Differences: A Concise Guide for Teachers and Parents

Gavin Reid and Jennie Guise



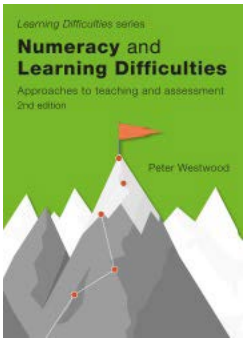
$45.99

Filling a hole in the market for an informative and user-friendly guide to the topic, this is a go-to guide for any parent or teacher. Positive, empowering and written to suit an international audience, this guide is essential reading for education professionals and parents of children with dyslexia and other learning differences. It includes practical strategies, useful websites and resources, as well as ways of recognising early on that your child or pupil has dyslexia. The authors, experienced dyslexia and learning differences consultants, highlight the importance of effective and positive communication between home and school, as well as with the child. Assessment for Dyslexia and Learning Differences is the perfect pocket guide for busy professionals and parents, who will be able to read it one sitting or alternatively dip in and out of it as they please.

Recommended for Teachers, TAs, SENCOs, learning support staff, school counsellors, tutors, parents and any other professional working with dyslexic children, including SLTs and OTs. Educational and clinical psychologists may also recommend it to potential clients.

Numeracy and Learning Difficulties: Approaches to teaching and assessment (2nd Edition)

Peter Westwood



$51.95

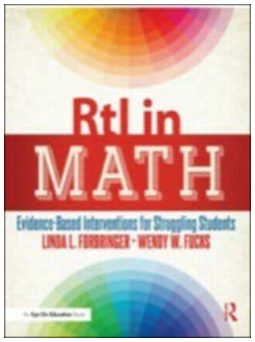
The 2nd edition of Peter Westwood's best-selling Numeracy and Learning Difficulties addresses recent initiatives around the teaching of numeracy, the increased focus on numeracy standards, and international research around numeracy teaching, learning and pedagogy. Drawing on research from the fields of developmental and cognitive psychology, Peter Westwood presents a case for high-quality 'first teaching' to prevent students failing in the initial acquisition of numeracy skills.

Numeracy and Learning Difficulties provides guidance on how to develop flexible teaching methods and strategies to improve mathematical skills of students. It discusses common areas of learning difficulty in mathematics and looks at ways teachers can determine gaps in students' knowledge, as well as how to develop curricula and problem-solving strategies to address these gaps.

In the Learning Difficulties series, Peter Westwood evaluates, summarises and presents research, strategies and best-practice methodologies for working with students that have learning difficulties in particular subject areas. Rigorous yet accessible, the titles in this series provide teachers with the knowledge, data and direction they need to develop their skills and meet student needs.

RTI in Math: Evidence-Based Interventions for Struggling Students

Linda Forbringer and Wendy Fuchs

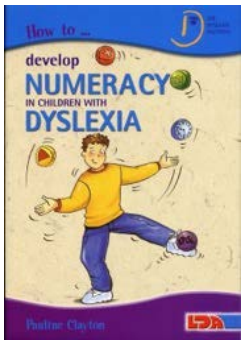


$62.99

Learn how to help K–8 students who struggle in maths. This book provides a variety of clear, practical strategies that can be implemented right away to boost student achievement. You will find out how to design lessons that work with struggling learners, implement the recommendations for maths intervention from the What Works Clearinghouse, use praise and self-motivation more effectively, develop number sense and computational fluency, teach whole numbers and fractions, increase students' problem-solving abilities, and more! Extensive examples are provided for each strategy, as well as lesson plans, games, and resources.

How to Develop Numeracy in Children with Dyslexia

Pauline Clayton



$27.95 (RP $33.50)

Written by the Principal Maths Tutor at the Dyslexia Institute in London, this book will be a significant step towards the successful understanding, teaching and support of pupils with dyslexia in the

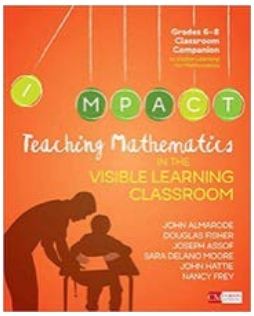
mathematics environment. The interest in this area has grown rapidly over recent years, as more teachers, SENCOs and parents have become aware of children's difficulties.

This book includes sections that will help you to:

- engage with the skills necessary for children with dyslexia to succeed at mathematics
- explore some practical ideas to support children with dyslexia in the classroom
- look at the Primary Framework for mathematics in relation to dyslexia.

Teaching Mathematics in the Visible Learning Classroom, Grades 6-8

John T Almarode, Douglas B Fisher, Joseph Assof, Sara Delano Moore, John Hattie, Nancy E Frey



$77.99

It could happen in the morning during homework review. Or perhaps it happens when listening to students as they struggle through a challenging problem. Or maybe even after class, when planning a lesson. At some point, the question arises: How do I influence students' learning—what's going to generate that light bulb "aha" moment of understanding?

In this sequel to the best selling Visible Learning for Mathematics, John Almarode, Douglas Fisher, Nancy Frey and John Hattie, help you answer that question by showing how Visible Learning strategies look in action in the mathematics classroom. Walk in the shoes of middle school teachers as they engage in the 200 micro-decisions-per-minute needed to balance the strategies, tasks, and assessments seminal to high-impact mathematics instruction.

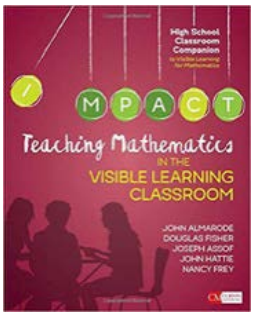
Using grade-levelled examples and a decision-making matrix, you'll learn to

- Articulate clear learning intentions and success criteria at surface, deep, and transfer levels
- Employ evidence to guide students along the path of becoming metacognitive and self-directed mathematics achievers
- Use formative assessments to track what students understand, what they don't, and why
- Select the right task for the conceptual, procedural, or application emphasis you want, ensuring the task is for the right phase of learning
- Adjust the difficulty and complexity of any task to meet the needs of all learners

It's not only what works, but when. Exemplary lessons, video clips, and online resources help you leverage the most effective teaching practices at the most effective time to meet the surface, deep, and transfer learning needs of every student.

Teaching Mathematics in the Visible Learning Classroom, High School

John T Almarode, Douglas B Fisher, Joseph Assof, John Hattie, Nancy E Frey



$77.99

It could happen in the morning during homework review. Or perhaps it happens when listening to students as they struggle through a challenging problem. Or maybe even after class, when planning a lesson. At some point, the question arises: How do I influence students' learning—what's going to generate that light bulb "aha" moment of understanding?

In this sequel to the best seller Visible Learning for Mathematics, John Almarode, Douglas Fisher, Joseph Assof, John Hattie, and Nancy Frey help you answer that question by showing how Visible Learning strategies look in action in the high-school mathematics classroom. Walk in the shoes of high school teachers as they engage in the 200 micro-decisions-per-minute needed to balance the strategies, tasks, and assessments seminal to high-impact mathematics instruction.

