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Issue 11 June 2021

IMPROVING READING INSTRUCTION: ARE WE THERE YET?

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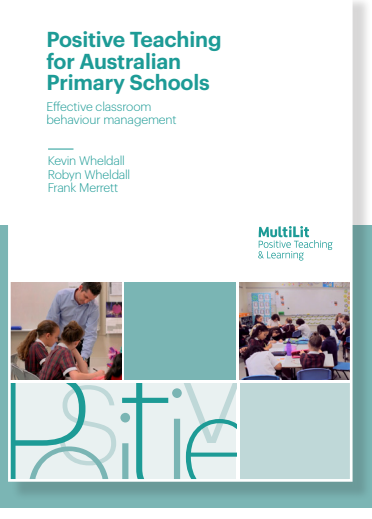

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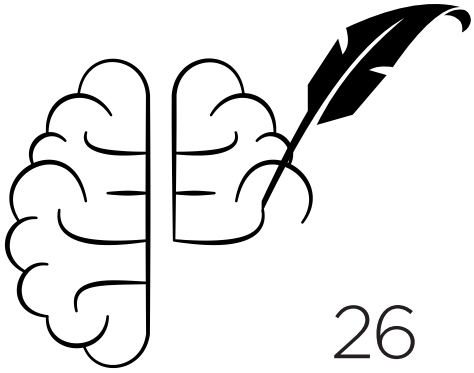

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Joint Editors
Emeritus Professor Kevin Wheldall AM
e: *kevin.wheldall@multilit.com*

Dr Robyn Wheldall
e: *robyn.wheldall@multilit.com*

My husband is a guinea pig

Robyn Wheldall

My husband is a guinea pig and I'm very happy about it! This may sound like a strange thing to say, but when one is faced with a life-threatening disease potentially taking over someone who you love, your perspective changes pretty quickly. Kevin has been engaged in research for over 50 years and I for over 30 years. We now find ourselves on the other side of the table, with K being considered for a clinical trial to treat his multiple myeloma. When one is familiar with the all-important steps in designing and implementing research studies, it is fascinating to be a part of this process when you are a 'subject' or participant.

Sometimes the holy grail of double-blind randomised controlled trials to assess the efficacy of a new medication is just not possible when we are dealing with human beings. The perfect experiment may be neither possible nor desirable when there are conflicting responsibilities. Medical researchers are often doctors first and foremost and are bound by the Hippocratic Oath, 'First, do no harm'. When medical researchers are planning clinical trials they must carefully assess the risks and benefits of what they are proposing. If a participant is in the experimental group, are the researchers confident that a new medication has the real potential to have a positive effect on containing a destructive disease? Might this new medication have an unintended negative consequence on the patient? Might it have no effect at all and while the experiment runs its course, a patient's disease has progressed to an irreversible point? And what about the patients in the control condition? Will they be put at risk by the treatment they receive? Will they have nothing but a placebo? Fortunately, reason and humanity prevails in the medical research we are involved in.

The clinical trial that Kevin is being assessed for will ensure that the participants are treated with a great deal of care and caution. What are the hallmarks of this approach?

1 **Transparency.** There is no attempt to keep secret whether patient participants have been allocated to the experimental or control condition. In the case of the clinical trial K is hopeful of joining, we know there is only a 25 per cent chance that he will pass the first hurdle – which is to have a certain chromosomal translocation, assessed by an invasive bone marrow biopsy. Even if K were to have this characteristic, he then only has a one in two chance of getting the new 'experimental' drug because he will be allocated randomly to the experimental or control condition. So, overall, there is only a one in eight chance that he will gain a potential benefit from the new drug by participating in this research. It is important to be prepared for this disappointment if you are the patient participant who misses out. However knowing that the control condition receives the medication you would otherwise get had you not participated in the research trial – the best 'business as usual' next line of treatment – is a comfort.

2 **Informed consent.** Knowledge is power and although one has no means of influencing the genetic makeup of one's disease, it is possible to arm oneself with facts about the research you are being asked to participate in. Human ethics committees (sometimes frustrating for researchers) provide a safety net for participants to be well-informed about the proposed experiment and provide

the means by which participants can opt out at any time without consequence, if things become too difficult for them (or they just change their mind). While participant attrition is a blow to researchers, it does provide a level of comfort to participants and arguably encourages more people to participate in research in the first place.

3 **Data.** Research is all about data. In the medical sciences, this inevitably involves research participants being subjected to an increased number of physical tests, some of which can be quite invasive and/or take considerable time. This is certainly the case in the trial that K is being screened for. Appropriate screening procedures are critically important to make sure the right type of participants are being recruited into the trial. There is no point selecting a patient with an X characteristic if the experimental treatment is trying to positively affect a Y characteristic. This inevitably means that there will be a lot of testing and screening of people who do not make it into the trial. This may lead to the dashing of hope, but it is an essential element of good research design – recruiting the right target group.

4 **Consistency.** Making sure tests and assessments are being conducted in the same way and subject to the same analysis is really important. In our case, all of the blood samples for a particular test are to be flown to Singapore (from pathology collection centres all over the world) so they are all analysed in exactly the same way for this experiment. This seeks to reduce variations that may be introduced into the analysis using slightly different methods or machines. Precision is important.

5 **Monitoring.** It's great to have a neatly designed study but when we are dealing with human beings, things can, and do, go wrong. The research protocol for clinical trials involves a good deal of monitoring, as it should. Data-based decision-making is a key feature of the clinical trial. This is good for the experiment and good for the patient participant. Researchers can see what is happening almost in real time and this provides important feedback to not only the researchers but to the patient and their physician too. If things are not going well for the patient then a discontinuation can be effected quickly. Patients leaving trials is valuable data too.

