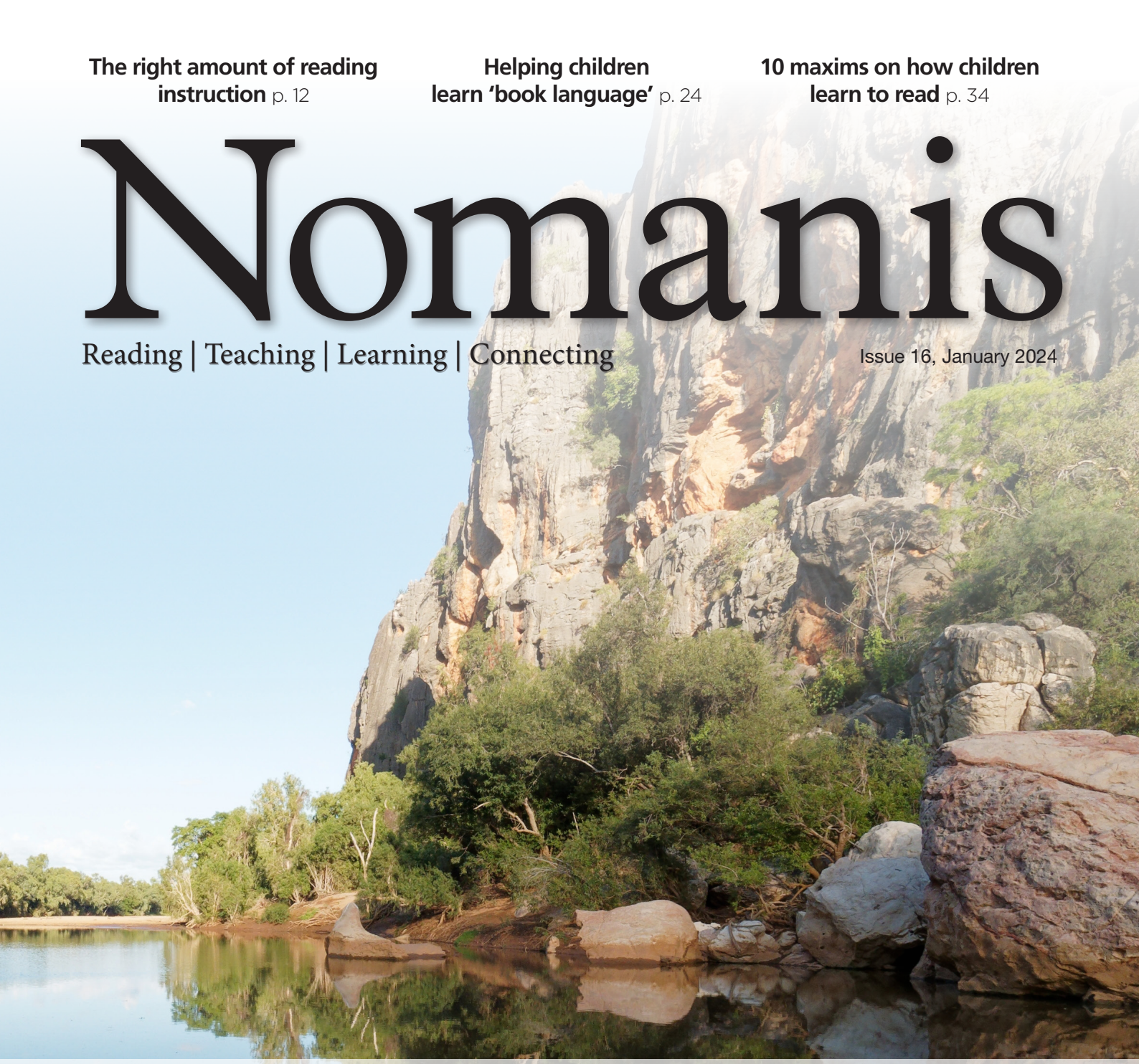
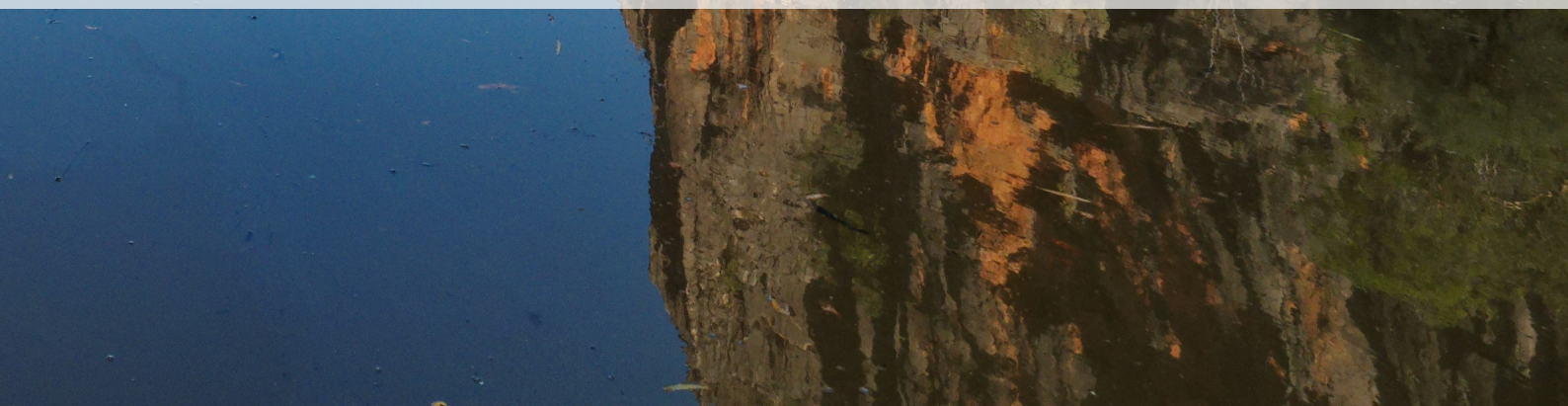
Nomanis

Reading | Teaching | Learning | Connecting

Issue 16, January 2024



EXPLICIT TEACHING AS A PATH TO INCLUSION



New from MRU Press

MRU PRESS

These new books from MultiLit's academic imprint, MRU Press, are highly recommended for educators wanting to engage with the latest research and inform their practice.

Effective Instruction in Reading and Spelling

Edited by Kevin Wheldall, Robyn Wheldall and Jennifer Buckingham

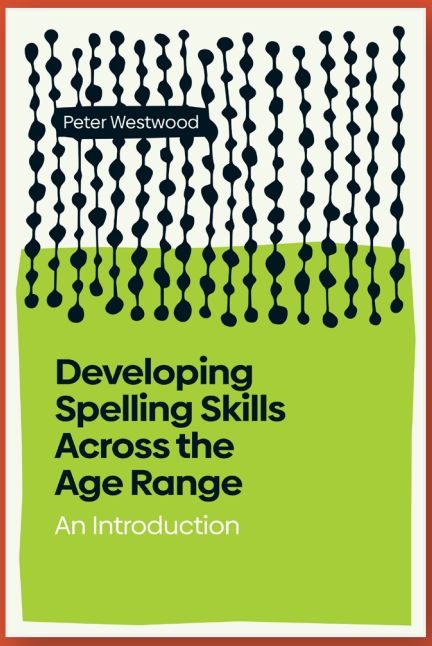
This textbook is an accessible, up-to-date guide to evidence-informed practices in teaching reading and spelling, grounded firmly in the Science of Reading and its application in classrooms.
It is ideal for use in initial teacher education (ITE) degrees and other higher education courses for primary school teachers. It is also a practical yet scholarly reference book for any teacher of reading.

The book covers theories of reading, the scientific evidence base on how children learn to read, the Five Big Ideas of reading, reading-related skills, intervention and assessment, with chapters written by respected Australian and international experts.

Developing Spelling Skills Across the Age Range: An introduction

By Peter Westwood

For too long, the explicit teaching of spelling was neglected. In this clear and concise text, author and educator Peter Westwood steps through the skills required to be an accurate speller, and how teachers can impart these skills to students of all ages – from those in the preschool years right through to adults, with an emphasis on explicit teaching strategies. The book also includes useful print and online resources, making it a practical addition to the bookshelf of any teacher looking to improve their students' spelling.



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RtI or MTSS?

Robyn Wheldall

Kevin Wheldall

There has been a lot of talk on socials lately about the usage of the terms RtI (Response to Intervention) and MTSS (Multi-Tiered Systems of Support). At MultiLit, we have been pioneers in Australia in the use and application of the former term for about 20 years. We have reservations about the unnecessary use of a new term (MTSS) for something that is already well-established and we believe that there is a danger of messages becoming mixed which can lead to confusion. Some experts in our field (both in Australia and overseas) say that they use the terms interchangeably, others stick with RtI, while others argue that MTSS is the next generation, much-improved model that we should adopt.

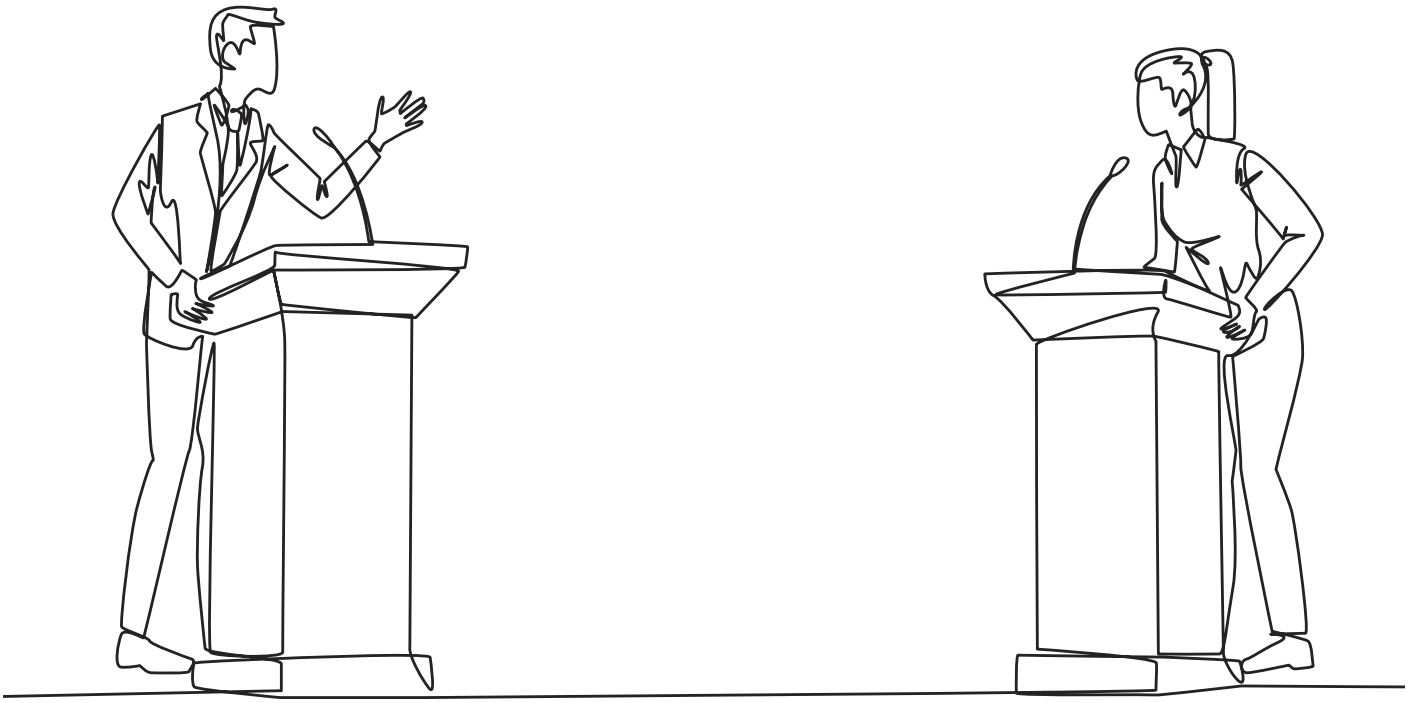
But what if *we* are wrong? Aren't all tiered systems of support trying to achieve the same thing? What if we are simply out of date, as some may have it? Let's look at the arguments.

First, it is sometimes said that RtI is limited and restricted in comparison to the broader, more all-encompassing term MTSS. There is often commentary about the fact that RtI deals with academic matters but not behaviour; hence the need to elaborate a more expansive model. But from the outset, RtI included student behaviour and student academic performance – and so it should because the two are inextricably linked. For students to learn, they must have a set of learning behaviours – attending to the instruction being the most basic. The argument that RtI does not include classroom behaviour is quite simply incorrect.

Secondly, we hear that RtI is only concerned with instruction at Tiers 2 and 3, that is, the intervention or intensified instruction that is occurring in addition to whole-class, universal instruction. Again this is incorrect. RtI has always been predicated on effective and exemplary instruction at the Tier 1 level. This is a core part of the conceptualisation; the foundation on which all other learning must build. The argument that MTSS is concerned with Tier 1 instruction, whereas RtI is not, is a false claim.

Thirdly, there is commentary about how RtI is not fit for purpose these days because it emanates from the field of special education and therefore is not relevant (or desirable) to a more contemporary inclusive view of education. There are problems with this idea. We need to interrogate these. RtI arose out of a need to change the way that students in the United States were identified to receive educational support services. The practice of using the discrepancy model – the gap between a child's IQ score and their measured academic performance – to determine access to special education services was inherently inequitable. Only those students who had an IQ assessment, which could often be very expensive to obtain, could be considered for intervention. So poor kids were more likely to miss out on the services that they needed. Moreover, the idea that a gap must be present to indicate a learning disability relegated those kids who did not score so highly on an IQ test to be considered ineligible. This is also discriminatory as kids who are not so cognitively talented should not be overlooked in terms of accessing the services that they need to reach their potential. This is particularly the case when we consider being literate is a basic human right.