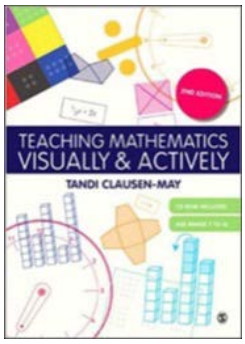
Using grade-levelled examples and a decision-making matrix, you'll learn to

- Articulate clear learning intentions and success criteria at surface, deep, and transfer levels
- Employ evidence to guide students along the path of becoming metacognitive and self-directed mathematics achievers
- Use formative assessments to track what students understand, what they don't, and why
- Select the right task for the conceptual, procedural, or application emphasis you want, ensuring the task is for the right phase of learning
- Adjust the difficulty and complexity of any task to meet the needs of all learners

It's not only what works, but when. Exemplary lessons, video clips, and online resources help you leverage the most effective teaching practices at the most effective time to meet the surface, deep, and transfer learning needs of every student.

Teaching Mathematics Visually and Actively (2nd Edition)

Tandi Clausen-May



$102 (incl. CD)

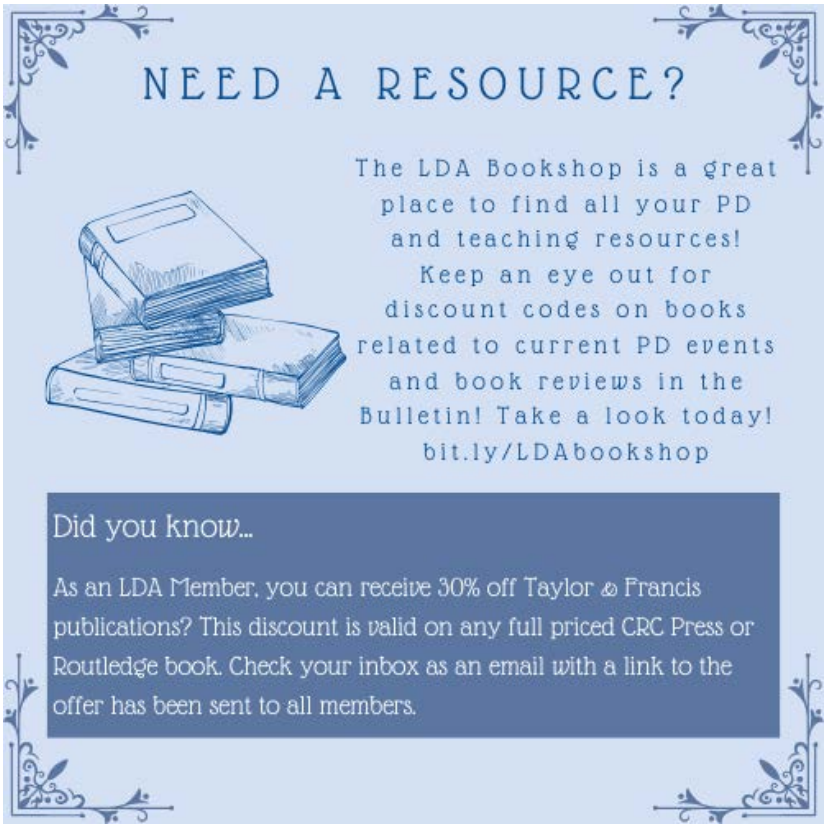
This practical book provides teachers in primary and secondary schools with advice and resources to develop a visual and active approach to teaching mathematics.

This exciting new edition comes with a helpful CD, offering resources and practical activities that make it easy for readers to try out the ideas in the book for themselves.

- This new edition has:
- new resource materials, including dynamic PowerPoint presentations to use in your teaching
- a new section on Time
- specific examples of teaching strategies
- lots more ideas for lesson activities.

The CD includes:

- Dynamic PowerPoint animations which can be used to help learners to develop their understanding of key mathematical concepts
- Posters of each concept
- And in addition to all this, each chapter suggests even further links to other useful resources for every topic to enhance your teaching. With clear explanations and strong visual layout, this is an ideal resource for teachers, SENCOs (Special Educational Needs Co-ordinators) and teaching assistants who want to motivate their learners with different and exciting ways of teaching and learning maths.



Rethinking Tier 1 spelling instruction

Dr Alison Madelaine

This is an edited version of an article originally published in Nomanis, Issue 16, January 2024.

Introduction

When we spell words, we write the letters in a way that conforms to an accepted set of conventions. For example, we know the words 'hoping' and 'hopping' have different pronunciations and different meanings signalled by the way they are spelled. We also know that English words can end with the sound /v/ but generally don't end with the letter 'v' ('glove' rather than 'glov'). Some consider spelling hard to teach, and this is mainly due to the complex nature of the English language.

English is considered to have a deep orthography. This means that there is not always a one-to-one correspondence between letters and sounds or graphemes and phonemes. But it turns out that English spelling is more regular than most people believe (Moats, 2005) and can be successfully taught using a rule-based approach. An analysis conducted by Hanna et al. (1966) found that only about 4% of English words are truly irregular; the rest are regular, mostly regular or can be spelled using knowledge of word meanings and word origins. While it would be overwhelming to teach every spelling rule, there is enough regularity in the English language to make it worth spending the time on the teaching of patterns, conventions and important rules.

The importance of spelling

There are many reasons why spelling is important. Spelling is crucial for effective written communication. Correct spelling ensures that a message is conveyed clearly and contributes to coherent writing in essays, reports or articles. Beyond the school years, spelling is considered important for job opportunities. In addition to being required for jobs involving writing, good spelling on job applications and CVs can impact the chances of being considered for a position (Pan et al., 2021; Sterkens et al., 2023).

Spelling is clearly important for writing development (Daffern, 2017; Esposito et al., 2023; Hutcheon et al., 2012; Moats, 2009; Sayeski, 2011). It is a lower-level writing skill and is said to be part of the mechanics of writing (along with typing skills and handwriting). Ensuring children are able to spell words automatically makes writing easier (Joshi et al., 2008) because it frees up working memory for other aspects of writing, such as getting ideas down on paper and making revisions while writing (Graham & Santangelo, 2014). Also, if children can spell more difficult words, they are more likely to use these in their writing. For example, they may choose the word 'miserable' rather than 'sad' if they can spell it.

It is sometimes suggested that students don't need spelling skills because they can use technology such as 'spellcheck' and 'autocorrect' when they write (assuming they are typing rather than handwriting, of course). While this technology may help to reduce some spelling errors, it is certainly not fool proof. To benefit from technology that assists with spelling, you need to have some idea of how to spell the word to type it in the first place. Then you are often required to make the correct choice from multiple options. In addition, sometimes we type a word that is spelled correctly, but isn't the intended word (for example, your/you're or bred/bread).

The consequences of poor spelling can be far reaching. Poor spelling not only affects written expression, but it can

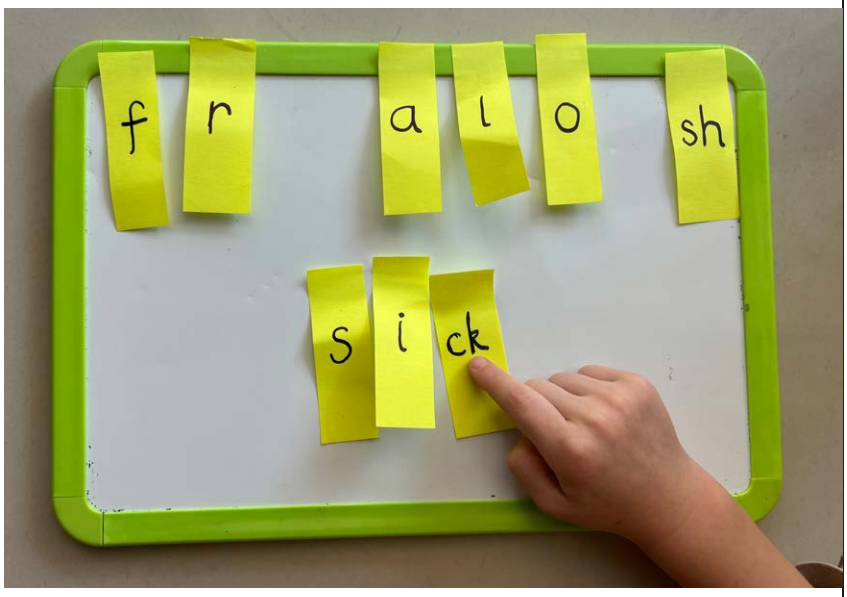


Image 1. Word building activity for teaching phoneme-grapheme correspondences, phonemic awareness and encoding skills.

result in harsh judgement (even when the content of a text is sound). This can cause embarrassment and hamper further writing development.