6 **Collaborative partnership.** A successful research study requires a great deal of collaboration, communication and goodwill from all parties. Having a responsive contact person heading up the research implementation is just as important as having talented researchers conceptualising the research. Research studies can fall over where there is not sufficient attention to detail and clear communication.

Reflecting on the experience that we are currently having in the medical research world has led both me and K to comment on how similar the process is when conducting educational research in real-world contexts. It's resource intensive and requires all involved to keep their attention on what it is that they have to do. The six elements outlined above – transparency, informed consent, primacy of data, consistency, monitoring and collaboration – are also the hallmarks of effective educational research. Yes, it's hard. Yes, there are often problems. Is it worth it? Absolutely.

Having a responsive contact person heading up the research implementation is just as important as having talented researchers conceptualising the research

After having tested literally thousands of children over the course of his research career, K is more than happy to be involved in research as a participant himself. He has benefited from the research participation of unknown others for many years. He is very pleased now to be 'doing his bit' in advancing the knowledge in the best approaches to treating disease.

Robyn Wheldall, Joint Editor

P.S. K qualified for the clinical trial BUT was randomly allocated to the control condition!

What we've been reading

Jennifer Buckingham

In my WWBR list this time is a book that has immediately become one of my favourite books ever. Frank Moorhouse's *Martini* is a very funny, poetically licensed memoir recounted via vignettes of drinking martinis and talking about martinis, in interesting places with interesting people. The martini minutiae are exquisite. The sort of book that made me want to read bits aloud to whoever was nearby. Another title in the "isn't that fascinating!" genre was *The Bookseller's Tale* by Martin Latham which chronicles the emergence of the book as a major cultural force and, for some, a life-long obsession. Did you know that some of the first local libraries were in chemist shops in Britain? Boots the Chemist's, to be precise. Apparently reading really is therapeutic. I also continued the MRU Round Robin of Reading with novels that my colleagues have mentioned in the past by Jane Harper and Chris Hammer. For the education policy wonks, I recommend *New Zealand's Education Delusion* by Briar Lipson, in which she sets out a compelling explanation for New Zealand's lamentable and utterly foreseeable educational malaise, and describes the path out of it.

Anne-Marie Van Duinen

The enforced solitude of quarantine gave me time to focus on Brian Deer's, *The Doctor Who Fooled the World*. The major outtakes: that fraud provided the impetus for Andrew Wakefield's 'science' and that a combination of celebrity, desperation and nescience have fuelled an urban myth that continues to burn unabated, affecting many more children than the small group who had the misfortune to come to Wakefield for diagnosis and treatment.

Continuing with the theme of false science, *Making Sense of Interventions for Children with Developmental Disorders* by Caroline Bowen and Pamela Snow is an excellent tome I discovered in the recesses of the MultiLit office and unofficially (sorry!) borrowed. I promise it will be returned (eventually). One of the major challenges faced by parents and teachers is navigating the proliferation of quick-fix solutions for learning difficulties. Quite apart from the false hope and indubitable expense, pursuing non-evidence-based intervention takes time away from quality teaching and intervention. A great starting point for sceptical educators and parents.

From one rabbit hole to another… In *At Night's End*, Israeli author Nir Baram's protagonist, Yonatan, wakes up in a hotel room in Mexico City and can't recall the last five days. Enough said.

Alison Madelaine

I've read a bit of non-fiction recently, which is not normal for me. Although all have difficult content, I did enjoy *Hillbilly Elegy: A Memoir of a Family and Culture in Crisis* by J.D. Vance, *Talking to My Country* by Stan Grant, and *No Friend But the Mountains: Writing from Manus Prison* by Behrouz Boochani. Boochani, a Kurdish-Iranian journalist, wrote his memoir in Persian on a mobile phone. It was subsequently translated into English and won the Victorian Premier's Literary Prize for Literature and for Non-fiction on 2019. It was a shocking read of course, but what really struck me was how much of it was about food and drink, and going to the toilet – things that really come to the fore when basic rights are taken away. Apparently, it is being turned into a film this year.

My fiction reads have included *American Dirt* by Jeanine Cummins, *The Survivors* by Jane Harper, *The Course of Love* by Alain de Botton, *Here is the Beehive* by Sarah Crossan, *The Thursday Murder Club* by Richard Osman, and *Honeybee* by Craig Silvey. *Honeybee* was my favourite of all these, and it also just won the 2021 Indie Book Award for fiction!

Finally, on a recent road trip with my son, I listened to *Storm Boy* by Colin Thiele on audiobook. He loved it and of course we then had to watch the original movie from the 1970s, which brought back lots of memories for me.

Nicola Bell

My reading list from the last couple of months has taken a bit of an unnerving turn. Instead of the usual light-hearted stories, most of the books I've read recently have centred around murder. I think this must have been prompted by *Scrublands* by Chris Hammer, which was absolutely absorbing. The other two books in his trilogy – *Silver* and *Trust* – were well-written, though not as good as the first. I also read *I'll Be Gone in the Dark*, which documents the hunt for the real-life "Golden State Killer". This was a fascinating read, partly because the author (Michelle McNamara) weaves in her own experiences of how the investigation affected her life. These snippets are all the more poignant given that the book was finished and published after McNamara's death in 2016.