The development of the RtI framework meant that all students in schools can have the opportunity to access additional services if they do not respond to the instruction



provided at the universal or Tier 1 level. This is a far more equitable approach than was previously the case. It is also in line with a non-categorical approach to education whereby we are not overly concerned with diagnoses or labels to identify who needs more assistance. This is not to say that we are not cognisant of the differing characteristics of learners but rather that we are committed to providing whatever instruction it is that any individual child may need, irrespective of a diagnosis or label. In this way, we might argue that a non-categorical approach is the foundation of a truly inclusive education system.

In some quarters, there is a clear and manifest disdain for special education. Anything that derives from special education theory and practice is seen as bad and as anti-inclusion. This is a concerning element of some of the debate as there is a wealth of good practice that has had its origins in special education. Some of the very practices that enable a more inclusive and successful educational experience for students derive directly from this field.

It seems rather counter-intuitive, then, to deride and dismiss a model that was a positive response to some of the inequities that existed prior to its conceptualisation. Some advocates for the need for the distinction between RtI and MTSS refer to the faults in the former as being inherent because of its origins in special education and the benefits of the latter because it is a 'general education' approach.

We go down this route at our peril. In eschewing special education and promoting the idea that it is the nemesis of inclusion, we stand to lose a great deal of expertise in our teaching workforce. University courses across Australia are deleting the words 'special education' from their degree programs so as not to offend those who advocate for an inclusive approach. The changes in degree names also reflect the dropping of content that was the hallmark of a qualification that provided specialist knowledge to assist students who, for whatever reason, were not making adequate progress in school. This has become an ideological battle that detracts from meeting the needs of students who require our support and our expertise as professionals.

We shall continue to use the term RtI until we are provided with convincing evidence that supports an alternative model. This editorial reflects the continuing discussion of the MultiLit Research Unit on this issue and we thank our colleagues accordingly.

Robyn Wheldall and
Kevin Wheldall,

In eschewing special education and promoting the idea that it is the nemesis of inclusion, we stand to lose a great deal of expertise in our teaching workforce.

What we've been reading

Nicola Bell

There are some authors who excel at writing about minutiae. It's so easy to get it wrong and to lose a reader in impenetrably boring prose. But in the right hands? Paragraphs describing an arched eyebrow, or a smile that flickers, or the dancing of thoughts passing through a character's mind – small moments that are strung together to form simple scenes where nothing actually happens – can make the reader feel like they are experiencing life through another's eyes. This is how I felt reading *To the Lighthouse* by Virginia Woolf. You don't just understand the motives behind a character's action in her stories – you see their whole world. I got the same feeling when reading another book: *A Gentleman in Moscow* by Amor Towles. This story revolves around Count Alexander Ilyich Rostov, an aristocrat in Stalin's Russia, who is placed under house arrest at his residence in an upmarket Moscow hotel. We readers are introduced to him when he begins his sentence as a 32-year-old man, thereafter following him as he spends his remaining years within the four walls of the Metropol. The plot meanders, but not in a tedious way; it meanders because that's what life does. The minutiae are made meaningful.

Another book I read recently that had more of a tumble-drier style of story structure was *After She Wrote Him* by Sulari Gentill. Gentill seamlessly switches protagonists throughout the book, first writing from the perspective of a crime author, whose half-finished mystery novel features a literary author, and then writing from the perspective of a literary author, whose half-finished introspective work of fiction features a crime author. But who is the 'real' author and who is the character? Reading this one is less like taking a gentle walk in the park and more like bolting towards the edge of a cliff while on fire.

Jennifer Buckingham

My latest Important Book is *The Satanic Verses* by Salman Rushdie. Didn't finish it. When I made the call to close it and put it back on the shelf, I was thinking about other books I haven't finished and what they have in common, and I have decided that it's magical realism. Other books I have failed to finish in this genre are *Ulysses* (James Joyce) and *100 Years of Solitude* (Gabriel Garcia Marquez) although I did finish Rushdie's *Midnight's Children*. Lots of people do like magic realism, but that style is generally not for me. Less celebrated but more enjoyable was a memoir by my friend and former colleague Peter Saunders. His book *Croydon Boy* is about his childhood, adolescence and young adulthood in the South of England. Peter is a rare breed – a conservative sociologist with a sense of fun – and he has cleverly and humorously woven statistics and social commentary about post-war England into his personal story. One of his footnotes led me to track down a book called *Family and Kinship in East London* by Michael Young and Peter Willmott, which was first published in 1957 and was apparently a hugely influential sociological study and became such a successful book it is now a Penguin Classic. While the maternal headship family relationships it describes are set in one place and time, they had been transported across the world to Australia. My parents spent their childhoods in places that were aesthetically very different – one in East London and the other in a tiny NSW country town – but the familial and neighbourhood dynamics were not so far apart. Finally for this round up is *A Little History of the World* written by E. H. Gombrich when he was a bored and out-of-work university graduate in Vienna in the 1930s. It was originally written in German, and he only relatively recently worked with his granddaughter to translate it into English not long before he died. It was written for children, which makes me very impressed with the reading skills of German-speaking children almost 100 years ago; I know several highly educated adults that have enjoyed this book. Gombrich revised it slightly when he translated it, but he never extended it. Events intervened after the original publication, of course, and he went on to spend his

time writing other exemplary books on art and cultural history. *A Little History of the World* is written in a narrative style and traces a line through people and events from pre-history to the time of publication that somehow seems fresh and gives a sense of how we got to where we are.

Mark Carter

Many years ago, I read a biography of Joseph Stalin. It was a voluminous tome but a fascinating and detailed insight into a ruthless dictator. Recently, I came across *The Shortest History of the Soviet Union* by Sheila Fitzpatrick and thought it might be an interesting big picture follow-up. The book is certainly short, and leaves the reader wanting to delve further into detail, but, surprisingly, was not unsatisfying. The book provides a birds-eye view of Soviet history and fulfilled my need for nostalgia given, rather depressingly, I lived through a large portion of the history discussed. The book documents many key events, both triumphs and disasters, including the chaotic birth of the Soviet Union, periodic purges, stunning success of the 1930s industrialisation, profound failure of the early pseudoscientific agricultural policy, tragedy and ultimate victory in WWII and of course, the Cold War. The book did remind me how utterly incomprehensible the rapid collapse of the USSR was in 1991. Up to that point, I am sure that many, including myself, assumed that unless they managed to mutually annihilate each other, superpowers would endure forever. Perhaps a timely lesson in there somewhere?

A second read was Sean Carroll's *Something Deeply Hidden*. Most popular books on quantum mechanics focus on how utterly weird the world of the very small is in comparison to our familiar macroscopic world. Quantum mechanics is often treated as a black box that can be used to make accurate and useful predictions, but there is no point trying to explain quantum reality, at least in classic macroscopic terms. Carroll takes a different approach and argues that quantum theory is not just a useful set of tools to make predictions about reality, it actually is reality, and importantly, is not really that weird. To be clear, this is speculation, but interesting speculation, nonetheless. Carroll argues that there is no real division between the quantum and our macroscopic world. The classical world we know is just a momentary slice of quantum reality. How does that happen? Well, it does get a bit weird at this point. Whenever two particles interact, the universe splits into two different realities – existing next to each other – but these realities are never able to interact; the so called Many Worlds hypothesis. This does sound utterly absurd but, at least to a lay reader with exactly zero expertise or knowledge in the area, Carroll makes a convincing case that the Many Worlds hypothesis arises directly from our current understanding of quantum mechanics and represents the most elegant and parsimonious interpretation. The fact that the theory is not widely accepted by physicists, who actually know something about the topic, should probably be considered an indication that my assessment should not be accepted uncritically. Actually, on second thought, I'm probably right. *Something Deeply Hidden* was a rather refreshing popular book on the subject, given it was not focusing on the fundamental weirdness of the quantum world, even if it did turn out to be, well, weird in a different way.

Anna Desjardins

Possibly the best book I've read in the last six months is *Limberlost* by Robbie Arnott, an up-and-coming Australian author. This unassuming little beauty came as a total surprise to me. I'd seen the book featured in a Harry Hartog email pushing 'new reads', but I thought it didn't sound terribly exciting. Then its name popped up again in a book club email I received, but I couldn't attend. Finally, I saw it sitting on the Quick Reads shelf at the library, so I took a punt and borrowed it. Now I've got another of Arnott's books on request! The story takes us inside the head of a sensitive teenage boy at the tail end of WWII, on an apple orchard in Tasmania, waiting

the interminable months for his two older brothers to return from war. The events of the protagonist's life that summer are interwoven with where his life moves in the ensuing years. This is a book to savour, a hymn to family ties, to the land and our connection to it, and to the language we use to render that on paper. It was quite simply a beautiful read, and I found myself quietly moved by it. It also made me want to go for a long walk through the forest in Tasmania again.

Just last week, I finished the other 'best book' of my last six months, *Lessons in Chemistry* by Bonnie Garmus. This is a searingly acerbic and witty tale of an exceptionally intelligent woman, up against all the prejudices of 1950s America as she attempts to forge a life as a chemist. You can imagine that I was not a little surprised when my 14-year-old son was actually the one to bring this into our home, using a precious birthday book voucher! But lucky for me that he did. Elizabeth Zott, the lab-coated and safety-goggled heroine, brooks absolutely no nonsense and although she tends to make a lot of enemies, she also ends up with a charmingly odd assortment of friends, including an insightful and deeply loyal dog, Six-Thirty. Their wonderful repartee (yes, including the dog's) as they all work to just 'make it through life' will have you laughing out loud through your indignant anger. I wanted to look for more by this author too, but amazingly, this is her first novel. It has justifiably become a bestseller.

Maddy Goto

Having always been a committed reader of books with real pages made of paper, I consider myself a bit of a latecomer to the world of eReaders and even more of a latecomer to audiobooks. In fact, I am currently experiencing my first ever audiobook (*The Bookbinder of Jericho* by Pip Williams), and am still very much an audiobook beginner. I'm told, with practice, I'll get better at them.

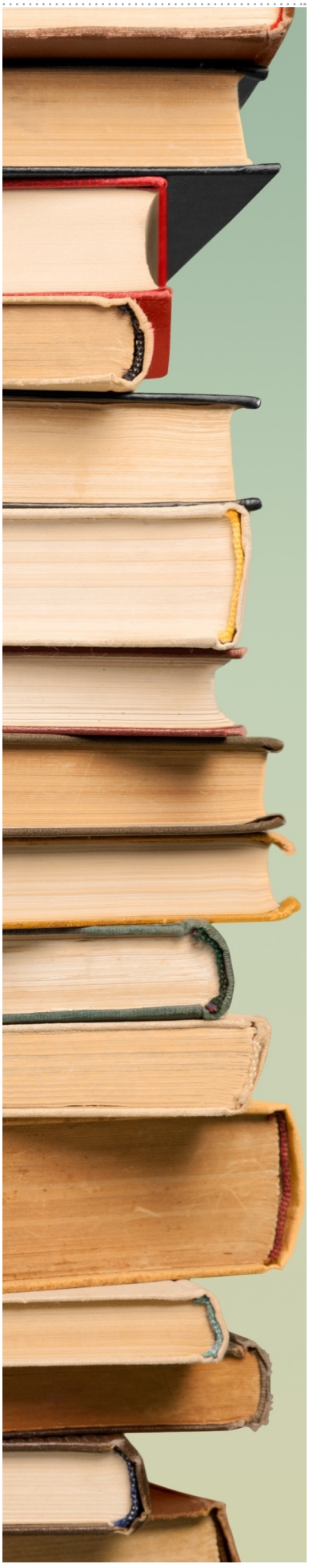
I was gifted a Kindle about six months ago and became an instant convert, devouring *Lessons in Chemistry* by Bonnie Garmus and *Eleanor Oliphant is Completely Fine* by Gail Honeyman in record time (for me)! It was the interesting, solitary, and somewhat leftfield women at the centre of these books that drew me in, and by the end I felt I knew these characters really well.

Next, I turned to some non-fiction and made a valiant attempt at *The Cutter Incident: How America's First Polio Vaccine Led to a Growing Vaccine Crisis* by Paul Offitt. Despite it being relatively short, I only managed half of this book. The beginning was fascinating, describing in detail the extreme failings of the first mass vaccinations in the US which resulted in hundreds of children being given live polio vaccines. It was easy to follow the narrative and learn some simple science along the way. I got bogged down, however, when the narrative began to lose its way, themes began to be repeated and individuals were reintroduced at random times. I decided to close this one before the end.

The book that has had the profoundest impact on me recently was *The Red of my Blood* by Clover Stroud. I'm glad I had a paper copy to hold. It deals with death, life, loss, love, and above all, sisterhood. Stroud writes with a brutal honesty and manages to put into words what can't be put into words. She writes of the year following her sister's untimely death, and while it is her own personal story, she manages to forge such a strong connection with the reader that you feel part of her journey. While the beginning of the book is raw and desperate, by the end not only did I feel like Stroud's friend, but I also felt uplifted and in awe of life.

Alison Madelaine

As usual, I have read some more Australian crime. Firstly, Margaret Hickey's third instalment in the Mark Ariti series, *Broken Bay*, is set in a coastal location and involves cave diving in sink holes. If you can get over your claustrophobia, it is a great read. Secondly, I read *Wake* by Shelley Burr. *Wake* is her first novel, and also the first in a series about Private Investigator Lane Holland, and this was definitely one of my favourite reads of 2023. I have the second book in the series (*Ripper*) ready to go and I see Shelley Burr has a third book due to be released in September 2024.



This time, I read a few quite short novels. As much as I love to get stuck into a really long book, there is something appealing about reading shorter ones. *Small Things Like These* by Clare Keegan had been recommended to me by multiple friends and colleagues and it didn't disappoint. The story takes place in 1980s Ireland in the lead up to Christmas. The central character, Bill Furlong, is married with five daughters. Bill was born to an unwed mother and this very short story highlights the treatment of young unwed mothers by the Catholic Church. The other short novel I read could not be more different. *My Sister, the Serial Killer* by Oyinkan Braithwaite is not the usual sort of serial killer book. Set in Nigeria, it is about the relationship between two sisters, the older of which feels very protective of her younger sister and goes so far as to help her dispose of bodies and clean up crime scenes after she murders men she has been seeing.