Spelling is also important for reading development (Ehri, 2000; Graham & Santangelo, 2014; Joshi et al., 2008; Kim & Petscher, 2023; Moats, 2005; Sayeski, 2011). Just as good phonemic awareness and phonics skills are critical for reading, they are also essential for the development of good spelling (Sayeski, 2011; Simonsen & Gunter, 2001). And early spelling ability is an important predictor of later reading performance (Treiman et al., 2019). It has been shown that we can improve reading decoding skills by providing good instruction in spelling (Graham & Hebert, 2011; Graham & Santangelo, 2014; Moats, 2005). Moreover, because spelling instruction has the added benefit of supporting the development of vocabulary (Moats, 2005), it is also highly correlated with reading comprehension (Joshi et al., 2008).

The components of spelling

To spell well, children need to acquire knowledge and skills in three main areas (Apel et al., 2012):

1. **Phonology** is the study of speech sounds in a language and involves the ability to manipulate and segment the sounds in words. For spelling, students need to integrate their knowledge of phonics or grapheme–phoneme correspondences with their knowledge of phonological awareness to spell words. For example, at the beginning stage of instruction, if a student wanted to write the word 'cat', they would need to segment 'cat' into the sounds /k/ /a/ /t/ and write down the letters 'c' 'a' 't' to spell the word.
2. **Orthography** refers to the set of conventions for writing in a language. To spell well, students need to know what those orthographic conventions are. For example, words ending in /j/ are spelled with 'dge' (badge) or 'ge' (damage), never 'j'. Orthographic mapping involves the process of storing word-specific representations (Ouellette, 2010) and includes such skills as learning which sequence of letters are permissible in English, and the ability to recognise when words are correct or incorrect.
3. **Morphology** refers to the study of morphemes or units of meaning within a word. Knowledge of morphology can help students spell lots of different words once they know the spellings and meanings of bases, prefixes and suffixes (Colenbrander et al., 2024). For example, the word 'unpacking' is made up of three morphemes: 'un' is the prefix, 'pack' is the base and 'ing' is the suffix.

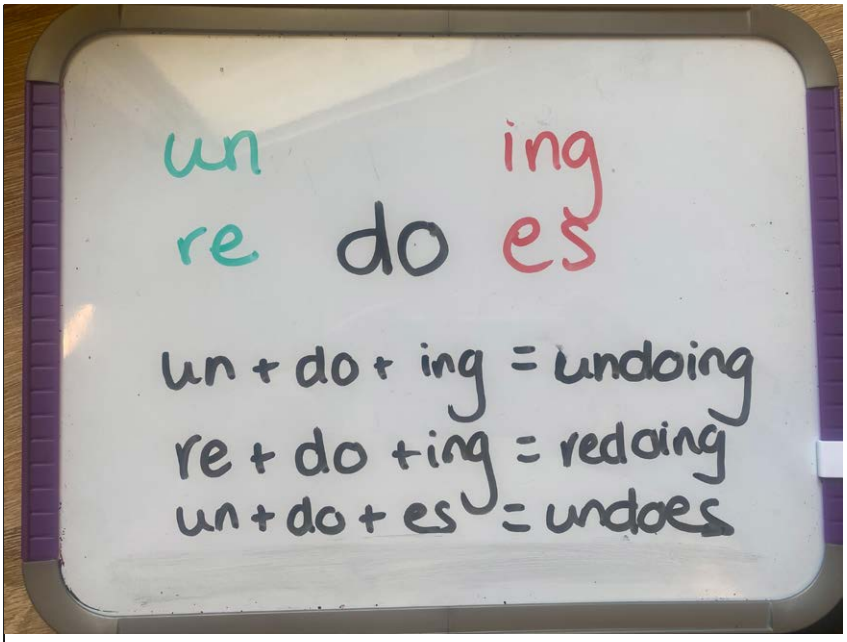


Image 2. Example word sum for teaching morphology

Etymology

In addition to these three main areas, there is another area of study that students can apply to their spelling knowledge: etymology. This is the study of word origins. Evidence is emerging as to the important role etymology can play in spelling development (Devonshire & Fluck, 2010; Hutcheon et al., 2012). As many English words come from other languages, explaining the origins of some of these words can help children understand why English words are spelled in such diverse ways. For example, knowing that the words 'ballet' and 'parachute' are borrowed from French helps children to understand why some graphemes have been used to represent certain sounds.

The development of good spelling skills

Theories on how children learn to spell have changed considerably over time, and these continue to evolve in response to research. It was once thought that children progressed through a series of sequential stages (Daffern, 2017), first moving through a phonological stage, then an orthographic stage and finally a morphological stage. As research into stages evolved, it was acknowledged that these stages could overlap (Hutcheon et al., 2012).

Recent research, however, has suggested that learning to spell may not follow a linear path. There is evidence that children use phonological, orthographic and morphological skills at all stages of their spelling development (Bahr et al., 2012). Triple Word Form Theory has been put forward to explain how children learn to spell. It suggests that spelling involves integrating phonological, orthographic and morphological word forms from the beginning stages of spelling development (Daffern, 2017; Niolaki et al., 2023).

Research on spelling instruction

The available research on spelling instruction, and instruction in general, provides some important information on how spelling should be taught. But before examining that research, we need to consider whether spelling needs to be taught at all. Much debate about spelling has revolved around whether it is 'caught' or whether it should be 'taught' (Graham & Santangelo, 2014). Proponents of 'spelling is caught' approaches believe that spelling is acquired naturally

through exposure, much like learning to speak, and that formal instruction is not required. But in fact, based on the results of a meta-analysis of studies testing the effectiveness of formal spelling instruction, Graham and Santangelo (2014) concluded that formal instruction in spelling is superior to no instruction, and that more formal instruction is superior to less formal instruction. In other words, 'spelling is taught' approaches produce better outcomes than 'spelling is caught' approaches.

Traditionally, a common approach to the teaching of spelling has involved the rote learning of lists of words, with an emphasis on the visual information each word conveys. In fact, using lists of words to 'teach' spelling has persisted since early in the 20th century (Pan et al., 2021). This approach often involves the teacher preparing a list of words for their students to learn for the week. Students may be given the words on Monday and are then tested on Friday. Spelling word lists may come from other areas of the curriculum, from children's own writing or from a spelling program. During the week, some light teaching may occur to practise these words (for example, copying the words out multiple times or writing the words in a sentence), but essentially there is often little, if any, in-depth instruction around the nature of the English language to assist students in their understanding of how spelling works. The main problem with this type of approach is the absence of any real, explicit instruction in spelling.