I also really enjoyed reading *So You've Been Publicly Shamed* by Jon Ronson, which is a deep dive into the phenomenon of internet-based pile-ons. Ronson is a brilliant journalist, and he has a kind of sarcastic/neurotic writing style that I love.

One book I didn't quite get on board with was *A Lonely Girl is a Dangerous Thing* by Jessie Tu. It was captivating enough, but the protagonist's terrible life choices frequently made me want to kick her.

Meree Reynolds

A recent favourite was *The Nowhere Child*, a debut novel by Christian White that was a Christmas gift from my granddaughters. They chose well! It is a quick, thoroughly enjoyable read that has everything: suspense, intrigue, twists and turns and lots of action.

In contrast, *Defending Jacob* made me squirm as I went into empathy overload for a family in crisis when the teenage son was accused of murder. There's plenty of suspense in William Landay's courtroom drama and it kept me engrossed right up to its quite unexpected ending.

Reading Michael Ondaatje's *Warlight* was a special experience for me. It is a story of memories of childhood, set in the years after World War II that I thought was beautifully written with fascinating characters and a mystery that captivated me as it was slowly peeled back, layer by layer.

Currently I am reading *Corruption in High Places* by Clarrie Briese who was a key witness in the trials of Justice Murphy in the 1980s. At the time, the Lionel Murphy scandal perplexed me, particularly because many of my friends and acquaintances were fierce defenders of the High Court judge. Yet I was not at all convinced of his innocence in the matter. This newly released book provides Clarrie Briese's side of the story. I found it very interesting and I am full of admiration for the author who put a great deal on the line when he testified against a very senior and highly influential public figure.

Anna Desjardins

The books on my latest round-up sound like they belong in a poem together, with *The Hidden Life of Trees* and *The Secret Life of Bees* both captivating me, for different reasons. *The Hidden Life of Trees*, by Peter Wohlleben, recounts how trees interact together in larger forest groups in surprising ways that resemble social networks. In a style that is both scientifically sound and emotionally aware, Wohlleben leaves us with a sense of just how much we underestimate these living beings that we share the earth with.

I'm not sure how I missed out on *The Secret Life of Bees* by Sue Monk Kidd, 20 years ago, but I am grateful to have been given a copy for Christmas (by a MultiLit colleague, of course!), as it has flown firmly to one of my 'top reads' spots. With a compelling story set at the time of the civil rights movement in the American south, and language you feel like eating at times for its ability to connect you with something hovering just outside our realm of physical experience, this deserves to be the bestseller it is. I have now raided the Sue Monk Kidd shelves at my local library.

I also had my first taste of Isabel Allende recently, when *A Long Petal of the Sea* took me to a moment in history I knew shockingly little about: the desperate Spanish Civil War and the subsequent retreat of Republican refugees as Franco's army comes to power. Leaving Barcelona in the depths of winter, on foot, the protagonists cross the Pyrenees, survive a subsequent internment in a French concentration camp and eventually immigrate to Chile aboard a ship chartered by the poet Pablo Neruda, just as World War II breaks out in Europe. And that's just the beginning! The reader is then swept through another fifty years of history, leading up to and through the turmoil of Chile's own repressive military regime under Pinochet. Against this backdrop, Allende illuminates the human will to survive and the multiple stories of our hearts. Masterful, eye-opening and uplifting in equal measure.

And for something light, *The Strays of Paris* is a sweet story by Jane Smiley (she's got the name to go with the feel of the book!), told from the viewpoint of an unlikely band of animals who take a young boy they meet quite literally under their wing (and paw and hoof). To be read with a cup of tea when nothing too taxing is required, I can see this book being adapted into a charming film for children that, if done well, would be equally enjoyed by parents.

Kevin Wheldall

For a change, I'll start with a book that I am currently reading entitled *How to Think Like a Roman Emperor: The Stoic Philosophy of Marcus Aurelius*. Over the last few years, I have been increasingly drawn to the philosophy of stoicism. As Donald Robertson makes clear in his book, there are many similarities with stoicism and the principles of cognitive behaviour therapy. I heartily recommend both the book and the philosophy.

I am also reading Chris Hammer's latest, *Trust*, the follow-up to his two highly successful previous novels, *Scrublands* and *Silver*. I note that some of my colleagues have been enjoying these books as well. What good taste we have in MRU!

I am often wary of Booker-prize-winning novels, with the exception of Hilary Mantel's superb works, but I was bowled over by *Shuggie Bain* by Douglas Stuart. Pulling no punches, it is a full-on visceral account of growing up gay and dirt-poor in Glasgow. As well as being unsettling, I also found it profoundly moving.

A Spy Among Friends: Philby and the Great Betrayal by Ben Macintyre is a work of non-fiction that reads like a novel. Being as critical as I am of the English establishment, even I was flabbergasted by the way that the upper class, old boys' network continually refused to see what was staring them in the face. They found it unthinkable that a sound chap, one of their own, could

possibly be a spy. You don't have to be an arch Republican (which I unashamedly am) to find this despicable and disgusting.

As a long-time fan of Graham Nash, I found his memoir *Wild Tales* disappointing and self-indulgent. He appears to have learned very little about himself over the years. Rather than reading this misogynistic litany of sexual and drug-fuelled escapades, I know that I'd be better off listening to the Hollies and Crosby, Stills, Nash and Young.