Finally, I have to mention two excellent novels, this time in the historical fiction genre. *The Bookbinder of Jericho* is the second novel from Pip Williams and came right after the very successful *Dictionary of Lost Words*. It certainly didn't suffer for being a second novel and I actually enjoyed it more than '*Dictionary*'. *The Lost Apothecary* by Sarah Penner is a dual timeline novel set in London in 1791 and the present day. In the former time period, a hidden apothecary shop caters for women who want to 'dispose of' men who have wronged them in some way. In the present day, an aspiring historian goes mudlarking in the Thames and discovers a link to the unsolved apothecary murders from centuries ago.

Siobhan Merlo

Last year, we hopped in the ute with our roof-top tent and did a lap of Australia. It is certainly a land of many contrasts with no wi-fi for at least half of the journey, and many remote and seemingly inhospitable landscapes. The question which kept arising in my mind was: How did/do people survive here? I was incredibly impressed with the capacity of our First Nations people to survive in these places and manage the land in sustainable ways. Mid-northern Western Australia was particularly inhospitable: red rock, heat, no water in sight, sand and salt bush if you were lucky. It is no wonder the Dutch who arrived in the early 1600s were suitably unimpressed by the 'Great South Land', placed a plaque on a small island off the coastline at Shark Bay and moved right along – which brings me to the book I have been reading. *Batavia* by Peter Fitzimmons chronicles an extremely macabre chapter in Australian history. In 1628, a spice-trading ship travelling from Amsterdam to what is now Jakarta, carrying 340 people and 12 treasure chests, was steered off course in an attempted mutiny and was wrecked on a coral reef off the coast of Western Australia. Survivors of the shipwreck made their way to the small islands nearby, but it was soon very clear that water, food and shelter would prove to be serious challenges. In a bid to obtain help, the captain and approximately 40 others rowed a longboat all the way to Jakarta (then Batavia). In the meantime, the ship's apothecary, a psychopath by the name of Jeronimus Cornelisz, took control of the remaining survivors. He and fellow mutineers decided that there was not enough food or water to go around, and therefore, the only solution would be to systematically 'dispatch' the remaining survivors by whatever means necessary. I found myself turning 'clumps' of pages at a time because of the brutality, and I am not sure I would necessarily recommend this book. I nonetheless find a book about shipwrecks and treasure hard to resist, and particularly intriguing given the *Batavia* ship, treasure, cannons, a 6.2 ft skeleton with a skull lesion, and a pestle and mortar inscribed with *Love Conquers All* which is believed to have belonged to Jeronimus, have been salvaged, many of which can be seen at the Freemantle Shipwreck Museum.

Ying Sng

If you are not put off by the size of *The Covenant of Water* by Abraham Verghese, you will be rewarded with two stories about love, loss and family set during Crown rule in India. The book begins with the marriage of a 12-year-old girl to a 40-year-old man she has never met – stay with me, it is 1900, so it wasn't unusual. Ammachi has married into a family with a mysterious condition that has plagued them for generations. The parallel story details the life of an impoverished Scottish boy who

becomes a doctor and joins the Indian Medical Service. The writing takes you through three generations across the better part of a century, and I was transfixed for all of it.

There has been a bit of fuss about *Yellowface* by Rebecca Kuang, and I understand why. It feels weird to say I enjoyed it because a feeling of unease permeates the entire book. The characters are unlikeable and they make many questionable decisions. The portrayal of the publishing industry is eye-opening but the most thought-provoking for me were the questions around diversity, cultural appropriation and the militant use of social media. In a case of life imitating art, the real-life praise and criticism of this book (and the author) is revealing and a little bit meta!

Independent bookshops are irresistible. Maybe it's the smell of freshly printed books, but I think it is mostly the bookseller's recommendation. I would never have picked up *The Collected Regrets of Clover* by Mikki Brammer otherwise. Clover is in her mid-thirties, introverted and awkward AND she's a death doula. Yup, I didn't know that was a job either! Despite the grim subject matter, there is nothing morbid about this book. It is an easy read and a tender reminder to celebrate life and take risks. Another bookseller recommended *Tomorrow and Tomorrow and Tomorrow* by Gabrielle Zevin, and I thought he was joking. Seriously? It's a young adult book about gaming for heaven's sake, but these booksellers know their stuff. I really enjoyed it – even the bits about developing and playing games!

If you haven't read *Tom Lake* by Ann Patchett, don't wait – buy it, read it. Better yet, listen to Meryl Streep narrate it on Audible. Lara's three adult daughters return to the family orchard because of the pandemic. As they work, they ask her to tell them the story of her relationship with Peter Duke, a famous movie star. There is a heartbreaking moment near the end, but overall it is a sublime coming-of-age story about finding contentment with the decisions we make.

Prize-winning books don't always hit the mark, but here are two that I really enjoyed. The first was *Trust* by Hernan Diaz (Pulitzer Prize joint winner). A collection of four stories, it begins with a novel about a wealthy financier and his wife during the Great Depression, followed by a ghost-written autobiography of Andrew Bevel who appears to be the inspiration for the first story. The next two stories are told from the perspective of the ghost writer and Andrew Bevel's wife, each revealing a little bit more to the reader until you realise how malleable the truth can be. I thought it was very clever. The other prize winner was *Chai Time at Cinnamon Gardens* by Shankari Chandran (Miles Franklin Award winner). Who would have thought that a book set in a Sydney nursing home could be so engaging! Don't be fooled by the light-hearted title. It is not about a tea party in a park. Some of the descriptions of what the characters went through in Sri Lanka are so brutal that if it were a movie, I would have covered my eyes. I suppose that is the beauty of reading; you can't avert your gaze from the images that words conjure up.

Kevin Wheldall

I recently rewatched (and appreciated afresh) *Apocalypse Now* (original cut), loosely based on Joseph Conrad's *Heart of Darkness*. So, I decided to have another crack at reading this apparently seminal novella. Having discarded it at least once before, only part way through, I tried an audiobook version this time. Reader, I fell asleep. Two of my family members told me that they had thoroughly enjoyed it. I found it unbearably turgid. According to CliffsNotes, "Conrad intentionally made *Heart of Darkness* hard to read. He wanted the language of his novella to make the reader feel like they were fighting through the jungle, just like Marlow fought through the jungle in search of Kurtz." He succeeded. All I can say is "the horror, the horror". But I did love *Lucie by the Sea* by Elizabeth Strout, as always. What a wonderful, humane, far-from-turgid writer she is.

I am new to the work of Mick Herron and was drawn to read his latest *The Secret Hours* after watching the excellent TV dramatisations of his earlier works. (*Slow Horses* was so seedy you could almost smell it!) His latest shows him to be a worthy challenger in the replacement stakes for John le Carré. Speaking of whom, le Carré devotees should not miss the award-winning doco *The Pigeon Tunnel* (on Apple TV) which is a remarkable piece of work. The pigeon tunnel analogy itself is the stuff of nightmares …

I have also read *A Winter Grave* and *Extraordinary People* by Peter May but was not as impressed as I was by his *Lewis* series (reviewed in an earlier issue). They both lacked the authenticity of his wonderfully evocative Scottish series of novels. In similar vein, *To Kill a Troubadour* by Martin Walker was, shall we say, average, but this series is wearing a bit thin now (apart from the descriptions of food)! Not so for *Standing in the Shadows* by the late Peter Robinson which was true to form. It is sad to think that this might be the last outing of Detective Superintendent Alan Banks unless the publishers have an, as yet, unpublished manuscript tucked away in the bottom drawer.

Robyn Wheldall

In my last entry for 'What We've Been Reading' I committed to reading more fiction (I hear you Dr Madelaine) and I did attempt it. I landed on a novel written by one of my favourite non-fiction writers, Alain de Botton (*Consolations of Philosophy* being well thumbed), that had been sitting on one of our bookcases with the pages yellowing. *Kiss and Tell: A Novel* was published in 1995 so is approaching a 30-year anniversary in the not-so-distant future. The goal of de Botton's novel was to demonstrate Dr Samuel Johnson's observation that everyone's life is "a subject worthy of the biographer's art". De Botton did this by deciding to write a biography (in the style of a novel) of the next person who walked into his life. If you think that sounds odd (that a biography can be a novel) you are not alone. Frankly, I don't think de Botton pulled it off on this occasion. The fact that I cannot recall a single detail of the life of the person who was the subject of the novel is testament to that. Having said this, I did enjoy it but was sometimes left wondering what type of book I was reading. It really didn't know what it was. I am pleased that de Botton did not devote his life to writing novels. Enough said.

During Covid-19 (and remembering that this is not actually over), Julia Baird published her now international best-selling book, *Phosphorescence: On Awe, Wonder and Things that Sustain You When the World Goes Dark*. I have written about *Phosphorescence* previously and it seemed that this book landed just at the right time (notwithstanding the fact that it was written before the pandemic arrived and changed our lives in dramatic ways) with many (thousands and thousands) finding comfort and inspiration from her invocation to engage in the natural world to help live our lives. Baird has done it again, with her new title *Bright Shining: How Grace Changes Everything* arriving as it has at a time when there are deep divisions in the world, both internationally and in Australia. I am thoroughly enjoying this latest offering but wonder if Baird's call for us to show grace and participate in acts of 'moral beauty' may be harder to achieve than allowing the natural world to speak to us, a main theme of her previous blockbuster. Baird has a committed following as evidenced by the crowds that are gathering over our country on a book tour following the recent launch of the book early in November. No doubt *Bright Shining* will be given and received much this Christmas, and if we can embrace the author's final words in the book we will be the better for it: "To walk alongside each other, despite everything. To sing, even. To feel the sun on our faces, and know we are alive."

What's the right amount of reading instruction?

Tim Shanahan

John Carroll (1963/1989) proposed an innovative model of academic learning. According to Carroll, learning was a function of five variables: student aptitude, opportunity to learn, perseverance, quality of teaching and ability to understand. It wasn't the list of variables that was so provocative, but how Carroll defined each.

He operationalised all those in terms of instructional time. For instance, aptitude – then usually a score on an IQ test – was, for Carroll, a matter of the how much time was needed to learn something. A young Einstein may be able to master a K–12 physics curriculum in 42 minutes, while it might take Tim Shanahan 42 years!

Opportunity referred to the amount of instructional time schools provided. If teachers devoted 100 hours to physics instruction, Einstein would have it made given his aptitude, while I might be better advised to become a reading teacher.

Even if schools allotted 42 years to physics, I still might not make it. What are the chances I'd sit still for all those laws of motion, electrons and quarks? Perseverance, the time students are willing to be taught, figures in learning as well.

Even quality is a matter of time in this scheme. If the quality of teaching is low, then kids will need relatively more teaching to be successful.

No one has come up with ingenious ways to measure those time-based variables. However, the point it made about instructional time was invaluable.

In the 1970–1980s, researchers following Carroll's lead explored time and its relationship to academic achievement, including in reading (e.g., Fisher et al., 1981).

They learned a lot about instructional time. As a result, educational scientists now have a different conception of instructional time and how it should be considered in research studies.

In my opinion, reading educators don't think enough about time and its importance.

Studies have, again and again, demonstrated the power of amount of instruction in determining student learning (Gay et al., 2021; Sonnenschein et al., 2010; Walberg et al., 1986).

Here are 7 key ideas about instructional time that every reading educator should know.

1 There's a difference between allotted time and academic learning time.

When scholars first looked at the amount of teaching, they were surprised to discover that there was not much connection to learning.

That's when they started distinguishing allotted time from academic learning time (ALT). ALT refers to the amount of time students are engaged in academic tasks likely to lead to learning (Fisher et al., 1981).

Observational studies reported big differences in ALT (Smith et al., 2001). Sometimes as much as 100%!

Ms Jones may provide 90 minutes a day of ALT, while Ms Smith's kids only get 45.

Year after year, the Jones's kids test out higher than the Smith's kids, and Ms Smith concludes, "Yep, the principal always gives me the lowest kids."

Scheduling 90 or 120 minutes of literacy instruction doesn't mean kids get that much actual teaching.

Some teachers struggle with classroom management, or they may be pushed into grouping schemes they can't handle. Big mistake.

Those kinds of things are time robbers. They prevent allotted time from being translated into ALT.

This can play out a couple of different ways. The obvious one has to do with unruliness, misbehaviour, noisiness. Those problems threaten the learning of everyone.

But mismanagement is not always an issue of poor discipline. Some kids lose out to inattention, daydreaming and obeying but not engaging … the kids who sit politely and

quietly but who fail to engage with the lesson. The page turners who don't read.

Allocated time is not the important issue, ALT is!

2 Time is a value, not a variable.

When researchers began looking at instructional time, they treated it as a variable. It was routinely included in lists of factors that influence learning (e.g., ability, motivation, quantity of instruction, quality of instruction, classroom climate, home environment, peer group, mass media exposure).

However, that isn't the way scientists have learned to deal with time.

An example here may help.

We know that iron rusts when the metal molecules bond with the moisture in air. But scientists used to think that it was time that caused rust.

Modern scientists blanch at the thought of that now. For them, time can never be a causative factor, only a measure of such factors. With rust, oxidation (that bonding of molecules) is the cause, and the time the iron is exposed to humidity is a measure of the amount of oxidation exposure.

In education, time itself shouldn't be the issue. No, it's the kind of teaching, the kind of educational environment or the kind of curriculum that are influencing learning. Time is a valuable way to estimate how much exposure kids are getting to those kinds of teaching and curricula.

Unfortunately, we tend to say things like, "phonics works" or "research supports comprehension strategies."

What we should be saying is, "kids benefited from 30 minutes of daily phonics instruction for a school year" or "we had measurable comprehension improvement from 8 weeks of strategy teaching."

Time should be seen as dosage. Too often we're satisfied that teachers are teaching writing or teaching phonics. But we should be asking, "Are they teaching enough of those things?"

3 Think components, not overall time.

Principals often proudly tell me that their teachers are required to teach reading/ language arts for two hours per day. That's not nothing, but it's not enough.

I think the lack of specific attention to time is why many teachers neglect certain aspects of reading, while overdoing others.