As stated above, we know we need to formally teach spelling (as distinct from merely assigning spelling activities). Good spelling instruction needs to start with a robust and detailed scope and sequence. This is a statement of the content that will be taught and the order in which that content will be taught. A scope and sequence ensures that instruction is not delivered in an ad hoc way, which could lead to conceptual gaps. Although assessment is important in deciding what to teach, a scope and sequence provides a framework for teachers so they can make sure that their students are presented with spelling content and skills in an appropriate order.

When deciding how to teach spelling, there are some things we need to do so that our instruction is evidence-based and effective. Firstly, we need to make sure that the spelling instruction is language- based. This means that students are taught about the structure of the English language and how it relates to spelling, rather than teaching students to memorise the spellings of individual words. Approaches based on rote memorisation are not effective as they do not allow children to consciously transfer their spelling skills to words that have not been taught (Dymock & Nicholson, 2017; Joshi et al., 2008; Mullock, 2012; Treiman, 2018). Providing language-based English spelling instruction has been found to be superior to instruction based mainly on rote memorisation, and this is most likely due to the generalising potential offered by language-based instruction.

Moats (2009) has identified five principles that help explain the pattern-based nature of English orthography:

1. Every phoneme is represented by a grapheme.
2. The spellings of some phonemes are determined by their position in a word.
3. Rules determine how certain letters can be used and what sequences of letters are permitted.
4. Spelling can represent morphemes.
5. Some spellings can be explained by the history of a word or its language of origin (etymology).

Secondly, the way we deliver instruction needs to be considered. Explicit instruction has been found to be instructionally effective (Archer & Hughes, 2011). This is a teacher-directed approach and includes features such as well-sequenced lessons, the use of clear, concise and consistent language, frequent student responses, guided practice, systematic and immediate error correction, distributed practice and cumulative review. In addition to the features of explicit instruction, the following activities can be used to support instruction in spelling:

- Use of a spelling voice (sometimes referred to as spelling pronunciation or over-enunciation; Hilte & Reitsma, 2006) can assist students in learning to spell words with a schwa vowel sound in an unstressed syllable, like those in the words 'fountain' and 'parent'. In addition, a spelling voice can be helpful when students are spelling words with 'disappearing syllables' like 'Wednesday' and 'interesting'.
- Phoneme Boxes (also referred to as sound, Elkonin or word boxes) are useful in teaching phonemic awareness, letter–sound correspondences and spelling (Ross & Joseph, 2019). For spelling, Phoneme Boxes involve students writing a grapheme for each sound in a word. For example, the word 'starve' has four sounds: /s/ /t/ /ar/ /v/ and these would be written as 's' 't' 'ar' 've' in the four boxes.
- Sentence dictation is a spelling activity where students write sentences containing words they are learning, which are dictated by the teacher. This can provide additional spelling practice and has the advantage of enabling children to write words in context (rather than only writing words in isolation). Sentence dictation has been found to be effective alongside explicit spelling instruction (Robinson-Kooi & Hammond, 2020).

Teaching irregular word spelling

Teaching children to read and write some high-frequency irregular words is important for reading and writing connected text. An irregular word is a word in which at least some of the letters are not represented by their most common pronunciation and, therefore, are not easily decoded or encoded. Some simple examples are 'was', 'of' and 'some'. In the past, children were sometimes taught to spell these words using a whole-word approach, often using rote memorisation. While we still have much to learn about how children learn to read and spell irregular words, more recent research has led to other ways of teaching these words (Colenbrander et al., 2020, 2022).

In the first few years of school, students should be taught phonics as part of their reading/spelling program. By Year 3, most children will have acquired knowledge of most grapheme–phoneme correspondences. Since nearly all words can be at least partially encoded using phonic knowledge, children can put these skills to good use when spelling irregular words. This reduces the amount of new learning that needs to take place and allows spelling instruction to focus mainly on the irregular parts of words. For example, when teaching children to spell the word 'walk', they use their knowledge of grapheme–phoneme correspondences

to spell the first and last letter and their attention is drawn to the irregular part – that is, for the sound /aw/ in 'walk', we write the letters 'a' and 'l'.

Spelling assessment and instruction

Spelling assessment can serve different purposes in the classroom, such as to measure gains in spelling ability over time, to evaluate an instructional program or to make decisions about the instructional needs of the class (Kohnen et al., 2009; Westwood, 2005, 2022). Curriculum-based assessment of spelling can provide teachers with information about each child's spelling skills to help them make instructional decisions, such as when to move on with instruction and when students need more practice. In addition to curriculum-based assessment, other tests of spelling may be used to provide additional information on students' spelling skills. Curriculum-based measurement assesses children's ability to generalise spelling rules to novel words (Hosp et al., 2016) and may be used frequently to track spelling progress over time. Norm-referenced tests are used to compare students to those in the same grade or of the same age and are generally used less frequently to provide teachers with information such as percentile ranks, standard scores or spelling age equivalent scores.

even within a Tier 1 program, instruction should be differentiated to cater for students who need additional support

In any class, there will always be a certain proportion of children who have difficulty with spelling. This will include students who need more instruction and practice to acquire the necessary spelling skills. These children may be catered for within whole-class instruction (referred to as Tier 1 in the Response to Intervention model). Teachers may utilise small group instruction within the Tier 1 classroom to provide extra assistance and practice to those who need it, with the aim of reducing the number of children who will need more formal small group Tier 2 instruction. In addition to extra instruction and practice, teachers may alter the difficulty level of words children are required to spell (Sayeski, 2011) and provide more scaffolding when completing spelling tasks. There are many ways in which teachers can provide instructional scaffolding to children who need extra support, for example, adding structure like boxes to represent the sounds in a word (Keesey et al., 2015), modelling, prompting in the form of a rule reminder, or completing additional examples during the guided practice part of the lesson. So, even within a Tier 1 program, instruction should be differentiated to cater for students who need additional support and more capable spellers who may need extending. Note that a small proportion of children will have spelling needs that warrant more intensive intervention and should be provided with Tier 2 or 3 spelling intervention accordingly.

Conclusion

Spelling is important for writing and reading, as well as for success in post-school life. Research on spelling development tells us that children need to learn to use phonological, orthographic, morphological and etymological information in order to spell well. In addition, research suggests that we need to teach spelling formally and in a way that is language-based.

About the author

Dr Alison Madelaine is a Senior Research Fellow within the MultiLit Research Unit at MultiLit Pty Ltd. She is also Clinical Director of the MultiLit Literacy Centres and is involved in the development of whole class and remedial programs in reading and spelling. Her publications and research interests include effective reading and spelling instruction, curriculum-based measurement of reading and teachers' knowledge and skills in teaching reading. She has taught in schools in Australia and in the United States. Alison is a Council member of Learning Difficulties Australia and is Editor of the Australian Journal of Learning Difficulties.

Conflict of interest

The author declares that there is no conflict of interest regarding the publication of this article. Images have been used with permission.

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Hear from two of our 2023 LDA Award Winners – Julie Phillips and Julie Mavlian

At the 2023 LDA AGM in Melbourne last year, the afternoon was dedicated to recognising award recipients for their ongoing contributions to the learning difficulties landscape. Each recipient presented on their related work, research, and advocacy; underscoring the invaluable contribution of individuals within our LDA community. Congratulations once again to our 2023 award winners:

- AJLD Eminent Researcher Award - Emeritus Professor Kevin Wheldall AM
- LDA Tertiary Student Award - Elvira Kalenjuk
- LDA Tertiary Student Award Highly Commended - Dr Shae Wissell
- LDA Bruce Wicking Award - Julie Mavlian
- LDA Mona Tobias Award - Julie Phillips
- LDA Rosemary Carter Award - Ann Ryan

2023 LDA Mona Tobia Award Winner - Julie Phillips

The LDA Mona Tobias Award recognises a person who has made an outstanding contribution in Australia to the education of people with learning difficulties, in leadership, research, practice, teacher and/or community education. In 2023, the Mona Tobias Award went to Julie Philips.