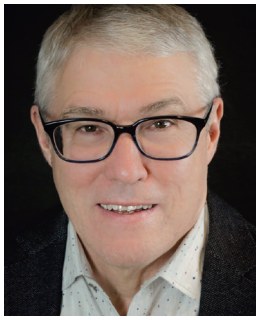
Robyn Wheldall

My absolute favourite book of the last calendar year was Pip Williams' *The Dictionary of Lost Words*. A wonderful piece of historical fiction (with more than a little fact) set in the context of the development of the Oxford English Dictionary. The interweaving of the activities of the suffragettes adds richly to the book and it provides wonderful insights into the lives of women at the time. I love the fact that Pip Williams is an author from the Adelaide Hills and that this book is set in Oxford. This is a book that I shall read again this year – too good to only ready once. (I note it's been a favourite of my MRU colleagues, too.) During that languid, balmy period between Christmas and New Year, I delighted in reading Nigella Lawson's *Eating* – a little book from the Vintage Mini series. An entirely appropriate book for the season, *Eating* is full of kitchen, entertaining (with a small 'e') and life wisdom. Nigella's 2020 book *Cook Eat Repeat* also provided some much-needed enthusiasm and fresh ideas when it comes to the gastronomic aspects of life.

The theme of fascinating female characters in my reading continued with Kate Grenville's *A Room Made of Leaves* which revolves around the fictional (but highly probable) innermost thoughts of Elizabeth Macarthur – the 'mother' of the wool industry – in early colonial Sydney. Grenville has a strong track record of bringing to life the characters, privations and tragedies of early European habitation in New South Wales and *A Room Made of Leaves* added to this tradition. *Hillbilly Elegy* by J.D. Vance was a powerful autobiographical read, deeply disturbing but also with hope for the strength and endurance of the human spirit. It gave me important insights into some of the reasons for the entrenched divide in contemporary USA, with origins in deep social disadvantage. I have not yet seen the Ron Howard film of this book – which I believe is also affecting – but am very much looking forward it.

On sequences of instruction

Tim Shanahan



I received an interesting question from a third-grade teacher in Frankfort, Kentucky (US). She writes, "In my district we do not have a specific scope and sequence for teaching vocabulary, nor phonics. I have tried to find something that I feel is research-based and comprehensive. I want to help my strugglers and my above-level students. Can you help?"

Those are two pretty important questions: What should the sequence of instruction be in phonics and vocabulary? And do you need a prescribed sequence to be successful?

Let me answer the easier of the two questions, first.

Yes, I think it is important to have a clearly established sequence of instruction in both phonics and vocabulary. In phonics, the question has been tested directly in several research studies, and always with the same result: teachers who were teaching a pre-established regimen of phonics were more successful than those who were winging it. I know of no direct tests of the question in the vocabulary literature, but all of the studies where success was accomplished in improving reading comprehension had a clear plan for the teacher.

So, what is the research-based comprehensive curriculum that teachers need to follow? Well, to tell you the truth, I don't know. When I look at phonics and vocabulary studies, it is clear that pretty much all sequences work. For example, the National Reading Panel looked at 38 studies on something like 19 different sequences of phonics instruction, and though those differed greatly in the inclusion and ordering of skills, all the approaches seemed to confer a learning advantage. The same kind of thing was true for vocabulary.

That doesn't mean sequence doesn't matter. Perhaps direct tests of different sequences could sort out some small learning differences. What I think it really means is that most of the schemes tested in research are pretty reasonable. Most try to teach the most important or largest skills first or have some kind of logic to their plan. Most don't emphasise minor or later developing skills. But all provide sufficient coverage and structure to make sure the kids have a chance of succeeding.

Yes, indeed, your school or district should have an agreed upon systematic plan for what is to be taught in each grade level so that teachers will have a clear idea of what to do. This plan, whether purchased or developed internally, may be somewhat arbitrary but I bet it won't be ridiculous.

(In other words, you'll probably spend more time on the m or s sounds than the z sound. Or, you'll be more likely to teach vocabulary words like 'contain' or 'reluctant' rather than 'quidnunc'.) Without such a plan, important words or spelling patterns may not be taught at all, and some concepts or skills may be covered again and again. In such a case, the most successful kids may progress anyway, but this kind of laissez-faire curriculum plan is a disaster for the strugglers.

That there isn't a single research-proven sequence gives your district latitude. They could buy one of the many commercial programs aimed at supporting systematic instruction or could convene a group of teachers to come up with a district plan. Apparently, within reason, it doesn't matter that much what the exact plan is, just that there be one and that teachers follow it (we don't teach alone – we build on what the previous teacher accomplished and prepare students for what is to follow). When a specific instructional sequence exists, you usually see more teaching than when it is left up to each teacher to work this out herself; and that is a big benefit for kids. Of course, if there is a plan, the teacher (and mum and dad) can tell how a child is doing – the instructional sequence becomes a point of comparison for determining who is not doing well.

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

That there isn't a single research-proven sequence gives your district latitude

Timothy Shanahan (@ReadingShanahan on Twitter) is Distinguished Professor Emeritus at the University of Illinois at Chicago and was formerly Director of Reading for the Chicago Public Schools, and president of the International Literacy Association. He is a former first-grade teacher and is a parent and grandparent. His website www.shanahanonliteracy.com is popular with parents and teachers.

But what if there was a screening test for COVID-19?

Tanya Serry

While COVID-19 plays havoc with our minds, our healthcare workers and our economy, let's just imagine that a COVID-19 Screening Check was available from tomorrow. We'll call it CSC for short. In the spirit of any screening check (think breast screening, hearing screening, antenatal ultrasound screening), the CSC acts as a population-based preventative measure for early detection of the virus. While your imagination is running wild about the CSC, let's also assume that those identified as positive on the CSC, will be eligible for early, evidence-based medical care. Let's also assume that for most people (say about 80 per cent), the treatment is short, sharp and effective; well before the virus causes fever, fatigue and fear. What a huge relief and wonderful safety net that would be. What a cause for celebration.