I've visited kindergarten classes with no phonemic awareness instruction, and third grade classes without writing (since their goal is higher reading scores). I have vivid memories of a second-grade class with an overwhelming 90 minutes per day of phonics and spelling. I'm often asked if having the kids read a paragraph for fluency practice is enough (no, I don't think so).

None of that makes any sense.

In Chicago, we overcame that problem by portioning the literacy instruction time among word learning, text reading fluency, reading comprehension and writing. That meant kids got a lot of attention to all the key components of reading development.

Making sure that enough time is accorded to each of those curricular components that research has identified as making a difference in reading achievement is not micromanaging.

What we found was that when teachers knew they were required to spend considerable time on fluency instruction or vocabulary, they got very interested in how best to teach those things. It's easy enough to hide your weaknesses in a 90–120-minute block if no one is paying attention to how those minutes are being divided up. But when you find out you have 30 minutes of fluency instruction to provide, how to accomplish that becomes a much more important question to a teacher.

4 Aim at learning goals not instructional activities.

Some time-based instructional schemes prescribe specific daily activities: student reading time, small group instruction time, writing, teacher read alouds, ABC Reading Program, etc.

Those schemes help teachers to fill their days.

But filling up a day's schedule and curating a powerful set of learning experiences are not the same thing.

Organise your instructional time around what you are trying to accomplish, rather than on certain activities. If you have set aside time to teach kids to bring their prior

knowledge to bear on the text that they are reading, then your minutes of reading comprehension this week should be focused on that. The texts and activities that you choose should be aimed at accomplishing that goal.

Focus on increasing kids' vocabulary knowledge, not on teacher read alouds. You may decide to structure a teacher read aloud in a way that will help address that vocabulary knowledge goal, but there are other effective approaches to that too. When it comes to time, keep eyes on the learning prize, not the activity that might be used to address it.

5 Rate and time are not the same thing.

Time has to do with the number of minutes or hours that we devote to a subject. Rate is more bound up in what happens within that time allotment.

For instance, research suggests that the number of interactions that take place between students and teachers (like how many questions they get to answer) makes a difference in learning (Allen et al., 2013; Folmer-Annevelink et al., 2010). Often the amount of interaction is limited. The teacher asks a few questions and calls on a couple of kids to answer them. No one must think about the information because they aren't likely to be called upon.

That suggests a useful way of evaluating classroom instruction. How many opportunities do kids have to respond in an hour? The traditional teacher might end up with a very low rate of response – asking few questions, calling on few students. In another classroom, the teacher might provide slates and all students are expected to respond, at least in writing, to every question.

In decoding lessons, I'm often concerned about how many words kids get to segment, or sound out or spell. Some teachers move those lessons along better, getting everyone to do those kinds of things multiple times in a lesson.

And what about the amount of writing that occurs in a writing lesson or the amount of reading in a comprehension lesson? (How many words are written or read in the time provided?)

We want substantial amounts of time devoted to key aspects of literacy learning. But these time allotments should be replete with reasonably high rates of action and response.

6 Not all learning time is equivalent.

Too often teachers assume that all activities common to language arts lessons are equally valuable. That's not the case. Some activities have higher payoffs – in terms of learning – than do others.

Some examples: studies of free or independent reading in which kids pick the texts and read on their own with little teacher involvement provide learning opportunities. However, studies show that the payoffs from using time in that way is markedly lower than when engaged in instructional activities with more teacher input (e.g., text selection, purpose, monitoring, feedback, direct instruction) (Shanahan, 2022).

Or, think about a phonics lesson. There is likely to be more learning payoff from a highly interactive lesson that provides opportunities to hear sounds matched to letters and words, and to sound out words with teacher guidance, than would accrue from having students completing worksheets quietly at their desks. Kids need to learn to connect phonology (sounds) with orthography (spellings) and that is best done with audible lessons.

I understand that at times teachers need time fillers, but instructional planning should always be a quest for what kind of lesson is most likely to foster the learning that we're aiming for.

7 Time and Tier 2 success.

Some kids have trouble learning. They just don't make the same progress as the other kids.

That's why we have the so-called Tier 2 programs – additional opportunities for kids to catch up and keep up.

Tier 2 programs should focus on important reading skills that kids might lag in (that means having instruction available for supporting both the decoding and language gaps that might occur).

Tier 2 programs should provide enhanced learning opportunities – focused, purposeful, specific, well-presented lessons with minimal distractions and minimal need for adjustments for student heterogeneity.

Tier 2 programs – and here is the time issue – should provide *additional* instruction, not replacement instruction. Pulling kids out of reading lessons to get other reading lessons down the hall is unlikely to increase learning. Tier 2 gives kids a chance for a double dose of instruction, but that means that schools need to schedule Tier 2 teaching thoughtfully so that it adds to the teaching the children receive.

If you want to raise reading achievement, take a careful look at the amount of time allotted for reading, how that time is divided among key learning goals, how engaged children are in that time, and the amount of actual reading, writing and interaction that is taking place. I think you might be sadly surprised at what you see. We can do better.

This article originally appeared on the author's blog, Shanahan on Literacy.

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Explicit teaching is inclusive

Greg Ashman

If you do a Google image search for Response to Intervention (RtI) or Multi-tiered System of Supports (MTSS) you will return variations on the below diagram.

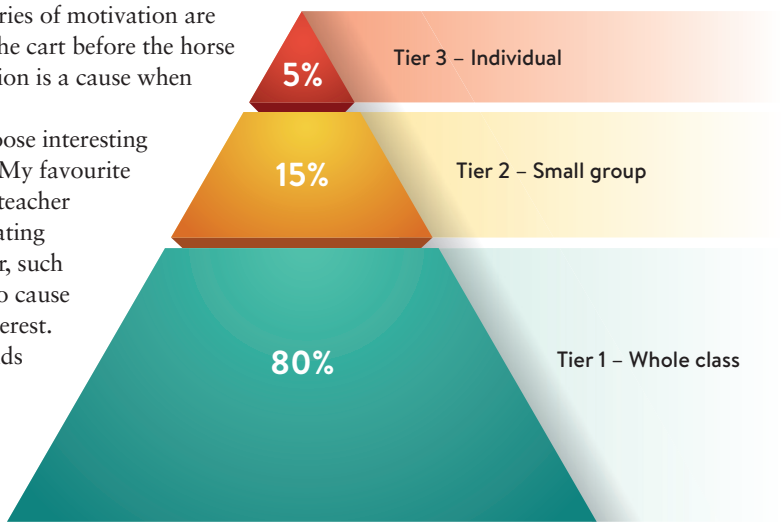
It is a model for teaching and student support in which all students receive the most effective possible Tier 1 instruction, and then a series of screens is used to determine if they need further interventions. A good example would be to teach early reading using structured literacy and administering a phonics check as a screen. However, RtI/MTSS is not limited to reading instruction and can be used for any area where students may face difficulties, including with classroom behaviour. Notice that I have used RtI and MTSS interchangeably – this is my understanding of the terms.

As I have written previously, I was fascinated to see Dr Kate de Bruin present this model at researchED in Perth. However, I remain sceptical of de Bruin's attempts to draw a distinction between RtI (bad and old-fashioned) and MTSS (good and effective) when both can be summarised with the same diagram.

Once we cut through the discussion about terms, an interesting question arises: If structured literacy is the best Tier 1 approach for teaching reading, then what is the best Tier 1 approach for managing classroom behaviour?

One answer is … structured literacy. Clearly, being able to read is a prerequisite for much of school life and an inability to read is likely to cause students to become frustrated and disengaged. This may explain why there appears to be a connection between poor behaviour and poor literacy skills.

Another consideration is motivation. If students lack motivation, they are less likely to pay attention and complete tasks and more likely to mess around. However, most theories of motivation are wrong. They place the cart before the horse and assume motivation is a cause when often it's an effect.



Sure, we can choose interesting tasks to do in class. My favourite activity as a science teacher has always been creating explosions. However, such activities are likely to cause only 'situational' interest. A student who attends a cool science lecture may enjoy the lecture but may still

not identify as a science student. What we really want to develop is 'personal' interest in a subject. The evidence suggests that such personal interest is linked to a sense of achievement. If so, to develop motivation, we need to use effective teaching methods that give students that sense of achievement.

When discussing Rosenshine's Principles of Instruction, a model of explicit teaching, people sometimes raise an eyebrow at the idea that teachers should obtain a high success rate. Surely, they suggest, the success rate will depend on the tasks we ask students to do. It is not in the teacher's control.

Except the choice of task, how much scaffolding we give, how many examples we demonstrate, how much we break the task down into separate steps and so on is entirely within the teacher's control. And we need to control it such that the student feels they are mastering the content. The idea that there is anything particularly productive about intentionally causing students to struggle is misconceived. Frustration is not motivating for all but the most advanced students with the strongest identification with the subject matter.

Rosenshine's principles include suggestions such as, "Present new material in small steps with student practice after each step." Is it a coincidence that a set of principles associated with effective teaching of content would also have a connection to motivation and, through that, to classroom behaviour?

No. It is not a coincidence, and there are other examples we can point to.

Although not strictly a facet of explicit teaching, many of those who use the approach seat students in rows facing the teacher. It makes it hard to check the responses from all students – one of Rosenshine's principles – if they are facing each other and away from the teacher. Unsurprisingly, such seating arrangements also increase the amount of 'on task' learning behaviour.

Seating arrangements are an example of an antecedent – a factor we control to reduce the likelihood of challenging behaviour occurring. Another example may be a classroom routine such as when entering the room, students collect a booklet from the front and complete a starter activity in that booklet. Setting tasks of the appropriate level of difficulty could also be considered an antecedent and so could giving opportunities to respond. These two approaches are features of explicit teaching, but they are also suggested as classroom management strategies, along with predictability, the use of praise, an appropriate pace and having clear rules and expectations.

Following Rosenshine's principles and building routines will increase the level of predictability in a lesson.

There is no incoherence. Strategies for managing behaviour either reiterate principles of explicit teaching or can be adopted without compromising these principles.

However, what about students who are neurodivergent? They often struggle in classrooms. Do they need something else?

Well, at Tier 1, perhaps not.

For instance, students with attention deficit / hyperactivity disorder (ADHD) benefit from praise, being seated in rows, having clear classroom expectations which are taught to them and the use of classroom routines. Students with autistic spectrum disorder (ASD) also benefit from a similar approach:

> *"The very structure of high school poses several challenges for many students with ASD… Being able to anticipate and understand activities, schedules, and expectations improves students' ability to appropriately participate and respond to classroom demands. Establishing routines and creating written schedules will support executive functioning difficulties that may impede students' ability to plan and organise their schedules …*
>
> *Individuals with ASD require explicit instruction to learn new skills, including academic skills. Generally, the instruction individuals with ASD receive around academic content should include clear explanations of the skill or task sequence, modeling, guided practice, and multiple opportunities to independently practice and apply the learned knowledge." [References removed]*

Need I point out that clear explanations and guided practice are key features of explicit teaching, at least if we use Rosenshine's principles as a map?

Will following an explicit teaching approach that incorporates best practice in classroom management solve all behaviour problems? I am a realist and so I am clear that it will not. By definition, Response to Intervention (MTSS) assumes that some students will need additional supports. Students with ADHD and ASD may, as part of a Tier 2 intervention, benefit from having some limited choice over which tasks they complete. And ultimately, I am under no illusions that all students, whatever their needs, can be incorporated into mainstream classrooms at all times. Otherwise, Response to Intervention would not need three tiers.

Instead, explicit teaching represents a good start – a best bet. It is not at odds with motivating students. It is not exclusionary of those with disabilities and disorders. Despite these charges often being laid against explicit teaching, it is the advocates of alternative methods who need to provide evidence these methods are inclusive.

This article originally appeared on the author's blog, Filling the Pail.

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What is at the heart of the Science of Reading for teachers?

In this excerpt from 'Need to know or nice to know … What is at the heart of the Science of Reading for teachers?' (Buckingham, 2023), Jennifer Buckingham highlights two key factors when making instructional decisions.

Jennifer Buckingham

Why it is important to consider 'need to know' vs 'nice to know'

The literature that comprises the Science of Reading is vast, but some concepts and findings, in particular, are essential for understanding why certain instructional strategies are more effective than others – such as the different cognitive processes of novice and skilled readers and how we remember things. However, effective teachers of reading don't need to be able to name all the parts of the brain for example, even though that's nice to know. Instructional design and lesson planning do not depend on it.

Around 25% of children's waking lives is spent in school, of which less than half is typically allocated to learning to read and to become literate in the broader sense. Children have no time to lose. Every day is important.

Therefore, because time is limited in the classroom, and in children's reading development, we must make decisions about how to maximise teaching time in the most effective ways. Two things should be kept in mind when making decisions about how to use instructional time: simplicity and opportunity cost.

Simplicity

Human beings like patterns and rules, and they like things to make sense. While a purist approach that attempts to reconcile irregularities with complex arrays of rules may be intellectually satisfying, it's not always the most pragmatic approach for novice learners. For novice learners, building on their existing knowledge and keeping new information conceptually simple, even if it is not always absolutely technically accurate, advances their learning. "Take the shortest path," as Lemov (2015) puts it.

English is a hybrid language that has evolved over a long period of time to incorporate multiple source languages, regional variations in pronunciations, shifts in pronunciation over time and occasional attempts to standardise spellings in a living language. It's almost impossible to come up with a set of rules that accommodate and satisfy all possibilities of spelling and pronunciations. According to Mark Seidenberg, "There isn't actually any canonical list of what the rules of English are. There is no agreement about this" (Seidenberg, 2021).

The issues of teaching speech-to-print vs print-to-speech, tricky words, letter names and syllable types are good examples. You can attempt to apply purist rules to all of these, but in practice such rules simply add unnecessary complexity for beginning readers, and research does not support a linguistically purist approach for early reading instruction.

80% of phonically regular words can be read if students know the most common 20 GPCs (and how to blend them to read).