Julie Phillips is a Disability Advocate in Victoria (*www.educationrights.com.au*) who's contributed more than 30 years of supporting people with Learning Difficulties, through her evidence-based practice and recognised work in advocacy and leadership. Julie has made a wonderful contribution providing much needed help in securing accommodations for students with diagnoses of dyslexia, dysgraphia, dyscalculia, receptive and expressive language disorder (and more) in the school system. She has contributed to other organisations, leads within her community alongside her advocacy at a national level by making submissions to government bodies, and showing leadership.

Here is Julie's acceptance speech for the 2023 Mona Tobias Award.

The thrill of being awarded the Monia Tobias Award was more about the work that I do and the cohort I advocate for, rather than myself.

Education is a human right, and being able to read is an intrinsic part of education. The right to education is a multiplier right, because it is integral to and enhances human dignity, and also serves as a means to achieve other rights. Education is a key social and cultural right that plays an important role in reducing poverty, promoting democracy, peace, tolerance, development and economic growth. (*https://www.unicef.org.uk/rights-respecting-schools/the-rrsa/the-right-to-education/*)

Education is a human right, and being able to read is an intrinsic part of education

Education is one of the most powerful tools in lifting socially excluded children and adults out of poverty and into society (*https://www.unesco.org/en/articles/what-you-need-know-about-right-education*). My approach to the education of children with disabilities is through discrimination legislation, reflecting the importance of those rights.

I have always been passionate about the education of children with moderate to severe disabilities, who are often written off as not having capacity, and as a consequence, denied more than the community of general students, such as access to evidence-based reading approaches. Particularly in segregated schools for children with disabilities, the expectations are low, and specific requests on behalf of families for students to have evidence-based remedial programs, or structured synthetic phonics approaches, have often simply been flat out refused.

It seems to me that those with the most barriers deserve the most intensive and evidence-based interventions, rather than to be given up on, because of an assumption they will never benefit.

The biggest barrier for students with disabilities to reading and education, is the low expectations and assumption of lack of capacity by others. I have seen first-hand how children with multiple disabilities benefit from evidence-based remedial programs, usually after they have left school.

The biggest barrier for students with disabilities to reading and education, is the low expectations and assumption of lack of capacity by others

Given the consequences of not having an education often include unemployment, poverty, acquisition of mental illness and involvement in the juvenile justice system, why would all of us not work together to realise the rights of all students, no matter their circumstances, to be taught to read?

It is my hope that academics and advocates will work closely together in the future, to realise these rights.

Julie Phillips

www.educationrights.com.au

2023 LDA Bruce Wicking Award Winner - Julie Mavlian

The LDA Bruce Wicking Award is presented to a person who has provided outstanding innovative programs or practices relating to the teaching of children with learning difficulties. In 2023, the Bruce Wicking Award went to Julie Mavlian.

Julie is currently an Assistant Principal (Curriculum & Instruction) at Riverwood Public School in New South Wales. She has worked in a variety of educational settings from preschool through to tertiary education and is currently working with AERO's on their Practice Reference Group. Julie has made a significant contribution to helping students with learning difficulties, as well as their parents and teachers. She has been developing and refining her teaching practice over more than two decades, seeking out all opportunities to participate in and facilitate professional learning. She has a Masters in Special Education and has a particular interest in helping students with reading difficulties, advocating for change in teacher education, and supporting students from disadvantaged backgrounds

Julie is the founder and administrator of Dyslexia Support Australia Facebook group with over 22,000 parent and teacher members, and a founding member of CodeRead Australia Dyslexia Network who advocate for all people with dyslexia. Julie, as a member of the Five from Five project team, has been instrumental to what has been a ground-breaking and innovative approach to influencing policy and practice – providing free, accessible information and resources based on the Science of Reading to parents and teachers, and using media and social media as well as direct engagement with politicians and senior education officials to bring about change in policy. Julie has engaged in the public debate over effective instruction and intervention with dignity and determination and has supported many others to do the same.

Here is Julie's acceptance speech for the 2023 Bruce Wicking Award.

I would like to thank Learning Difficulties Australia for the honour of the 2023 Bruce Wicking Award. When I look back at previous award winners such as Jocelyn Seamer, Alison McMurtrie, Steven Capp and Ray Boyd I am truly humbled – these are among the people that I look up to and whose work I have followed closely for many years.

My work with students with learning difficulties began with my own son who failed to learn to read and his schooling was a nightmare. I couldn't understand why because I had read to him every day from the time he was very young. Along the way, I had fallen into the trap of trying every magic unicorn treatment or 'sciencey' sounding 'neuroflapdoodle' approach (thanks Pam Snow for that term). Most disappointingly, I was also a teacher so I should be able to help him, right? I asked myself, how could this be happening?

I was completely blindsided to learn that my own teaching degree did not prepare me for the teaching of reading let alone to teach a student with reading difficulties. I felt completely ripped off! I then went looking for answers, and there's nothing like an angry mum on a mission, especially an angry mum who is also a teacher.

my own teaching degree did not prepare me for the teaching of reading let alone to teach a student with reading difficulties

As Sara Henderson once said, "If you can't find the light at the end of the tunnel, stride down there and light the bloody thing yourself", so that's what I did. I learned all that I could about the teaching of reading and I taught my son to read when his teachers could not.

In my quest for knowledge I was lucky to come across so many incredibly knowledgeable and supportive people. I must thank Jody Clements, from the Australian Dyslexia Association, for teaching me what my own degree had not, and for setting me on a path of further learning and a path to help other students.

Thanks to Dr Jennifer Buckingham for writing, 'Why Jaydon can't read', this article helped me to understand why so many students were not learning to acquire the skill of reading. What was disappointing to me was that so many other parents and teachers seemed unaware of the crisis before us and that my own situation was being repeated over and over again. It's been a privilege to work alongside Jen on the Five From Five project to try to influence policy makers and to provide teachers with much needed information around the teaching of reading via the website and social media.

so many other parents and teachers seemed unaware of the crisis before us

Social media cops a lot of criticism; however, it can be a useful platform for gathering of like minds, and sharing and disseminating information. I started Dyslexia Support Australia more than a decade ago, because there was a disconnect between parents, teachers, universities and students. Parents needed to understand what their child needed in order to learn to read and they needed to know that their child's teacher wasn't trained in the best methods for teaching reading. Teachers like myself needed to understand the

lack of effective preparation within our own degrees, so DSA targeted teachers too. Thanks must go to Belinda Dekker, for the time, effort and expertise she poured into DSA for many years. We had some epic battles with sellers of snake oil treatments.

they too, have experienced the hardships caused when their own children struggled with reading and spelling

Julie Hermansen, Jody Leonie and Dr Sandra Marshall who also give so much of their precious time to parents and teachers because they too, have experienced the hardships caused when their own children struggled with reading and spelling. DSA wouldn't be what it was without them.