But what if we substituted CSC for PSC: the Phonics Screening Check? Would there be as much fanfare? Unfortunately, the answer is no, even though the PSC performs a similar function as our imagined CSC, but in relation to identifying students who are not tracking as expected in learning how to decode. It's just that reading difficulties are a slow-burn virus that can take a lot longer to declare themselves, unlike COVID-19, which has a short incubation period. More about that later.

Background to the Phonics Screening Check

The Phonics Screening Check *commenced* in the UK in 2012. *According to the South Australian Department for Education*, which had the foresight in 2018 to trial the check statewide across publicly funded schools, the check is "… a short, simple assessment that helps teachers to measure how well students are learning to decode and blend letters into sounds – one of the building blocks for reading".

The Check (note the word 'check' and not 'test') is conducted towards the latter half of Year 1 to monitor students' progress in learning to decode words and in particular, to achieve the early identification of children struggling with decoding. The PSC takes between four and seven minutes to administer and consists of 40 items: 20 real words and 20 pseudowords. Herein lies the rub – 'pseudowords'; loved by some, despised by others, **misunderstood by many**.

Real words could be for example: ITS, SUM or THIRD while pseudowords could be OSK, PAB or DARP. You'll see that the pseudowords are all *phonologically legal* and *phonotactically identical* (respectively). I can't show you a picture of test items as they are not labelled for re-use. However, the reality is that every word that children encounter, real or pseudo, is new for a novice reader *at least once*. All the PSC is doing is determining whether Year 1 students can decode phonologically legal combinations. Perhaps in an ideal world, where

Properties of the check	(Imagined) CSC	(Real) PSC
Provides early detection of risk?	Yes: for COVID-19.	Yes: for ongoing difficulties learning how to decode words.
May identify some false positives?	Yes: but better safe than sorry.	Yes: but better safe than sorry.
May identify some false negatives?	Yes: it's a possibility but managed by close progress monitoring of COVID-19 'symptoms'.	Yes: it's a possibility, but managed by close progress monitoring of 'signs' of reading struggles.
Offers intervention options?	Yes: evidence-based treatment to significantly reduce the virus taking hold.	Yes: evidence-based treatment to boost the word decoding abilities of children.
Effective for everyone?	About 80% will benefit from the treatment. The remaining 20% are likely to need more intensive treatment.	About 90-95% will benefit from a brief but intensive Tier-2 reading intervention. The remaining 5-10% of students will need more intensive, more enduring Tier-3 treatment.
Reasons not to use it?	None identified.	None identified, although there is much misinformation about its use.

there was overarching support for the concept of a PSC, the entire check could be pseudowords. That would really be the purest way of tracking students' decoding abilities; but for now, a bridge too far. It would mean, however, that we would *not* see ill-informed comments reported in newspapers such as, "*Apparently, puzzling over the sounds of 'flisp' is going to help children learn to read and write*".

So how does the Phonics Screening Check stack up against the CSC?

If we reflect on the likely support for the imagined CSC and the real-life PSC, it would go something like this:

The good news

On August 2nd, a media release was circulated by the Hon. Dan Tehan MP (Federal Minister for Education)[1] headed '*2020, Free phonics check for all Year 1 students*'. In this release, the Minister was quoted as saying, "Importantly, Phonics Check results provide teachers with a useful picture of where individual students are at in their reading, so they can implement the right support for those who are struggling…"

How good is that?

Well yes, it's good if you support the Phonics Check (like I do). And if you do support the Phonics Check, implicitly that means that you understand:

- That the ultimate aim of reading is to gain meaning;
- That Gough and Tunmer's (1986) *Simple View of Reading* (which states that reading is a product of being able to decode words and understand spoken language), is theoretically sound;
- That novice readers (5- to 6-year-old students) need to be taught how to '*crack the code*' of English;
- That learning to decode accurately and efficiently is the first, crucial step to becoming a competent reader;
- That not all children will learn to 'crack the code' without explicit teaching, but these children do not necessarily have a learning difficulty;
- That structured literacy using a *synthetic* phonics approach is the safest way to ensure that children learn to decode words;
- That a systematic scope and sequence is superior (safer and more trustworthy) to a non-systematic approach (see *here* and *here*), and;
- That humans were *not born "wired to read"* (and spell) and therefore need to be taught, ideally in a systematic and explicit way.

Why the backlash?

Those who challenge the value of the PSC use the straw-man argument that says "decoding alone does not a good reader make". But that's just not correct as shown by the evidence (see for example *here* and *here*). Take the *Simple View of Reading* which states, in the most elegant way, that being a competent reader comes about by being able to (i) decode well and (ii) have a solid grasp of oral language comprehension. Then there is the very important work of *Professor David Kilpatrick* who has demystified for us all, that critical step of moving from decoding in a rather mechanistic; sound-it-out way to developing orthographic mapping skills for fluent effortless word reading (the 70 minute investment in the hyperlinked YouTube video above is well worth it).

The sound-it-out decoding part, which is all the PSC is used for, opens the door to becoming a competent reader. That's all. In the same way that we would be fist-punching for that imagined CSC, universal acceptance of the PSC, which is at our fingertips and on our iPads, should elicit the same joy. The joy of reading, in fact.