As Seidenberg also pointed out, teaching a large number of complicated rules still requires a lot of rote memorisation, so if the goal is to reduce the number of words that students need to commit to memory, it is just swapping one type of memorisation for another. The most stable knowledge to impart to students is the way that the 26 letters of the alphabet are used to represent the 44 sounds of speech (which have variations due to accent), and a limited set of conventions for spelling based on morphology and etymology (Stone, 2021; Westwood, 2023). However, the imposition of an extensive set of spelling rules that are not widely, let alone universally, accepted does not have evidence to support it.

It can be useful for a teacher to know the intricacies of the English orthography, but they do not have to attempt to impart it to young beginning readers from Day 1. As Peps Mccrae says, "Teaching is in large part, an efficiency play" (Mccrae, 2023). Educators need to strike a balance between the technical accuracy of the curriculum content and the ideal pedagogical strategies for the developmental stage of the learner.

Speech-to-print or print-to-speech?

While it is true to say that speech is the original form of language, and that writing was invented to encode it – and that this is an essential *principle* for students to understand – it is not necessarily true to say that *instruction* in decoding should also work in this direction. There are a few reasons for this. One is that reading involves translating from print to speech, and effective instruction should focus on the task and skill we want children to learn. Another reason is that effective instruction is also systematic and sequential. It is extremely difficult to devise a logical instructional scope and sequence organised around phonemes. Finally, spellings are more stable than pronunciations and therefore it is easier to accommodate variations in accents and the pronunciation of morphemic units when graphemes or print provide the organising content (Desjardins, 2021).

The simplicity principle applies to this question. A long-term program of research by Jonathan Solity and colleagues has analysed the statistical frequencies of grapheme–phoneme correspondences (GPCs) in words in books. The idea was to identify the optimal sequence of instruction in terms of accuracy and efficiency. They found that 80% of phonically regular words can be read if students know the most common 20 GPCs (and how to blend them to read). They also found that around three-quarters of *all* words in children's books could be read if students know 60 GPCs and 58 high frequency irregular words (Solity, 2020). This indicates that instruction should focus initially on regularities before introducing systematic variation, and necessary instances of irregularity can be accommodated by children as they gain confidence and understanding.

Reading irregular words

A purist response is that there are (almost) no irregular words. That's technically true, depending on the definition of irregular. In scientific reading research, the term 'regular' is narrowly defined and refers to words that are decoded using the most common GPCs. In teaching, it's more useful to think about degrees of regularity. Some words can be decoded and encoded using the most frequent or common form of their GPCs. These are usually (but not always) monomorphemic words. Other words will contain a less common form of one or two GPCs but are not necessarily irregular in a broad sense, in that they do follow rules bound by the grapheme's position in the word and its morphology.

In the beginning stages of reading instruction when students are learning the basic code, many high frequency words are irregular (at that stage of learning), such as 'was', 'one', 'she', 'go' and 'find'. These words need to be learned alongside a typical phonics scope and sequence to enable students to read connected text.

In a research review, Danielle Colenbrander and colleagues concluded that there is no evidence that teaching a small set of high frequency words alongside systematic, explicit instruction

in phonics, is harmful for beginning readers (Colenbrander, et al., 2020). For reading irregular words in general, it is efficient to teach very young readers to use mispronunciation correction strategies such as 'set for variability', which can include something known as 'vowel flexing'. An example of this is when a student sees the word 'want'. They may initially read it with a short /a/, pronounced to rhyme with 'rant' but then try an alternative vowel sound to find a word they recognise. Later, word analysis helps children to make sense of, generalise and automatise less regular spellings. They will learn that the letter <a> is often pronounced as /o/ when it follows <w> but they can learn to read the word 'want' before that spelling pattern is learned.

Letter names

In a similar way, there is some debate about whether teaching children letter names in initial reading instruction is confusing and will interfere with their learning of GPCs. There does seem to be some logic to this, but the research evidence leans more towards the teaching of letter names than not, especially for spelling. There are a few reasons. As Rebecca Treiman has said, letter names are stable and consistent ways to refer to graphemes (Treiman, 2021). It is better to say that the grapheme that represents the phoneme /sh/ is spelled <s><h> than to say it is spelled /s/ /h/. That would be even more confusing. Another reason is that most letter names provide a clue to one of its phonemes. For example, the letters <b>, <m> and <s> include their phoneme, while vowel letter names are the long form of their phoneme. Research has also shown that knowledge of letter names helped children to learn letter sounds (Share, 2004) and is a good early predictor of later reading achievement (Treiman & Wolter, 2021). Many children recognise the alphabet when they begin school; there seems little point in disregarding the knowledge children already have when we know that knowledge will subsequently be necessary.

Syllable types

Words have multiple sub-word units. For example, the word 'telephone' can be analysed in terms of letters, graphemes and phonemes, syllables and morphemes. Understanding these sub-word units is important for reading and spelling, but the least stable of these is the syllables. Because the first syllable has a short /e/ sound, we would typically split the syllable after the <l> to denote a closed syllable type. But this doesn't work with all words, such as 'final'.

Open and closed syllable types are commonly taught to children to help them choose the right vowel sound or spelling for multisyllabic words.

But beyond some basic guidance about the functions of syllables (i.e., that all syllables have a vowel sound), how useful is it to spend instructional time on 'rules' based on syllable divisions? A study by Devin Kearns found that syllable types are highly unreliable. Depending on the number of syllables and the vowels they contain, open and closed syllable rules predict the correct vowel pronunciation between 18% and 94% of the time (Kearns, 2021). In other research, Kearns (2015) found that students learn to read multisyllabic multimorphemic words more effectively (assuming they can decode using phonics) by using morphology and vowel flexing, the latter being highly dependent on vocabulary.

In 1945, Edward Dolch published an article called 'How a child sounds out a word'. The title is itself an exercise in simplicity. Dolch didn't talk about cognitive load, but his thinking was entirely consistent with it. He wrote: "Rules require an extra step between seeing print and thinking sound and this extra step should not be inserted if it can be avoided" (Dolch, 1945, p. 279).

It's important to note the caveat *if it can be avoided*. Some rules do lead to greater efficiency and accuracy, but not all of them. When something becomes so complex that highly specific rules make it more complicated, we can apply heuristics or 'rules of thumb' and then allow the brain to do what it does well – find the patterns and remember the exceptions.

Opportunity cost

By choosing to spend instructional time on one aspect of reading, there is inevitably less time to spend on others. This is called opportunity cost: what are you *not* doing that might be more beneficial than what you *are* doing?

There is no doubt that explicit instruction is the most effective method of teaching. However, the English language system and its vocabulary is too vast to be learned by explicit instruction alone. It has been estimated that students need to know a minimum

t-e-l-e-p-h-o-n-e	letters (9)
t-e-l-e-ph-o-ne	graphemes (7)
t-e-l-e-ph-o-ne	phonemes (7)
tel-e-phone	syllables (3)
tele-phone	morphemes (2)

It has been estimated that students need to know a minimum of 8000 word families in order to be able to read high-school-level texts without impaired comprehension.

of 8000 word families in order to be able to read high-school-level texts without impaired comprehension. This is clearly more than can be taught explicitly in school. This research further suggests that the average student learns 1000 new word families (e.g., late, later, latest) between Year 4 and Year 6, a minority of which would have been explicitly taught (Duff & Brydon, 2020). Most will have been acquired through reading.

Research consistently finds that the amount of reading activity has a reciprocal relationship with vocabulary growth and reading comprehension, especially once students have mastered decoding (Ricketts et al., 2020; van der Kleij et al., 2022). Good readers read more, and kids who read more get better at reading. Conversely, struggling readers do less reading and fall further behind. This is known as the 'Matthew effect' – the rich get richer while the poor get poorer.

Stanislas Dehaene (2022) says that three main variables predict success:

1. Teaching of grapheme–phoneme relations
2. Size of the child's spoken vocabulary
3. Read, read, read!

On the last point, Dehaene says, "One shot learning is not enough – children need to consolidate what they have learned to render it automatic, unconscious and reflexive" (Dehaene, 2020, p. 242).

This should not be misconstrued as saying that children learn to read just by exposure to text. Explicit, evidence-based instruction for beginning and developing readers is essential. But, as explained by David Share in his 'self-teaching hypothesis', beyond a certain point in reading development, reading practice of a wide variety of texts has to be a big part of the equation (Share, 1995). Ideally, this would be at home, but it cannot be neglected in the classroom.

Reading practice at school is not as simple as 15 minutes a day of silent reading. It needs to be more structured than that. What students read is important, and their comprehension of the text must be monitored. There is evidence that the long-standing practice of matching students to text levels using informal reading inventories is neither precise or reliable (Burns et al., 2015), and is likely to limit students' reading growth rather than facilitate it (Shanahan, 2020). Once students have a good grasp of decoding and are able to read natural language text, a better approach is to encourage them to read challenging texts that increase their knowledge of vocabulary and syntax, and expand their background knowledge, without exceeding their abilities to the point where understanding and motivation is lost. It's a tricky balance, but a necessary one.

Furthermore, the adoption of a content-rich curriculum in which students are building knowledge while developing their reading and writing skills (and vice versa) will boost daily reading time (Oakhill et al., 2023; Smith et al., 2021).

The aim is to get children reading well so they can read for themselves

As Colenbrander and colleagues wrote: "The ultimate aim of reading instruction and intervention is to equip children with the skills and knowledge they need to read fluently and independently, and to do this in the shortest possible instructional time" (Colenbrander et al., 2020).

It is wonderful for teachers to explore the fascinating intricacies of cognitive science and linguistics, but we should never lose sight of this instructional aim. In order to achieve it, as Anna Gillingham is quoted as saying, "You go as fast as you can and as slowly as you must" (Hanbury King, 1996).

This is an excerpt from Dr Jennifer Buckingham's piece, 'Need to know or nice to know … What is at the heart of the Science of Reading for teachers?' The full article is available on the FiveFromFive website.

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The science that's missing from Science of Reading laws

This story was originally published by Chalkbeat. Sign up for their newsletters at ckbe.at/newsletters.

Matt Barnum, Chalkbeat

In the long-running reading wars, proponents of phonics have won. States across the United States of America, both liberal and conservative, are passing laws designed to change the way students are taught to read in a way that is more aligned with the Science of Reading.

States, schools of education, districts, and – ultimately, the hope is – teachers, are placing a greater emphasis on phonics. Meanwhile, the 'three-cueing' method, which encourages students to guess words based on context, has been marginalised. It's been a striking and swift change.

But there has been much less attention paid to another critical component of reading: background knowledge. A significant body of research suggests students are better able to comprehend what they read when they start with some understanding of the topic they're reading about. This has led some academics, educators and journalists to call for intentional efforts to build young children's knowledge in important areas like science and social studies. Some school districts and teachers have begun integrating this into reading instruction.

Yet new state reading laws have almost entirely omitted attention to this issue, according to a recent review. In other words, building background knowledge is an idea supported by science that has not fully caught on to the Science of Reading movement. That suggests that while new reading laws might have real benefits, they may fall short of their potential to improve how children are taught to read.

"It's an underutilised component," said Dan Trujillo, an administrator and former teacher in the San Marcos Unified School District in California. "There's a lot of research about that: The more a reader brings into a text, the more advanced their comprehension will be."

However, translating this research into legislation or classroom instruction – at a moment when curricular decisions are increasingly fraught – may not be straightforward.

Reading requires comprehension, not just decoding

Researchers sometimes speak of two major components of reading: decoding words and then comprehending their meaning. (This is known as the Simple View of Reading, although researchers now say it's a bit oversimplified.)

Decoding means turning the text into cognisable words. Phonics – using letter sounds to determine a word – is a critical part of this process. This has been a key focus of the Science of Reading movement and the laws that have followed.

But the ability to read doesn't end there. Readers also need to be able to comprehend the words they have sounded out. It's not just the dictionary definition that counts either, but the meaning in specific contexts. That's where background knowledge comes in.

"The main determinant of understanding a text is how much knowledge a reader brings to reading," noted a 2020 review published in the journal *Reading Research Quarterly*.

Consider the knowledge required to understand the following seemingly simple sentence, which summarises a recent Chalkbeat story: 'House Republicans seek to cut Title I funding by nearly $15 billion.'

It assumes the reader knows that 'House' is a legislative body in the United States federal government (not a place where someone lives); that 'Republicans' make up one of the major political parties; and, most importantly, that 'Title I' is a source of funding for schools. Readers who know all this can easily interpret the sentence; otherwise, it's all but meaningless. Decoding skills are necessary to read but not sufficient.

That's because all writing assumes that readers have some level of background knowledge. After all, it would be unwieldy to pause to describe, for example, the United States House of Representatives.

"A whole lot is omitted when a person speaks or writes on the assumption of common ground, on the assumption that you and I both have knowledge that we share," said Daniel Willingham, a cognitive psychologist at the University of Virginia.

The main determinant of understanding a text is how much knowledge a reader brings to reading.

Some argue that knowledge is less relevant today with the availability of internet search engines. Why do students need to memorise basic facts if they can just Google them?

But looking up every unknown word or concept is time-consuming and gets in the way of comprehension. Imagine stopping to search for a key term every few sentences of this article – it would be exhausting and difficult to keep all the new information straight. Plus, searching for the right terms or interpreting searching results may also require background knowledge.

In other words, Google can help fill in gaps in knowledge, but it can't easily fill a chasm.

"Background knowledge is not just an incidental aspect of reading instruction," one recent review of research concluded. "Instead, explicitly teaching background knowledge should be considered foundational to increasing competency in reading."

State laws don't address knowledge – and solutions aren't easy

In the last few years, most states have enacted legislation that seeks to improve students' reading skills. These laws typically emphasise multiple tenets of effective reading instruction, including phonics and comprehension – but the role of knowledge in reading comprehension has gotten scant attention.

"Building content and background knowledge as a foundation for reading comprehension are almost completely absent from this legislation," concluded a recent report released by the Shanker Institute, a think tank affiliated with the American Federation of Teachers. (A handful of states mentioned knowledge in their legislation, but only briefly.)

This omission has been noticed already. "Unfortunately, the Science of Reading has often been interpreted far too narrowly as exclusively focused on foundational skills," the Knowledge Matters Campaign, which focuses on

raising awareness about the role of knowledge in reading, noted last year. "Our charge is to bring knowledge into the vibrant and dynamic conversation about the Science of Reading."