Through DSA many of us determined angry mums got together and formed Code Read Dyslexia Network. A not for profit registered charity with the aim that all people with dyslexia and reading difficulties are understood, acknowledged, empowered and have equal access to opportunity. On Sunday if you see significant monuments and buildings lit up red near you, it is because of Code Read and our 9th annual Light it Red campaign as part of October being Dyslexia Awareness month.

Code Read are having their major fundraiser and bi-annual ball this evening in Adelaide, and it is for this reason that I am unable to be in Melbourne today to be with you and to celebrate the incredible work that Learning Difficulties Australia does.

I am thankful to the LDA for their excellent publications, professional development and resources that have been used to inform the work that I do with students. I work in a disadvantaged community and our students start school with lower than average oral language competence. It is an absolute pleasure to work with the executive staff, the teachers and support staff at our school and the community to put into practice what research suggests works best to ensure that every child leaves our primary school able to read.

I am very happy that October is dyslexia awareness month and I have the opportunity, via this award, to spread the word about Code Read and the work we do.

I accept this award in the name of every parent who has a child that struggles with reading and spelling including Belinda, Julie, Jody and Sandra.

Thank you from all of us!

Julie Mavlian

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LDA Bulletin Author Guidelines

The LDA Bulletin is a publication of Learning Difficulties Australia that aims to provide information and support to educators in a range of professions as they implement effective evidence-based teaching.

As a practice-based journal, articles in the LDA Bulletin generally focus on topics related to the development of literacy and numeracy in both mainstream student populations and especially students with learning difficulties.

Contributions are welcome from researchers, literacy and mathematics specialists, classroom teachers, speech-language pathologists, school psychologists, and other professionals in the field of education. Articles focusing on effective approaches to teaching and effective intervention are particularly welcome.

Contributions to the LDA Bulletin typically include:

	Content	Approx. Length *
Feature articles	Topics likely to be of interest to LDA members that summarise research on a significant aspect of literacy or numeracy learning.	2000 - 3000 words
Reports from the chalk face	Summaries of the implementation of specific evidence-based school practices.	2000 – 3000 words
Debates and discussions	Overviews and evaluations of relevant controversies in the field of education.	2000 words
Reviews of resources	Critical evaluations of assessment tools and available teaching resources	1000 – 2000 words
Book reviews	Critical reviews of published books in the field of education.	1000 words
Journal article reviews	Critical reviews of relevant peer-reviewed research.	1000 words

* All length guidelines are flexible, depending on the content of what is covered.

Submissions to the LDA Bulletin are peer-reviewed within the Bulletin Editorial Team, and any requests for changes are returned to the author/s for consideration. Referencing should be presented in *APA (7th edition) format*.

The LDA Bulletin is published three time a year. It is distributed to all LDA members in both hard copy and electronic format, and is also available for download on the LDA website.

Please contact the LDA Bulletin Editor, with any queries, suggestions for topics, or proposed submissions:
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2023 LDA Tertiary Student Award Recipient

Dr Elvira Kalenjuk

My name is Elvira Kalenjuk (Elly), and it was my honour to be the recipient of the 2023 Learning Difficulties Australia (LDA) Tertiary Student Award. I received the award in recognition of my contribution to the field of dysgraphia, which is an understudied area of research especially within education. The term dysgraphia can be confusing as its meaning differs across fields and countries (McCloskey & Rapp, 2017). In Australia, dysgraphia refers to specific learning disorder (SLD) in written expression (WE) (see for example, AUSPELD, 2014). This meaning aligns with the diagnostic and statistical manual of mental disorders, fifth edition (DSM-V), although the term dysgraphia was removed in this iteration adding to the confusion (American Psychiatric Association, 2013). In the USA, dysgraphia often refers to handwriting-only difficulties with the reference to SLD-WE termed as SLD in written language or SLD-WL (Berninger, 2018). In my research, I use the term more broadly to include reference to SLD-WE as well as in relation to significant difficulties with handwriting or typing (Kalenjuk, 2022b; Kalenjuk et al., 2021). Within schools and the broader Australian community, dysgraphia is a relatively unfamiliar type of SLD. As a consequence, there is limited information and expertise available to support children, their parents, educators, and other professionals making it difficult to properly navigate and address. I commend LDA for their efforts in bringing attention to writing difficulties, which impacts approximately 7-15% of students (Döhla & Heim, 2016; McCloskey & Rapp, 2017).

I wish to thank the 13 participants across several studies who generously and willingly communicated their personal experiences that have enabled me to gain and share nuanced insights about dysgraphia.

Writing difficulties, more generally, can be a challenge to which to respond as writing involves multiple components, including handwriting and typing, spelling, grammar, punctuation, revision, and editing skillsets (Graham, 2019). Dysgraphia is often characterised by significant difficulties in any or all these areas. Limited skills are typically compounded by writing stress and/or combined by inadequate writing knowledge (e.g., knowledge of the writing process or the specific structures and features of a given writing genre), or writing strategies (e.g., targeting a certain audience or setting writing goals). As a result, limited skills, knowledge, and strategies for writing often leads to low motivation for engaging in writing tasks (Graham, 2019). Additionally, research has shown difficulties with working memory (WM) and executive function (EF) as core features of SLDs (Berninger et al., 2017; Berninger, 2018). Because of these factors, students with dysgraphia generally require intensive, repetitive, scaffolded and explicit instruction coupled with excessive practice to make learning gains. This can create logistical challenges for students, teachers, and parents alike with, for example, curriculum pressures, time limits, or writing stress getting in the way of focused attention on writing improvement. Nevertheless, research also shows that early detection and targeted intervention can hasten learning gains (Beers et al., 2017; Hopcan et al., 2019; McCloskey & Rapp, 2017). Significantly, students with SLDs, especially if undiagnosed, can be severely impacted by mental health concerns (Bonifacci et al., 2020). From this perspective, detection, understanding, and responsive practices can also alleviate the impact of mental health issues that might arise from writing difficulties.

Over the last few years, my work has included empirical research via doctoral studies at Monash University (Faculty of Education), producing referred publications, presenting at local and international conference presentations, professional workshops, teacher professional development, and initial teacher education. My audience has expanded beyond teachers and has reached parents / carers, school support

staff, school leadership, occupational therapists, psychologists, speech pathologists and others interested in deepening their understanding about dysgraphia. For me, the recognition from LDA through the tertiary student award reflects a growing interest in, and awareness about, dysgraphia. To this end, I wish to thank the 13 participants across several studies who generously and willingly communicated their personal experiences that have enabled me to gain and share nuanced insights about dysgraphia. These personal insights benefit the community in gaining collective capacity and efficacy in providing appropriate responses to individuals with dysgraphia. I am grateful to LDA for the work in raising the profile of dysgraphia and, by extension, acknowledging my role in this work.

…there was limited understanding and research about dysgraphia, especially within the field of education.