1. Since the time of writing, the Hon. Dan Tehan has been replaced as Federal Education Minister by the Hon. Alan Tudge.

This article originally appeared on The Snow Report.

Tanya Serry (@tserry2504 on Twitter) joined the School of Education at La Trobe University in 2020 as A/Prof (Literacy & Reading). Together with Prof Pamela Snow, she is the co-director of the SOLAR Lab. Prior to joining the School of Education, Tanya was a senior lecturer and discipline lead teaching Speech Pathology, also at La Trobe University. Tanya's research and teaching are focused on language and literacy and learning difficulties among students from the early years through to tertiary students as well as students experiencing social disadvantage. Tanya's research and teaching centres on how to facilitate greater collaboration between educators, parents, speech pathologists and psychologists.

Associate Professor Tanya Serry is an Advisory Panel Member for the Australian Government Department of Education, Skills and Employment in relation to the development of the 2020 online Phonics Screening Check. All views expressed in this blog are opinions of the author alone.

Are we there yet?
The long, steep and winding road towards improved reading instruction

Pamela Snow

All parents will be familiar with the pleading question from the back seat on long (or sometimes not so long) car journeys, normally delivered in the most whinging (whining for US readers) tone of voice possible: 'Are we there yet?' As the youngest of four children, growing up in the 1960s and sitting unrestrained in the back of the family station wagon, mine may have been the loudest voice in this chorus. I hope the advent of car air conditioning, screens and wireless headphones makes for easier car trips these days for parents. However, I have been reminded of the 'are we there yet?' plea in the context of recent media interest in the ongoing problem of how we teach children to read (or in many cases do not).

If you've missed the recent media offerings, you can find Rebecca Urban's piece in *The Australian* here and Jordan Baker's *Good Weekend* feature article here (apologies if you strike a paywall).

The road towards improved reading instruction has been made unnecessarily long and complicated as a result of those in the front seat accepting directions from people who may be well-intentioned, but don't actually know what the destination looks like, or how to get there. It's also been muddied by advice from people who thought we would be better off heading down a side street because the town down that way is pretty and everyone seems happy there. Some people don't necessarily think there's a destination at all; rather that wherever we are right now is just fine and there's no need to move on to greener pastures.

I thought it might be time to check the map, because there have been some dead ends and unnecessary detours that have made this journey longer and more painful than it ever needed to be.

So let's see how we're travelling and do some misdirection fact-checking along the way.

Misdirection 1: Tensions in how to teach reading are a battle between whole language and 'phonics'.

This is overly simplistic. The key tension, as I see it in 2021, is between instruction that is delivered explicitly by teachers who are highly knowledgeable about all aspects of the English language (spoken and written) and instruction that is delivered by teachers who have been presented with an extremely restricted lens on reading and are overly reliant on a limited and superficial repertoire of classroom materials and routines. Such materials often include expensive classroom sets of levelled (predictable) readers that do not follow a scope and sequence with respect to the teaching of phoneme-grapheme correspondences and sets of 'sight' words which children do not have the tools to analyse at a sub-lexical level, so must over-burden their

fragile visual memory systems by learning them as pictographs. Then there is the all-too-familiar whole language throwback, *Multi-Cueing (Three Cueing)* and some frankly bizarre advice, like telling children to 'get your mouth ready' to read an unfamiliar word.

None of this would matter, of course, if we were more successfully teaching 95 per cent of children to read, as the *cognitive psychology research indicates we should be**. We're not even close.

*If you cannot access this paper by Dr Kerry Hempenstall, the key quote (2013, pp. 108–109) is this:

> *According to research, we should not be content until the reading difficulty rate falls to around 5 per cent … Until then, we are not teaching reading well enough, and many students do not have an inbuilt resistance to learning how to read, but should be considered as* instructional casualties.

The wrong turn here that has delayed our journey is that universities, by a process of steady erosion of teacher knowledge in initial teacher education (ITE) over recent decades, have over-simplified the reading process, for both teachers and children. That means that rather than needing faculty who are knowledgeable about the linguistic basis of reading, universities have reassured themselves that it's okay for this part of the ITE curriculum to be delivered by academics with backgrounds in anything from *drama, art and secondary English literature*. This has resulted in a collective form of interpretative dance around such fundamental questions as the meaning of the word 'literacy' (insert just about any meaning you like and it will get up; the more postmodern it sounds, the better). I am yet to meet a primary school teacher who sees an opening for critical literacy in their struggle to teach six year olds how to spell; nor have I met a primary teacher who has asked for assistance in supporting students with multiliteracies. If you want to test these propositions, it is easy to do so:

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- Ask some recent graduates what theories of reading they learned at university.
- Ask what they learned about the three national inquiries into the teaching of literacy that were held between 2000 and 2006.

- Ask whether reading is a biologically primary or secondary skill, and why this matters.
- Ask what the relationship is between oral language abilities and learning to read.
- Ask them to define phonemic awareness and morphological awareness.
- Ask about the difference between synthetic and analytic phonics.
- Ask what they know about orthographic mapping.
- Ask how they teach spelling.
- Ask whether they are confident identifying and supporting struggling readers.
- Ask whether they need professional learning on critical literacies, multiliteracies and/or neoliberal praxis in the early years' classroom.

Why are students in related disciplines such as speech-language pathology and educational and developmental psychology learning about these fundamental concepts and yet teachers, in most cases, are not? Why have education faculties given away the family china? If you give away the family china, you can't then complain that others find it useful in their work. I wrote about the issue of education discarding precious knowledge from its teacher education programs back in 2017. You can read that blog post *here*.