Part of the challenge is that – unlike the lessons from phonics research – it's not obvious how schools should address the importance of background knowledge. There is, after all, a near infinite amount of knowledge in the world. Schools can't give students all the knowledge they need to read all the texts they will encounter.

"It's daunting," said Willingham. "There's not a quick fix here."

Some educators have said the answer is adopting a curriculum that integrates important texts in science, history and other topics into reading instruction. That way, students will start to build their knowledge on issues that they will likely encounter in what they read. That's the approach a number of districts have adopted, including San Marcos Unified, a large district north of San Diego.

"They have to read about something," said Trujillo, the San Marcos administrator. "You might as well read about something in science – sound or how plants grow – or social studies – the area, the people, the Constitution."

Some have also argued that schools should devote more time during the school day for regular instruction in science and social studies, which get relatively little attention in elementary grades. But there aren't clear research-based answers here. Although there is solid evidence that knowledge is an important part of reading, there is less research on *how* schools should go about building knowledge in a way that translates into improved reading skills.

In other words, Google can help fill in gaps in knowledge, but it can't easily fill a chasm.

One recent study provides some encouragement to advocates of knowledge building: researchers found that students who attended charter schools that taught a knowledge-focused curriculum made large reading gains on state tests. Still, the study could not show whether these improvements came from the curriculum itself or other features of the charter schools.

Separately, there are political and cultural questions about what sort of knowledge – and whose knowledge – is taught. Some have worried that codifying essential knowledge will privilege elites' conception of what is important, while giving short shrift to the contributions of historically marginalised groups. This issue may be particularly challenging for policymakers to navigate at a moment when classrooms have become a cultural battleground.

Esther Quintero, a senior fellow at the Shanker Institute, rejects this dichotomy. She says that careful attention should be paid when designing a curriculum to include a broad swath of history and culture. Ultimately, she believes a knowledge-focused approach may benefit disadvantaged students the most.

"There's an equity argument to be made for knowledge-building curricula – it levels the playing field for kids," she said. "Everybody is exposed to the same content. Otherwise, you leave it up to chance."

Chalkbeat *(chalkbeat.org) is a non-profit news organisation covering public education.*

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Tips and resources to help preschooler or school-aged children learn 'book language' for later school and life success

David Kinnane

I'm confronted with tens of thousands of words a day. Most of them are written words – something I didn't really think about until I read a marvellous paper by Professor Kate Nation and colleagues (Nation et al., 2022).

Before my first client each day, I've usually devoured news headlines, doom-scrolled social media feeds, scanned my inbox for urgent emails, and – if I'm lucky – skimmed a research summary or two. In sessions with clients, I read all day. I then go home to read subtitled TV, night-time emails and texts, and (if I don't fall asleep first) a few pages of a good book.

Without help, I couldn't do any of these things without my written language (i.e., reading) skills.

Spoken and written language are related but different

Humans have a biological instinct for oral (spoken) language. Oral language is often considered an evolved, biologically primary skill.

When we start reading, our language experience changes in major ways. Learning to read is built in part on oral language skills, including oral language comprehension skills. But learning to read changes our brains. Once we know how to read, our relationships with language are changed forever.

Written language is different to spoken language. Unlike conversation – where you interact with others in a specific place and time and can often see facial expressions and gestures – we often read alone without much context. Most of what I read is written by people I don't know well who are living in different places. Some of what I read is written by people who lived and died before I was born.

To compensate for limited context, the written language is generally more precise and complex than the language of everyday speech. For example, when writing we often use:

- fancier words and a greater variety of words
- longer sentences with more advanced syntax,

than when talking with each other. This is especially the case when tackling academic and professional writing – particularly the bad stuff.

Key implications for families and educators (and speech pathologists)

(a) Early exposure to written language is a good idea

Picture books for infants and preschoolers have more words, and more sophisticated words, than the language parents and other caregivers usually say to their preschoolers. You can read more about some of this research here.

As Nation and colleagues put it, 'book words' are more often nouns and adjectives, tend to be longer and morphologically complex, are more abstract, are acquired later in development and are more emotionally arousing than

spoken words. When children listen to their parents read a good picture book, they hear at least some vocabulary that is fundamentally different from the language they hear in day-to-day conversations.

Picture books tend to contain more complex constructions than child-directed speech (e.g., Cameron-Faulkner & Noble, 2013). For example, picture books contain more relative clauses than speech (Hsiao et al., 2022).

(b) Encouraging lots of reading and varied reading experience is also a good idea

Even from a young age, exposure to printed words – and the acquisition of print knowledge (also called print awareness) – is valuable, including for gaining knowledge of the names and features of letters, words and sentences, and for learning the ways in which print is organised and used for different purposes. As Kate Nation and colleagues report:

> *"[R]eading experience shapes language development and leaves a legacy that is evident in how well adults deal with language" (p. 377).*

As children become independent readers, they:

- encounter many new words (including academic vocabulary)
- read words they already know, used in a variety of contexts
- deepen their knowledge of the phonological and semantic features of words
- encounter higher-level language features, like homophones, homonyms, homographs and idioms.

Children who have learned to read independently improve their understanding of written sentences and texts and become better at understanding and using language generally. For example, good reading skills may assist independent readers to:

- draw local and global inferences (e.g., about ambiguous pronouns)
- identify and name complex emotions (e.g., despair, ambivalence, frustration, pride)
- grasp first and second order theory of mind
- understand advanced sentence syntax (e.g., relative clauses and passive sentences)
- build mental models about what they are reading and to integrate information in texts with their existing background knowledge of the world and text types so they can understand texts.

(c) Some children (and adults) need extra help to learn book language

For all the reasons above, reduced exposure to written language over time is likely to have a significant, negative effect on a child's language development and skills.

This statement (taken from Nation et al.'s paper) forced me to reflect on my clinical approach to supporting children with reading difficulties. When we encounter a school-aged child with dyslexia or other significant decoding difficulties, I need to think about a three-track, parallel strategy, composed of:

1. an initial, narrow and urgent focus of my limited intervention time working to improve the child's word recognition and/or reading fluency skills
2. quality fiction and non-fiction books read regularly to the child (e.g., through parents and teachers reading age-appropriate books aloud to the child, audiobooks, videos or by using technologies (like text-to-speech), to ensure the child is exposed to the same book language as their peers)
3. a functional, strengths-based approach to support, ensuring that the child participates in age-appropriate academic and social activities, despite his or her communication difficulties.

This will be easier said than done given the constraints we are all under, but well worth a go.

Bottom line

Exposure to the language of books – and written language generally – is an essential part of language development for school, work and life. We want all children to experience book language from an early age, including through early shared reading experiences with parents, other caregivers and early educators.

Some school-aged children need extra help to access book language, including children with dyslexia and other reading difficulties, and many children with Developmental Language Disorder. Parents, caregivers, teachers, speech pathologists and others can all help these students, including by implementing some of the suggestions above.

Some free resources to help

- For parents and caregivers of preschoolers, we have collated several evidence-based tips and free resources to set up a good home literacy environment here.
- Our free guide to helping your preschooler get ready to read can be downloaded here.
- We've put together a free resource of recommended picture books for preschoolers, with key vocabulary definitions suggestions here.
- You can read more about complex syntax and why it matters here.
- For a summary of how to help students become independent readers, check out this article.
- For academic vocabulary, check out our article here (including free vocabulary lists).
- For free, quality audiobooks, check out our free downloads for preschoolers, Kindergarten and Year 1, and Year 2–6 primary school-aged children.

This article originally appeared on the Banter Speech & Language blog.

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The SpellEx approach to teaching spelling

Alison Madelaine

MultiLit has recently released SpellEx, a comprehensive whole-class Tier 1 spelling program. The program aims to develop students' understanding of the English spelling system and is designed for students from Year 3. What follows is a rationale for the approach to spelling instruction used in SpellEx.

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).

Spelling is clearly important for writing development (Daffern, 2017; 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.

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.

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 foolproof. 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 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; 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. For example, the word 'unpacking' is made up of three morphemes: 'un' is the prefix, 'pack' is the base and 'ing' is the suffix.

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,

Recent research, however, has suggested that learning to spell may not follow a linear path.

orthographic and morphological word forms from the beginning stages of spelling development (Daffern, 2017). Triple Word Form Theory has been used to guide the development of SpellEx, so students are learning how to apply knowledge in phonology, orthography and morphology to spell words.

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 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. SpellEx uses explicit instruction as it 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, SpellEx incorporates some extra strategies and activities to support this instruction. Some examples are listed below:

- 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 in the form of regular progress monitoring tests and cumulative reviews 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.

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, by 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. SpellEx is a whole-class Tier 1 spelling program that uses explicit, language-based instruction to teach spelling to children from Year 3 onwards.

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The development and use of the WARs

Nicola Bell, Robyn Wheldall, Alison Madelaine and Kevin Wheldall

The WARs (our affectionate nickname for the Wheldall Assessment of Reading Passages, Wheldall Assessment of Reading Lists and the Wheldall Assessment of Reading Nonwords) are a set of assessment measures that are used to quickly gauge primary school students' reading proficiency. In this article, we will detail the process of developing these instruments, as well as the rationales underpinning that process, the tests' psychometric qualities and the recommendations for using them in the classroom.

Development of the WARs

The Wheldall Assessment of Reading Passages (WARP) was the first to be published by MultiLit in 2013. Its development can be traced back to the mid-90s, when the MultiLit Research Unit's Director, Kevin Wheldall, wrote 21 passages, each 200 words and of roughly equal difficulty. Research was conducted to establish the five passages most highly correlated with one another (Wheldall & Madelaine, 1997). Based on those five passages, additional studies provided evidence for:

- using words correct per minute, as measured in the first minute of the student reading, rather than averaging over the entire passage (Wheldall & Madelaine, 1997)
- reliability and validity of the measure (see final section of this article for definitions of these psychometric qualities) (Madelaine & Wheldall, 1998, 2002a; Wheldall & Madelaine, 2000; Wheldall & Madelaine, 1997)
- WARP scores predicting reading ability better than teacher judgement (Madelaine & Wheldall, 2002c, 2005).

In the early 2000s, there was a transition from studying five passages to studying three. These three passages would later be known as the 'Initial Assessment' Passages, while another set of 10 passages would be known as the 'Progress Monitoring' Passages. As well as establishing reliability and validity for the Initial Assessment forms (Madelaine & Wheldall, 2002b), research in the lead-up to publication was devoted to establishing benchmarks that could identify students as either at risk or average (Madelaine & Wheldall, 2002a, 2002b).

The next WAR to be developed was the WARL, or the Wheldall Assessment of Reading Lists. The development process for the WARL was shorter, because having the WARP's structure and administration guidelines as a foundation meant there was only a little fine-tuning that took place before publication. Instead of passages, WARL stimuli comprise lists of isolated, high-frequency words. These were originally taken from a database of the

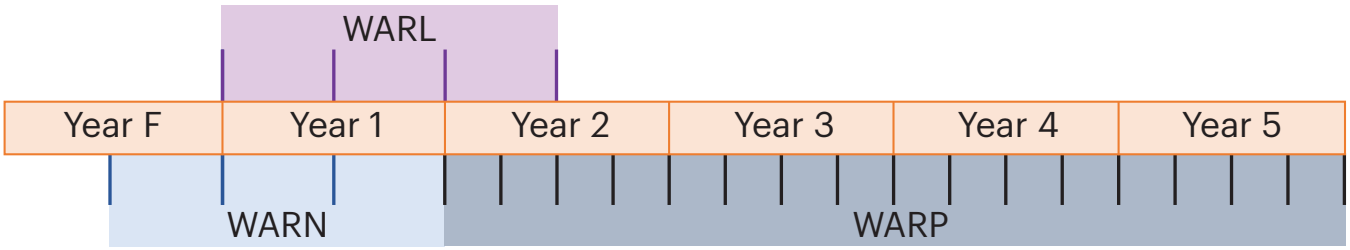

Figure 1. Timespans for average WARN, WARL and WARP benchmarks.

most frequently used words from books read by 5- to 7-year-olds.

The research underpinning the WARL's development established evidence for:

- using 100-word lists (Reynolds et al., 2009 [pilot study])
- having a 60-second duration for the test (Reynolds et al., 2009 [main study])
- 3 similar Initial Assessment Lists and 10 similar Progress Monitoring Lists (Reynolds et al., 2009 [main study])
- benchmarks for at-risk and average performance expectations (Reynolds et al., 2011)
- reliability and validity of the measure (Reynolds et al., 2009 [main study], 2011).

The most recent WAR to be published was the WARN, or the Wheldall Assessment of Reading Nonwords. The WARN stimuli were constructed using grapheme–phoneme correspondences taught in InitiaLit-F (MultiLit, 2017), although the stimuli aren't InitiaLit specific because they contain correspondences that are commonly taught in synthetic phonics approaches. In 2016, a proof-of-concept trial was conducted, followed by a more formal trial in 2017 and 2018. Results from these studies provided evidence for the same characteristics that are listed above for the WARL, except that having students read for just 30 seconds produced scores that were just as reliable as those for 60 seconds. This informed the decision to have the WARN be a 30-second measure, with just 50 nonwords to a page.

Rationale for conceptualisation of the WARs

All three WARs were designed to be curriculum-based measures (CBMs). This means they are intended to reflect students' skills in meeting the curriculum requirements. In terms of reading, CBMs do not need to strictly involve the same texts that are used in the classroom; it is enough that the measure represents the general reading curriculum. Hence, the overall rationale for developing the WARs was that they would give Australian teachers assessment tools that were quick and easy to administer but also effective in capturing students' reading proficiency.

Although they are all CBMs, the WARP, WARL and WARN look different because they are designed to reflect curriculum requirements of different year level ranges. To illustrate, Figure 1 shows a diagram of how the WARs fit together. The vertical lines mark the benchmarks that can be used for comparison against a student's score.