Sustaining my efforts in lifting community awareness about dysgraphia has been the research I have undertaken as part of my doctoral candidature. My thesis explored the lived experiences of dysgraphia from the perspectives of children with dysgraphia (aged 10-12), their parents/carers, and teachers (Kalenjuk, 2024b). The research was framed by phenomenology, which is the study of things as they appear in consciousness (Moran, 2002). The 'experience of dysgraphia' was the phenomena under exploration in my thesis and this was largely investigated through semi-structured interviews. The thesis included five studies that have each translated into individual research papers (referred publications). The first study (*https://static1.squarespace.com/static/62cb6c4f3dd8c74a52efdb24/t/63a36283a7a4ba2400edbe3c/1671651977795/A-22-Kalenjuk.pdf*), an autoethnography, reflected my own positionality as a former primary teacher of 25 years, art therapist, lecturer, and researcher, as well as a parent of a child with dysgraphia (Kalenjuk et al., 2022). Self-studies are an important aspect of qualitative research projects because they help to clarify the researcher's biases, which later assists in delineating the researcher's position from those of the participants (Kalenjuk, 2022a, 2024a; Kalenjuk et al., 2022). This level of transparency is vital for research practices where partialities and lived experience are typically analysed through a subjective lens. The second study (*https://www.tandfonline.com/doi/abs/10.1080/19404158.2021.1999997*) was a scoping review, which mapped and summarised current (2015-2021) research about dysgraphia. The review found that there was limited understanding and research about dysgraphia, especially within the field of education (Kalenjuk et al., 2021). This research was foundational in driving the direction of the thesis, which focused on garnering Australian perspectives with an emphasis on student voice.

As a consequence, studies three (*https://onlinelibrary.wiley.com/doi/full/10.1111/chso.12709*), four (*https://www.tandfonline.com/doi/abs/10.1080/1034912X.2024.2361287*), and five (*https://www.cambridge.org/core/journals/australasian-journal-of-special-and-inclusive-education/article/thats-not-something-thats-necessarily-on-the-radar-educators-perspectives-on-dysgraphia/7B1B84737FCFED12D54179D85EE60104*) provided empirical research about the experiences of dysgraphia for children, their parents, and teachers, respectively (Kalenjuk, Subban, Laletas, et al., 2024; Kalenjuk, Subban, Wilson, et al., 2024; Kalenjuk et al., 2023). Young people in grades 5 and 6 (ages 10-12 years; one female, four males; rural, regional, and metropolitan locations across Victoria) were invited to depict their experiences of dysgraphia using self-selected art materials (i.e., Lego, drawing, digital art, and video performance) in three online, group-based sessions. Through the process of artmaking, the outcomes showed the diversity of writing difficulties from poor handwriting and typing to challenges with organising thoughts on paper. For several of the students, the main difficulty involved transferring ideas from their head to paper. One student depicted this through two side-by-side drawings: (1) an image of a clear pineapple (how writing appeared in his mind) and (2) an image of a fuzzy pineapple (how writing appeared on the page) (Kalenjuk et al., 2023). Another participant used an image of a wonky sword showing how the ideas started out well in his head (the handle of the sword), but then the writing did not appear on the page in a way that reassembled what was in his mind (depicted as a bend in the sword blade) (for images see, Kalenjuk et al., 2023). The study with children also highlighted the symbiosis between writing and identity. This was an important finding as it underpins the necessity of supporting students to achieve writing success for their own wellbeing and sense of achievement.

Before inviting the children to participate, I interviewed their parents to garner the carers' perspectives. The parent-participants highlighted a range of issues in supporting their students that included home writing support, managing meltdowns, tantrums, or excessive homework demands as well as the challenges in locating information and support services specific to the requirements of their child (Kalenjuk, Subban, Wilson, et al., 2024). The parent-participants did struggle to navigate and balance the demands of their own paid employment along with family responsibilities, including finding equitable time and resources for their other children. The writing concerns required additional meetings with their child's school and an individual learning plan, which some parents found useful, taxing, or unsatisfactory. Parent-participants were largely positive about their child's teacher. However, several parent-participants also described situations where the parent-teacher relationship became strained by the limited awareness or understanding about dysgraphia. The study concluded that the parent-participants, in their role as mothers, carried excessive intellectual, financial, and emotional burdens in the context of dysgraphia (Kalenjuk, Subban, Wilson, et al., 2024). It showed the need for greater awareness at the school level as well as the potential benefits of parent support groups specifically for carers of children with dysgraphia.

…students with dysgraphia generally require intensive, repetitive, scaffolded and explicit instruction coupled with excessive practice to make learning gains.

The final study explored the experiences of three educators in great depth. Each educator-participant had varied experiences in supporting students with dysgraphia. Among all three educator-participants, there was consensus about the limited information, access to professional development, and lack

of awareness about dysgraphia within schools and beyond (Kalenjuk, Subban, Laletas, et al., 2024). These limitations created significant barriers to supporting their students with writing difficulties. However, each of the participants described several effective strategies, such as explicit instruction and the use of assistive technologies in supporting their students with dysgraphia. In cases of handwriting difficulties, slant boards, lined paper, or typing were offered and perceived as impactful. For challenges in ideation, students were provided sentence starters or visual prompts to stimulate thinking or evoke ideas for writing. On the other hand, students with rich ideas often struggled to translate these ideas into print and were offered a scribe or voice-to-text technologies as intervention strategies. It should be noted that for some students, typing was worse than handwriting, and dictation apps often generated feelings of self-consciousness. These same apps were also ineffective for use in foreign language classes. The results highlighted the degree to which dysgraphia manifested quite uniquely at the individual level, requiring personalised intervention programs. Moreover, two of the classroom teachers gained qualifications in multisensory structure language (MSL) as a means of addressing SLDs and moved into private tuition practices. The study concluded that professional development in dysgraphia would add greater levels of awareness and collective efficacy for the teaching profession.

The thesis fused all five studies together to locate the conceptual and systemic views about the experiences of dysgraphia. The conceptual view, or phenomenological essence, revealed five key concepts:

1. identity,
2. power,
3. benevolence,
4. tensions, and
5. transformation (Kalenjuk, 2024b).

The interrelated conceptual findings showed the degree of good will (benevolence) by students, teachers, and parents complicated by a range of challenges (tensions) impacted by a range of relationships, factors, and dynamics (power) and notions of self-efficacy (identity). The conceptual view corresponded to the systemic view, which pinpointed the successes and limitations as mapped across the diverse layers of Bronfenbrenner's (1979) ecological model. The system's view highlighted the challenges for students at the centre of the model through individual difficulties. These were either offset or exacerbated by the responses from schools, teachers, parents, or other stakeholders in the child's immediate radius. The impact of these responses could be viewed as productive or counterproductive. External factors, such as initial teacher education (ITE) programs or professional development opportunities were restrictive in communicating information about dysgraphia. Despite some gaps in the system, there were also well-developed policy (e.g., NCCD, reasonable adjustments) (Department of Education and Training Victoria, 2020; Nationally Consistent Collection of Data, 2021a, 2021b) and legislative frameworks (e.g, children's rights, Disability Discrimination Act) that also assisted in creating conditions for school funding (Federal Register of Legislation, 1992; United Nations Educational Scientific and Cultural Organization, 1989). Overall, the potential for change was apparent (transformation) with systemic reform in key areas across the system.

Recommendations from the thesis included:

1. dysgraphia-specific professional development,
2. consistent and evidence-based assessment and intervention practices for writing, and
3. collective responsibility through whole-school approaches.

I wish to dedicate the 2023 LDA Tertiary Student Award to my participants. It was their willingness and lived stories that inspired the high-quality research output to which LDA recognised as excellent. I am grateful to LDA for the ongoing support in my ambition to raise awareness about dysgraphia and to provide new research and practical support for families, children, educators, and others to address the challenges and affordances that living with SLDs might generate.

About the author

Elvira Kalenjuk BA GDipEd MCAT VITF PhD, AThR

Bachelor of Arts, Graduate Diploma of Education, Master of Creative Arts Therapy, Victorian International Teaching Fellowship, Doctor of Philosophy, Professional member of the Australian, New Zealand and Asian Creative Arts Therapies Association (ANZACATA).