Misdirection 2: Calling for improved reading instruction means advocating for a 'phonics only' approach.

This straw man would be laughable if it were not so disappointing and exhausting. It is reading instruction's flat tyre that results in a collective moan from the back seat, as everyone piles out to stand by the side of the road while even more time is wasted.

As per Misdirection 1, the debate needs to be much more nuanced than this. Advocates of improved reading instruction spend just as much time talking about the role of vocabulary, comprehension, fluency, syntax, discourse and so on, as they do about how speech and print map to each other in English. Related to this, it is inaccurate to suggest that systematic and explicit phonics instruction (whether synthetic or not) by definition bypasses vocabulary development. It does not. Its prime function is to *automatise children's mastery of the code*, but if teachers are teaching decoding without incidentally talking about meanings of words, putting them in sentences and drawing children's attention to morphological markers (e.g., plural -s, present progressive -ing), then there's some low-hanging fruit they can access to enrich their teaching as of Monday morning.

You can decode something you can't understand particularly well (like me reading in my rusty school-girl French), but you can't understand something at all that you can't decode (like me being presented with a page of text written in Arabic). If you don't a) know that there is a code and b) know how to decipher the code, then you cannot '*read for meaning*'. Reading will remain an opaque mystery and your academic success will be jeopardised accordingly.

If we can't get past this road-block in the reading debate, we cannot get on to the pressing and important matters of *strengthening vocabulary*, getting students over *David Corson's 'lexical bar'*, and *improving their writing skills* (to name a few imperatives).

Misdirection 3: The real culprits here are parents. They are either too poor, too non-English speaking or too busy to teach their children to read themselves.

This is a pernicious but transparent attempt to shift responsibility for reading instruction from schools (whose job it is) to parents (whose job it is not).

Does anyone remember the bumper sticker (below) from the 1980s? I wonder why we don't see it anymore. Could it be that the inverse is also true – if you can't read it, did something go wrong in your early reading instruction?

The myth that parents reading to their children will rid the world of illiteracy has been *promulgated by children's author Mem Fox* and resoundingly *rebuffed by Distinguished Professor Anne Castles* of Macquarie University. This particular misdirection is related to the notion of reading being 'natural', as discussed further below (see Misdirection 5).

Misdirection 4: Teachers are professionals and the rest of the community should just trust them to know what's best for children in their class.

I have written about the issue of professionalism previously (see *here)*. This idea is so out of step with community standards and expectations, it's hard to know where to start. Doctors, nurses, psychologists, physiotherapists, engineers, speech pathologists, lawyers, etc, are not afforded the freedom to *do their own thing*. Professionalism is a highly constrained form of accountability. Members of other disciplines are held to account by professional bodies when (not if, *when*) they do not do their jobs properly, through errors of either omission or commission.

When was the last time a teacher was held to account by a professional body for

not teaching reading well enough? I don't know either. But this scary reality is what true professionalism entails and perhaps if education academics had to factor that possibility into their pre-service curricula there would be some better attention to detail in what is taught. Academics in medicine, nursing, psychology and a raft of allied health disciplines know that this is the kind of community accountability they are preparing their graduates for.

Misdirection 5: Reading is a natural thing for children to do. Explicit instruction in phonics kills their enjoyment of text. We should foster the ability to read through immersion in high-quality children's literature.

As you can see, there's a few interconnected pieces of misinformation here. If you are unconvinced of the notion that humans have evolved for spontaneous development of spoken language but not for written language, I refer you to the work of *Diane McGuinness*, *Stanislas Dehaene* and *David Geary*. Unfortunately, the late *Kenneth Goodman* gave education the fanciful but empirically unsupported notion that reading is 'natural', like oral language. This became something of a meme in early years education and has been hard to budge.

What teachers who have adopted a *structured literacy approach* to early reading instruction consistently report is the *joy* that children display when they can crack the code and lift words off the page. All of which does not mean of course that children should not be exposed to beautiful children's books on a daily basis – books that expand their vocabularies, their comprehension of complex sentences, their imaginations, and their knowledge of the world. That's a no-brainer.

We need to remember though, that listening to adults read beautiful books does no more to teach children how to read than listening to adults play Mozart sonatas teaches them how to play the piano. There are several concepts and skills that children need to master in order to do both and instruction delivered by knowledgeable teachers is what makes the difference. Would parents knowingly pay for piano lessons taught by someone who does not understand musical notation and the logic behind it? No, and they should not have to buy into a lottery of hoping that classroom teachers have received adequate preparation for the specialised knowledge and skills required to support children's early reading success.

We need to remember though, that listening to adults read beautiful books does no more to teach children to read than listening to adults play Mozart sonatas teaches them how to play piano

If reading was as natural as acquiring oral language, why is it taught in schools at all? And if it's so easy for everyone to acquire, why are there so many illiterate people in the world (*who have completed primary school*)?

Perhaps it's time for education faculties to claim reading, and all aspects of how children are best taught how to do it, as their own. This would entail fully embracing the fact that reading is a complex skill that requires teachers to be knowledgeable experts, not guides on the side.

It would entail acknowledging that the English writing system is an imperfect representation of spoken language and teachers need to understand these imperfections so they are not glossed over with an awkward 'because English' wave of the hand.

It would entail some humility in the face of the fact that knowledgeable language scholars have been tinkering with the English writing system for hundreds of years, yet we ask children at the tender age of five to start mastering it and give then approximately 36 months to do so.