In the first couple of school years, a lot of the focus of reading instruction is on developing students' decoding skills and getting them to apply the letter–sound knowledge they have learned to sound out new words. The step beyond that is automaticity at a single-word level. At this point, it's hoped that the students have been applying their decoding skills and have started to build up a sight word vocabulary based on that self-teaching. Then, as we move up to Years 2 and 3, the focus turns to more passage-level reading and actually using texts to learn about other topics. Ultimately, the WARs reflect where students, very broadly speaking, are at in terms of their reading development, as well as what the reading curriculum is demanding of them at that point in time.

Rationale for format and structure of the WARs

The WARP is a classic example of an oral reading fluency measure. Oral reading fluency scores typically represent the number of words an examinee can accurately read aloud within one minute. The score therefore captures both accuracy and rate of reading aloud. Theoretically, it makes sense that both these factors contribute to overall reading comprehension. Readers must decode or recognise words to retrieve their meanings, and they must do this quickly enough to hold that meaning in mind while parsing the remainder of the sentence and passage. The relationship between oral reading fluency and reading comprehension has also been established empirically.

A reader's passage reading fluency depends on their automaticity of word identification. This is where the WARL – a measure of word identification fluency (WIF) – comes in. The WARL was intended to be more sensitive to changes in performance with younger readers and to be less daunting. It measures efficiency of word identification, so the factors of accuracy and rate are still what contribute to the score. In this case though, the score specifically reflects the reader's automaticity at a single-word level. Sight word retrieval efficiency is a key factor limiting reading comprehension. This is theorised in the Simple View of Reading model and, again, borne out in empirical research (Bell & Wheldall, 2022; García & Cain, 2014).

If we peel back another layer, we get down to nonword reading efficiency, which represents the accuracy and automaticity with which a reader can decode unfamiliar words. Skills in this area should theoretically feed into word identification efficiency via a self-teaching mechanism. Again, though, this relationship is not only theoretical because countless studies have shown that instruction focused on grapheme–phoneme relationships leads to improved word reading outcomes (Torgerson et al., 2006).

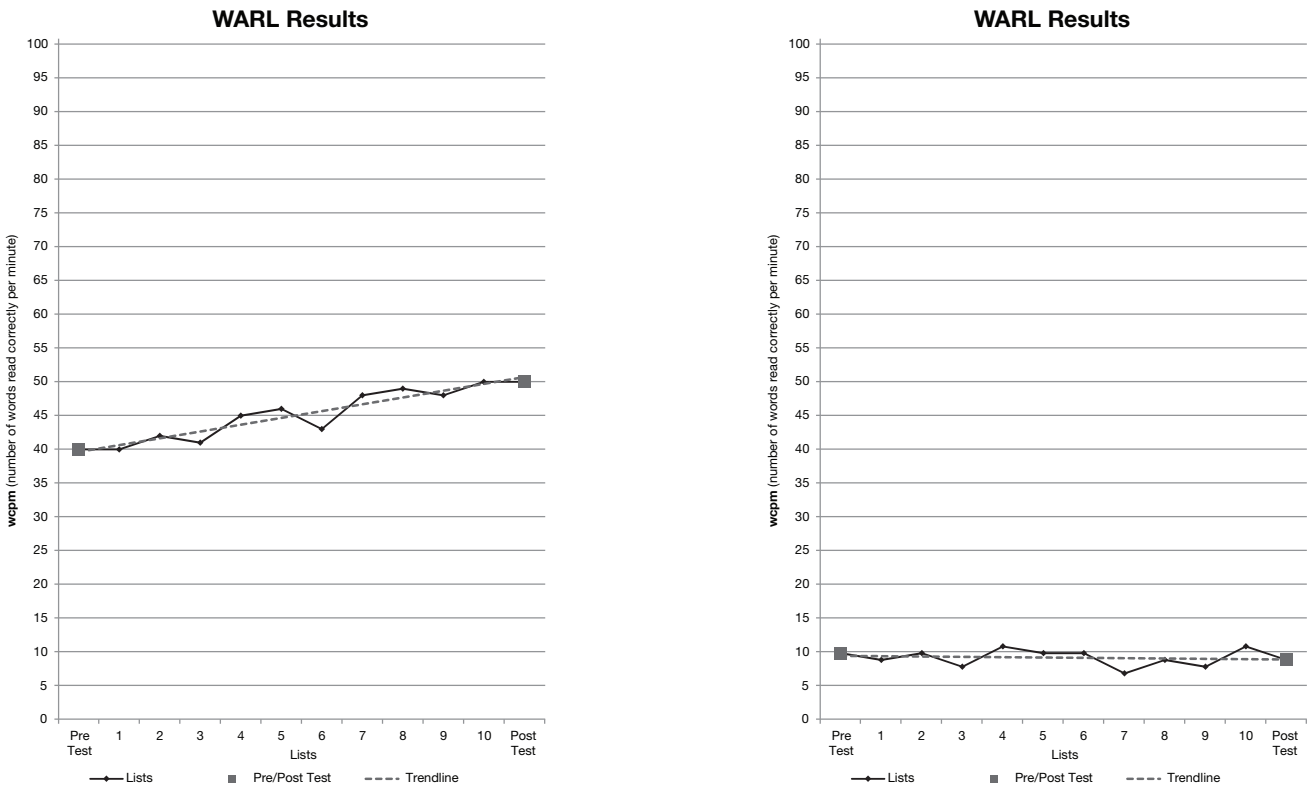

Figure 2. Progress monitoring graph showing increase vs. plateau in scores over time.

In summary, based on both theoretical and empirical grounds, it was decided that a timed oral reading task, with stimuli that aligned with grade-based expectations, would be the best format for a reading CBM.

Using the WARs in a Response to Intervention (or Instruction) approach

Within a Response to Intervention (RTI) approach, 'Tier 1' often refers to a whole-class teaching context, 'Tier 2' often refers to the small-group remedial support given to students with difficulties, and 'Tier 3' often refers to the individualised support given to students with significant difficulties.

Firstly, the Initial Assessment forms of the WARs can be used for screening in a Tier 1 setting, since the benchmarks allow users to identify students who may benefit from more targeted support in a Tier 2 setting. The Initial Assessment forms may also be administered at a whole-class level for long-term progress monitoring (e.g., 3–4 times per year). The purpose here would be to check that students are on track, and, again, to identify whether any students have fallen through the cracks and would benefit from Tier 2 intervention.

At a Tier 2 level, the Initial Assessment forms can be used as evidence in support of exiting a student from a program. Each measure's threshold scores for 'average' performance provide a goal that educators can aim for their students to reach through intervention. Once the students reach this goal, they may no longer be suitable for intervention and can move back into a Tier 1 teaching context.

Finally, at both Tiers 2 and 3, the Progress Monitoring forms for all WARs can be used to track students across shorter intervals (e.g., each fortnight). If they aren't responding to small-group instruction, they may need to move from Tier 2 to Tier 3. If they aren't responding to support delivered at an individual level, something more needs to be done. A comprehensive assessment of their language and cognitive abilities is warranted if that has not already been conducted.

Figure 2 illustrates why frequent progress monitoring can be useful for making instructional decisions. The first student is clearly responding positively to the intervention provided, since their scores are moving in the right direction towards average performance. On the other hand, the second student is not responding well. Assuming the intervention has a solid evidence base and is being delivered with fidelity, this would be considered a red flag, indicating that they may benefit from more individualised intervention and/or the additional support of a speech pathologist, specialist teacher or educational psychologist.

Strengths and limitations of the WARs

As outlined in the previous section, the WARs have multiple uses within an RTI context. They are quick and easy to administer, are sensitive to small improvements, allow for progress monitoring and have good reliability and validity (see Figure 3).

'Reliability' refers to the test's consistency across different testers, forms and testing times. A reliable test assesses what you want without capturing too much 'noise'. All three WARs have 'alternate forms' reliability at or above .9, which is excellent. 'Validity' refers to the test's ability to capture the specific skills of interest. We judge this by looking at how well a test correlates with other similar and dissimilar measures. As can be seen, the WARP is most strongly correlated with measures of passage reading accuracy and sight word reading, which is what you would expect of a test that theoretically aligns closely with these areas. This is a similar story for the WARL and WARN. In all, there is good evidence for the validity of each WAR.

As well as noting the strengths of the WARs, it's important to note their

Reliability (Alternate forms)

WARP	WARL	WARN
.97[a]	.90[b]	.94[c]

Validity

WARP	
WARL	.91[e]
NARA (passage) accuracy	.86[d]
Burt (sight word accuracy)	.83[d]
SAST (spelling)	.77[d]
Martin & Pratt (NW reading)	.59[d]
NARA Reading Comp	.55[d]
PPVT (vocabulary)	.33[d]

WARL	
TOWRE Sight Words	.92[b]
WARP	.91[e]
Burt (sight word accuracy)	.87[e]
WARN	.86[c]
SAST (spelling)	.83[e]
SPAT-R (PA)	.69[e]
TOWRE Phonemic Decoding	.76[b]
Martin & Pratt (NW reading)	.75[e]
PPVT (vocabulary)	.42[e]

WARN	
Martin & Pratt (NW reading)	.87[c]
WARL	.86[c]

[a]Madelaine & Wheldall (2002b)
[b]Reynolds et al. (2009)
[c]Wheldall et al. (2021)
[d]Wheldall et al. (in preparation)
[e]Reynolds et al. (2011)

Figure 3. Reliability and validity of the WARs.

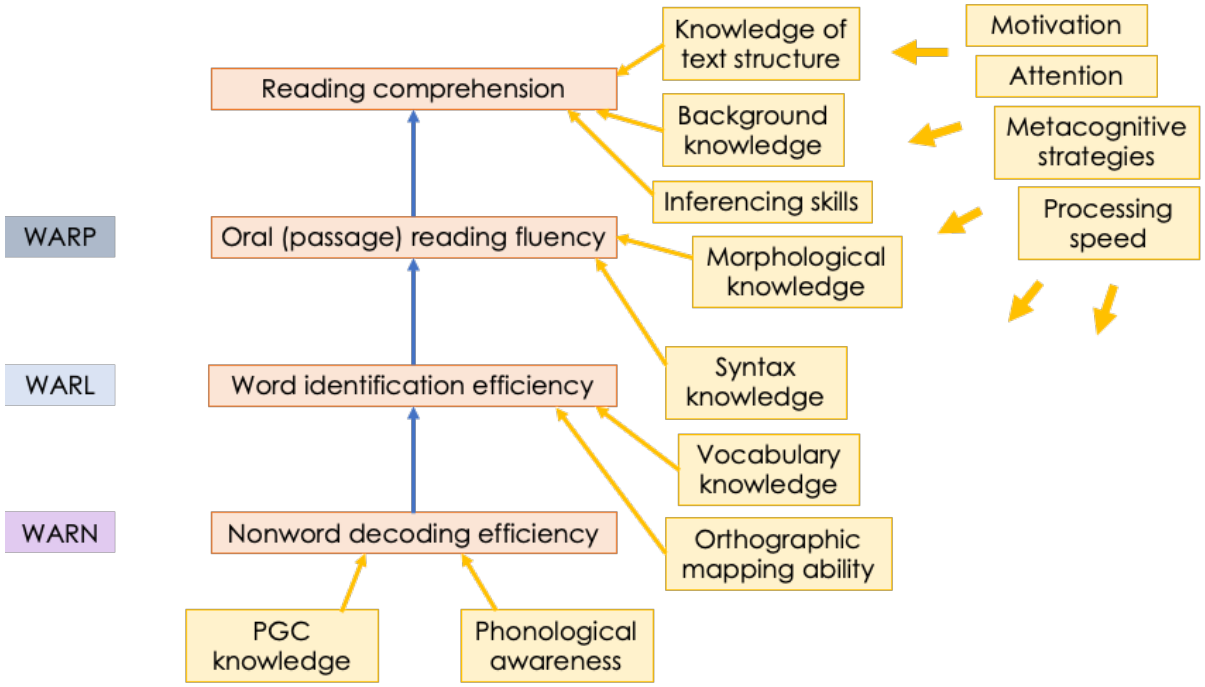

Figure 4. Factors contributing to reading comprehension.

limitations. They cannot and do not test all skills and factors that contribute to reading comprehension, as illustrated in Figure 4. These additional factors may be captured to varying degrees by the WARs, but further assessments would be required to draw any concrete inferences about their functioning.

The point is that the WARs are intended as quick and easy measures that index a student's developing reading proficiency. They provide useful information in that regard. However, they aren't intended to replace a comprehensive testing battery if that's what is considered necessary for a student to receive. This makes the WARs both limited and also fit for purpose.

Disclosure statement

Emeritus Professor Kevin Wheldall and Dr Robyn Wheldall are directors of MultiLit Pty Ltd and receive a benefit from the activities of the company and the sale of its programs and products, including the measures mentioned in this article. Dr Nicola Bell and Dr Alison Madelaine are paid employees of MultiLit Pty Ltd.

This article is an edited excerpt from a presentation delivered at Learning Difficulties Australia's 'Best Practice Using an RTI Framework' Online Conference.

The authors of this article (Nicola Bell [@NicolaBellSP], Robyn Wheldall [@RWheldall], Alison Madelaine [@alisonmadelaine] and Kevin Wheldall [@KevinWheldall]) are members of the MultiLit Research Unit.

Ten maxims: What we've learned so far about how children learn to read

Reid Lyon

Over the last 50 years, there's been a vast outpouring of research about reading development, drawing on insights from neuroscientists, psychologists, linguists, speech pathologists, educators and other experts. I'm sometimes asked to summarise, in plain language, what we've learned so far. These ten maxims represent my best attempt at doing that.

This may seem like a fool's errand, because no set of maxims can fully convey the scope or the nuance of thousands of studies. I hope nevertheless that these maxims might be useful in crystallising some of the most essential findings. In collaboration with some outstanding researchers and practitioners, I've compiled a selective list of studies that underlie each of the ten maxims. The research behind the maxims addresses a wide range of individual differences in reading development, reading difficulties and reading instruction. Taken as a whole, the studies encompass children identified as having dyslexia and other learning disabilities as well as children who struggle with reading as a result of inadequate instruction. Many of the studies also include proficient readers.