Elvira Kalenjuk is an Australian university lecturer in education and accredited art therapist with over 20 years' experience in primary teaching. Her professional experience has included English teaching in Kaohsiung (Taiwan), facilitation of a major art project in Ltyentye Apurte (Northern Territory), and member of the Victorian teacher delegation to Shizuoka (Japan). In 2016, Elvira was awarded an international fellowship, leading action research to support First Nation communities in Williams Lake (Canada). She undertook doctoral studies at Monash University about the lived experiences of dysgraphia, including several referred publications. Elvira is also the recipient of Monash University's 2024 postgraduate publication award, and the Faculty of Education's inclusion, diversity, and equity student award.

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From the Archives

Book review
How we learn: The new science of education and the brain

Reviewed by **Dr Roslyn Neilson**

This article was originally printed in the LDA Bulletin, Issue 3, Volume 52, December 2020.

How we learn: The new science of education and the brain
Stanislas Dehaene
Penguin Books, 2020.

In 2009 Stanislas Dehaene, neuroscientist and science writer, published a book that captured the attention of many education professionals: *Reading in the Brain*. In that book Dehaene provided a very accessible account of some current developments in neuroimaging, explaining what brain imaging research can teach us about how humans learn to read. Dehaene described how neural networks that originally served other purposes, adapt to specialise in the demands of reading and writing – skills that are very new in human evolutionary history. He showed that our apparently effortless recognition of words is achieved through the activation of neural connections between the visual cortex and other parts of the brain that process sound and meaning. His explanation made perfect sense against the backdrop of what educational research has taught us about efficient teaching methods of teaching children how to read. The practical implications that Dehaene drew in his 2009 book, relating to systematic exposure to the phonemic basis of the alphabetic code, were very compelling indeed.

In his 2020 book, entitled *How we learn: The new science of education and the brain*, Dehaene displays a keen interest in both artificial intelligence and cognitive psychology, along with an inspiring reverence for the human ability to learn. The book is just as powerful as *Reading in the Brain* in terms of translating quite specialised research into accessible food for thought for readers, and its practical implications are equally compelling. Dehaene makes the point in the introduction that one of the great human experiments in learning was the invention of formal schooling, which allows us to systematise and extend learning. The book is essentially a well-argued review of the evidence that is available to educators about how to maximise learning potential.

Parts 1 and 2 provide a fascinating but rather complex background. Part 1 begins by defining learning in some detail, arguing that it is a process in which the brain forms an internal model of the outside world, generates predictions, and changes itself on the basis of feedback about the accuracy of the predictions. Part 2 provides a wide-ranging account of how our brains learn, including the issue of plasticity and the nature and nurture question. This section presents intriguing data on babies' abilities to process environmental input and change their behaviour accordingly – I was surprised not only at how much babies can do, but at how much can be learned about babies if you know what to look for. Dehaene makes frequent references to artificial intelligence to help clarify the concept of learning, as he considers what programmers need to do to make computers learn.

Part 3 is the most accessible section of the book. It is organised around what Dehaene calls the four 'pillars' of learning: focused attention, active engagement, error feedback, and rehearsal and consolidation. A good deal of the material covered in this section may be familiar to readers who have thought about cognitive psychology, including concepts such as attention control, executive function, cognitive load theory and retrieval practice. The material is very elegantly organised and summarised, and the empirical support underlying the principles of learning is presented with clarity and simplicity. Interestingly, every point made about cognitive psychology research is accompanied by practical recommendations. For example, one fascinating area of research that was not familiar to me in this section involved the way in which sleep can allow the rehearsal of learned material – and one of the practical recommendations following from that point involved the suggestion that high schools could consider changing their hours to fit in with typical adolescent sleep cycles. The chapter that highlights the importance of immediate and supportive error feedback is perhaps at the heart of this section, with Dehaene arguing that errors, and the feedback that errors can generate, are an essential part of learning. His argument in this section steers a deft middle course between the two unhelpful extremes of passive acceptance of teacher input on one hand, and unguided discovery learning on the other hand – and along the way he provides a very cogent argument that end of year school grades are a very inefficient way to give feedback.

How we learn… is a challenging and very interesting book, and I think that it would be useful to set at least Part 3 as a core component of pre-service teacher education. It is certainly worthwhile for teachers to take the time to read and digest it, and parents will find it intriguing. Some readers may end up feeling that the book has served largely to justify, reinforce and perhaps extend the strategies that competent teachers already use, but I think that it offers much more than that. In the introduction, Dehaene writes: "When you close this book, I hope you will know more about your own learning processes." He has succeeded in this – this is a book that can make us all think.

From the Archives

A student perspective – Living and learning with Dyscalculia

This interview was originally printed in the LDA Bulletin, Issue 2, Volume 52, September 2022.

Maggie, at 15 years of age and in Year 10, is a teenager with a spontaneous sense of humour and a deeply felt sense of justice. She also has dyscalculia, which makes learning maths a significant barrier. Maggie is learning to manage this difficulty on a daily basis in school, where she has to implement strategies to manage this, cognitively, socially and emotionally. Maggie generously gave permission for these interview comments to be published.

"I first learned that I had a difficulty with maths when I was in Year 3. Before this, I didn't really notice that I struggled, but once I was diagnosed, I guess it made more sense to me. Any type of maths can really stress me out. Numbers don't work in my brain properly like they do for other students, so I work at a lower level in maths than my peers. When I don't understand something, I can feel quite embarrassed and anxious. Sometimes I just feel quite stupid. I can't do the same work as everyone else, so I prefer to do my work away from the others. When I am working on maths in class, and doing different work to everyone else, it just makes me feel even more different, even more embarrassed, and even more anxious. So, I am allowed to work outside the classroom. This makes me feel calmer, so I don't hate maths as much. When I was a kid, I got a psychologist to help me work out how I think and feel about learning. People said that having dyscalculia also has its pros, but I can't remember what they are. Anyway, talking through this helped me to focus on my strengths and work out ways to manage maths. I also got a tutor, who has helped me a lot.

What works for me? Connections

When I was in Y7, I had this really amazing teacher. She would help me stay on task, and individualise my work for me and she never made me feel like I was stupid or behind. She made me feel like I could actually do maths at the same level as everyone, and I would kind of get excited when I was doing things because I would actually understand it for once. At the time, I don't think I knew specifically what she did, but I now realise that she just had a good connection with me. I thrive in classes when I have a good connection with the teacher.

When disconnections affect communication

Sometimes teachers ask me what I want, and they say to me, 'What do you want to do?' or 'What would make maths more enjoyable for you?' To be honest, this doesn't really help me, because whenever you ask me this, the answer is always going to be the same … "Nothing." I know I still have to do maths, so I guess the main thing for me is being able to actually do the work. Give me work to do that I can actually do, then just let me do it. I've learned that I am not comfortable with constant check-ins because I don't like the attention.

Awareness

I think there needs to be more support for kids, specifically for kids with dyscalculia. We need more awareness of what dyscalculia is. When people think about difficulties, they just think of dyslexia. No one really knows what dyscalculia is. People know what to do to help kids with dyslexia, but people do not know what to do for Dyscalculia. If teachers had known what Dyscalculia is, maybe I would have got the help I needed earlier."

Jacinta Conway is a specialist teacher who works with students with additional needs She has a particular interest in Specific Learning Difficulties (Dyslexia, Dysgraphia and Dyscalculia). She has taught in schools for more than 20 years until recently, and is now the Director of Impact Tuition, where she tutors students and coaches teachers to implement evidence-based learning strategies.

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