Because these maxims are very broad, there is of course more to say about specific sub-populations of students with distinct strengths and needs. I encourage advocates for these students to formulate additional maxims that are not adequately covered by these first ten. Any additions should be in clear, consumer-friendly language and supported by cited studies that report relevant empirical findings.

The overarching message is that learning to read is a complex process involving multiple abilities, skills and knowledge. Each is essential but none is sufficient on its own.

With that as prologue, here are my **ten maxims**:

1 Almost all children learn to speak naturally; **reading and writing must be taught**.

2 Literacy begins at birth. It is rooted in early social interactions and experiences that include regular exposure to oral language and print. **Strong roots tend to produce stronger readers**.

3 **All good readers are good decoders.** Decoding should be taught until children can accurately and independently read new words. Decoding depends on phonemic awareness: a child's ability to identify individual speech sounds. Decoding is the on-ramp for word recognition.

4 Fluent readers can instantly and accurately recognise most words in a text. They can read with expression and at an appropriate rate for their age. **Reading fluency requires comprehension AND it supports comprehension**.

5 Comprehension – the goal of reading – draws on multiple skills and strengths, including a **solid foundation of vocabulary and background knowledge.**

6 One size does not fit all: **use student data to differentiate your instruction.**

7 **Direct, systematic instruction helps students develop the skills they need to become strong readers.** Indirect, three-cueing instruction is unpredictable in its impact on word reading and leaves too much to chance.

8 **These maxims apply to English Learners/Emergent Bilinguals,** who often need extra support to bolster their oral language as they learn to read and write in a new language.

9 **We should support students who speak languages or dialects other than General American English* at home,** by honouring their home language and by giving them expanded opportunities to engage with General American English* text.

10 To become good readers and writers, **students need to integrate many skills that are built over time.**

With appreciation to Kelly Butler, Claude Goldenberg and Noel Gunther.

Contributors: Jane Ashby, Louise Dechovitz, Linda Diamond, Jan Hasbrouck, Kari Kurto, and Julie Washington

**Editor's note: In Australia, the 'mainstream' dialect is referred to as General Australian English.*

This article originally appeared on Reading Universe. References to research in support of the ten maxims are available on Reading Universe. Background information relating to this article and the author's work more generally is available in a two-part special on Science of Reading: The Podcast.

Dr Reid Lyon has had a distinguished career as a research scientist, professor, classroom teacher, special education teacher, neuropsychologist, school psychologist, and leader in the development of evidence-based education policy at federal and state levels. From 1992 until 2005, Dr Lyon served as the Chief of the Child Development and Behavior Branch within the National Institute of Child Health and Human Development at the National Institutes of Health.

The overarching message is that learning to read is a complex process involving multiple abilities, skills and knowledge.

Maths is about preparing students to play 'the game of life'

So we need to teach students the rules, and then play it with them!

Siobhan Merlo

"And of course, the things they do not know must be taught to them by other people who do. The people around them must give their assistance. Education is not intervention but assistance towards self-reliance. For example, how would it be if one were thrown into society without knowing any traffic rules; without knowing the meaning of red lights and green lights? Or, if one had no car-driving skills and found oneself behind the wheel? Naturally, there are rules to be learned here and skills to be attained …"

(The Courage to be Happy by Ichiro Kishimi and Fumitake Koga p. 14.)

I have often wondered why there are some controversies which persist for a very long time. Take, for example, the explicit instruction versus inquiry debate in maths education. On the one hand, proponents of explicit instruction argue for the importance of teacher-led synthetic, structured and systematic instruction for teaching academic skills, while inquiry approaches aim to support students to construct their own knowledge/schemas by providing engaging tasks intended to pique their natural curiosity. This is indeed a very hot topic – there is a lot at stake here. Australia's mathematics PISA (Programme for International Student Assessment) results have declined over the past 15 years (see report here), rankings have dropped relative to international standards, and stakeholders in this space are scrambling to work out why, and what can be done about it. This is not to mention the impacts that lack of skills in mathematics have on the economy and the country in the global context.

After much contemplation, and I know I am heading into dangerous waters here, I have come to the conclusion that the reason this debate has persisted is because: both sides are right! The only problem is, neither side in its purest form captures the entire story, and this is why:

Maths, survival and agency

In my previous conversation piece, I addressed the issue of why mathematics is not only relevant, but critical for survival, especially in today's complex world. I argued that:

> *"Children need to build the foundational skills necessary and be versed in the socially-agreed upon mathematical conventions by which to communicate and interact with others, so that they can use critical thinking and logic to make astute decisions and solve increasingly complex problems. In these ways, they are able to optimise favourable experiences and minimise negative outcomes. Thus, mathematics is not only relevant, it gifts children with agency in their lives and is essential for survival."*

If we accept the purpose of mathematics education is to prepare students for 'the game of life' and not merely to cover content in the curriculum, then setting students up for repeated success ensures they will continue trying, take on new challenges and develop the agency needed to survive in a complex world.

In other words, the purpose of mathematics education is to prepare students for 'the game of life'.

'Mastery' is an element of control which is a human drive implicated in 'the game of life'. Similar to the smell of fresh bread, when a person has 'mastered' something, neurochemicals such as dopamine are released in the brain, which are recorded in memory and drive the individual to repeat the same behaviour again. Interestingly, we know from the research that motivation in mathematics at school is linked to mastery. Motivation is not linked to teachers trying to convince students that 'maths is fun', or textbooks featuring bright colours and images of ice cream. Neither is it linked to presenting students with challenging problems which they do not have the skills and knowledge to solve.

Correspondingly, there are serious implications for a person's wellbeing if they are subjected to persistent failure. As I wrote in my previous conversation piece:

> *"Repeated failure in mathematics may have devastating impacts on the life trajectory, including during school: anxiety, learned helplessness and poor self-concept, social isolation, behavioural implications, school refusal, leaving school early and school detachment. In transition to adulthood, it often translates into difficulty maintaining employment, unemployment, not venturing into further study, low income, mental health problems, poor financial decision making, never owning one's own home, and in the most dire of circumstances, incarceration."*

In other words, students experiencing repeated failure in mathematics often start to 'bow out' before the game has even started.

Educators and schools have a significant role to play in determining which path their students take. By adopting sound pedagogical approaches and ensuring that tasks are pitched at a level which enables students to experience outcomes in favour of success and not failure, schools are effectively making a significant contribution to their wellbeing and indeed, their survival. If we accept the purpose of mathematics education is to prepare students for 'the game of life' and not merely to cover content in the curriculum, then setting students up for repeated success ensures they will continue trying, take on new challenges and develop the agency needed to survive in a complex world. So, how do we prepare students for 'the game of life', and what implications does this have for pedagogy?

Relevance!

First and foremost, would you start teaching a child the rules of a game without telling them why? This may seem preposterous, but judging on how many times students have said to me that they have no idea why they are doing the maths they are being asked to do, this happens more than it should. Students need to understand why the maths has a functional purpose in their lives, but this is often a tricky tightrope: we need to explain the purpose, but we can't expect them to play the game without knowing the rules first. Throwing students into the deep end with minimally guided approaches when they are not yet ready, is another educational trap which can be made when attempting to make maths 'relevant'. So, students need to know the goal of the game and that we, as educators, will teach them the rules so they can play it.

If math is preparation for life, explicit instruction is about rules

Now for a second question: would

you ask a child to play a game with you, without telling them the rules? Would you ask them to just start playing and say: "You'll pick up the rules as you go"? I don't believe many people would, because this would place the child at a serious disadvantage, especially if they were competing against other children who *did* know the rules. This is not to mention the amount of time it might take, that they may pick the rules up incorrectly, or they may not work out the rules at all. And then, there are the implications for students' wellbeing, knowing that other children seem to understand something they do not. Explicit instruction in mathematics is about teaching students the rules and conventions for playing 'the game of life' so that students can be set up for success.

Conceptual knowledge in mathematics is essential, but drill is also necessary (and kind!)

Imagine arriving in secondary school, like many Australian school students do, and being required to make measurement conversions swiftly, find common denominators, understand percentages and more, without automatic number fact and times-table knowledge? How long would it take if you were still using concrete methods and repeated addition to work these things out? How would you feel if you looked around the room and other students were doing the same schoolwork effortlessly? Lack of automaticity in significant mathematical skills stymies mathematical growth. It also sets students up for failure experiences which may ultimately damage their self-concepts and affect their wellbeing.

This is not to minimise the critical importance of conceptual knowledge which enables students to develop increasingly sophisticated understandings that can be applied to novel situations. It just means that once children have been taught mathematical conventions through explicit instruction, they need to practise them and develop increasingly efficient strategies to solve problems faster. The automaticity which results enables them to be successful when tackling increasingly sophisticated mathematical challenges. So, just like going to the gym to improve fitness, students need drill to be able to achieve mastery.

Inquiry approaches are about rehearsing for the game

Now – for a final question: Would you teach a child the rules of a game, and then not play it with them? That would definitely not seem right, as children need to be able to apply their knowledge to novel situations, so they can build increasingly sophisticated schemas. These schemas allow them to solve the problems they encounter and make decisions which promote positive outcomes and minimise negative ones in their lives. This is not to mention how disappointed they would be if they had worked hard to learn the rules and then had no chance to play the game! Inquiry and other minimally guided approaches work when students have already been taught the rules through explicit instruction and mastered them through practice. Such pedagogies are also engaging because they allow students to apply the knowledge they have mastered and provide a 'carrot' for keeping students in the game. Opportunities provided through this type of approach are not only engaging but allow children to rehearse for 'the game of life'.

An integrated direction for Australian mathematics education

If the purpose of education is to support students to develop the temperaments, skills and knowledge necessary to play 'the game of life', it is an ethical responsibility to set children up for repeated success in mathematics so that they 'stay in the game'. Not only does this have implications for the wellbeing of individuals, but also for the wellbeing of the country. I have no doubt that highest ranking countries on international mathematics tests conceptualise mathematics as critical for 'the game of life', with subsequent implications for pedagogy as I have described here.

The Singapore syllabus, for example, includes a strong emphasis on relevance and cultivating positive attitudes towards mathematics, explicit instruction, practice towards mastery (drill), and inquiry and application to novel problems. It is also not surprising that Singapore has a strong economy to boot. If we do not want our children to be the students who do not 'know the rules' or who have never had a chance to 'rehearse for the game' among others who have, we need to start working together and accepting that there is a place for both explicit instruction and inquiry pedagogies, and that neither one on its own is sufficient. There would not be international tests for both the conventions of mathematics (Trends in International Mathematics and Science Study – TIMMS), and the application of mathematical knowledge (Programme for International Student Assessment – PISA) if either pedagogy was. As I have argued here, students also need to understand the functional purpose of the maths they are being asked to do from the outset, and they need to practise until they achieve mastery. In these ways, we can move towards a more integrated pedagogical approach which sets students up for success and facilitates our children's ability to optimise positive outcomes and minimise deleterious ones in 'the game of life'.

Dr Siobhan Merlo is a Senior Product Developer and Senior Member of the MultiLit Research Unit. She obtained her PhD from the University of New South Wales in Cognitive Load Theory in 2005 and has worked as a psychologist and learning intervention teacher over the past 20+ years. Following her extensive work with students exhibiting specific and pervasive learning difficulties, she lectured in numerous subjects as part of the Masters of Learning Intervention at the University of Melbourne, and designed and developed the Specific Learning Difficulties in Numeracy subject. Siobhan works within the theory-to-practice nexus to develop programs which promote fluency as well as deep conceptual understanding of mathematics.

Nomanis Notes
Issue 16 | November 2023

What is cognitive load theory?

Mark Carter and Siobhan Merlo

Statement of the problem

Instruction is often derived from theories that are not solidly grounded in research on how humans learn or are based on ideological considerations. Consequently, teaching practices are not always optimal. Understanding how people learn can inform and improve teaching practices.

Proposed solution

Cognitive load theory provides explanations of how learning occurs based on well-established principles related to the architecture of memory. Cognitive load theory has a range of direct implications for how teaching should be planned and delivered, particularly for novice learners.

The theoretical rationale – how does it work?

Cognitive load theory is based on two well-established principles related to memory. The first is that working memory, where short-term memory is stored and manipulated, is inherently limited. We can only hold a small number of pieces of information simultaneously and only for a short period. Thus, working memory can be easily overloaded, impacting negatively on learning. The second principle is that long-term memory is virtually unlimited. Information in long-term memory is often organised and integrated into schemas so it is readily and automatically retrievable in response to task demands, with relatively little effort from the learner. In effect, the capacity and duration limits of working memory disappear when dealing with familiar information from long-term memory. A key implication is that systematic and explicit instruction for novice learners minimises the load on working memory and facilitates the transfer of information to long-term memory, resulting in learning.

Rehearsal is important to consolidating schemas. The process of automation enables schemas to be more efficiently retrieved from long-term memory as an individual moves from novice to expert, freeing up working memory to engage with new information.

Research on cognitive load theory has produced a range of teaching principles that can improve learning outcomes. For example:

- **Worked example effect.** Worked examples involve the use of a problem that has already been solved, which is systematically and fully modelled to the student. This has been consistently found to be more effective for learning in novice learners than presenting students with conventional problems to solve.
- **Redundancy effect.** Presenting students with unnecessary information to the content being taught tends to needlessly load working memory and impairs learning. For example, redundancy occurs when the same information is presented in two different formats, when either one would be self-evident on its own. Another example is when non-essential graphics draw attention away from the key components of the task.
- **Expertise reversal effect.** While novice learners benefit from explicit instruction and worked examples, learners with more expertise may benefit from a greater emphasis on problem-solving. Awareness of the skill level of the students should guide the instructional approach.
- **Transient information effect.** Transient information that quickly disappears (such as spoken words) presents a greater challenge to working memory than non-transient information (such as written instructions), which can be reviewed as needed.

What does the research say? What is the evidence for its efficacy?

Cognitive load theory continues to be developed and refined, and some key questions remain to be answered. Nevertheless, an extensive body of replicated high-quality research has been published over 40 years supporting the basic tenets of the theory, as well as many of the specific effects described.

Conclusion

Many aspects of cognitive load theory are well validated by research and have direct implications for teaching practice. All teachers should have a working knowledge of cognitive load theory.

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