These are only some of the unfortunate misdirections that reading policy makers and university academics have provided to schools in recent decades. They have made the drive unnecessarily long (never-ending some might say), treacherous, and time-wasting for teachers, parents and students of all backgrounds and education sectors.

As with real life, adults can generally cope better with distance, detours and delays, but children will be the ones who experience the pain of an unnecessarily long trip and the seemingly non-existent destination.

So dear reader, no, we are not there yet, but we are not abandoning the journey either.

This article originally appeared on the author's blog, The Snow Report.

Pamela Snow (@PamelaSnow2 on Twitter) is Professor of Cognitive Psychology in the School of Education, at the Bendigo campus of La Trobe University. She is also Co-Director of the Science of Language and Reading (SOLAR) Lab in the School of Education at La Trobe University. Pamela is both a psychologist and speech pathologist and her research interests concern early oral language and literacy skills, and the use of evidence to inform classroom practices.

Does the Year 1 Phonics Check lead to improved reading outcomes?

Jennifer Buckingham

The recent announcement that all NSW public schools will administer the *Year 1 Phonics Check* in 2021 has been *widely welcomed*. The Phonics Check has been administered in South Australian primary schools since 2018. In September this year the federal government launched an *online version* that is available to all schools, and has been accessed by *over 1000 schools* since then.

Not everyone is in favour of the Phonics Check, but the most common criticisms of it are easily refutable. An often repeated yet *unsubstantiated criticism* is that there is no evidence that the Year 1 Phonics Check is associated with improved reading comprehension in the later years of school. This claim is demonstrably untrue. In England, where the Phonics Check has been implemented for long enough for it to have had an effect on reading performance, there is growing evidence of improvement.

The graphs below are recreated from a recent *peer-reviewed journal article* by highly respected reading researcher and educator, Professor Rhona Stainthorp, based on official data published by the UK Department for Education.

First, let's look at the per cent performance of the Year 1 Phonics Check itself. In the initial year of the national implementation in England in 2012, 58 per cent of students achieved the threshold score or above. The percentage of children achieving the threshold score increased each year until it stabilised at just above 80 per cent in 2016. Many schools have 100 per cent of students achieving at or above the threshold score but others still have room for growth. *An early independent evaluation* of the Phonics Check concluded that the assessment had influenced teaching practice in ways that led to better student outcomes in phonic decoding.

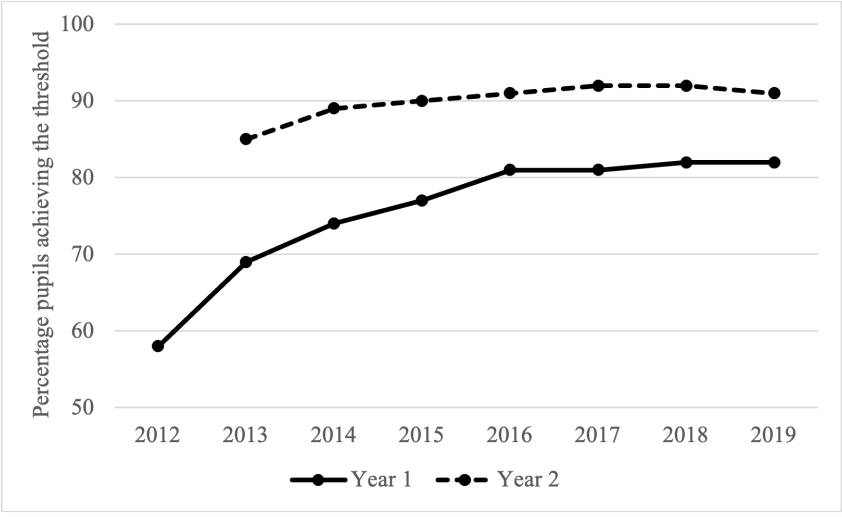

Figure 1. Percentage of students achieving the threshold score of 32 or more in the Phonics Check

Second, we can consider the performance of other national reading assessments. This picture is a little more complicated because the assessments changed significantly in 2016 with the introduction of a new and more demanding curriculum, and therefore there is a broken trend-line. Performance on these tests before and after 2016 cannot be fairly compared – a fact that is often ignored. Nonetheless, there is clear evidence of improvement in both versions of the Key Stage 2 (Year 6) reading tests, which are measures of reading comprehension. It is worth noting that the first cohort of students to perform well in the Phonics Check were in Year 1 in 2016 and will be in Year 6 in 2021, which is when we would expect to see an impact on KS2 results.

Third, there are statistics on Year 4 reading performance from an international assessment called the *Progress in International Reading Literacy Study (PIRLS)*. It also measures reading comprehension. In the latest PIRLS, conducted in 2016, the average reading score for English students was the highest it has been since England first participated in PIRLS in 2001 (the 2001 results had some sampling differences). Importantly, the attainment gap between the highest and lowest performers narrowed considerably in 2016, at the same time as the average score increased. This means that all students improved, but the lowest performers improved the most.

An analysis published in another *peer-reviewed journal article* found that a student's performance on the Year 1 Phonics Check was a good predictor of their performance on PIRLS. That is, students who did well on the Phonics Check in Year 1 were likely to do well on the PIRLS reading assessment in Year 4. Again, it should be noted that the 2016 cohort of PIRLS students did the Year 1 Phonics Check in only the second year of implementation, so we would expect to see a greater average impact in the next cycle of PIRLS, due to be conducted in 2021.

The official statistics for the *Year 1 Phonics Check, Key Stage 2 tests*, and *PIRLS* are all readily available online, and the journal articles cited here are

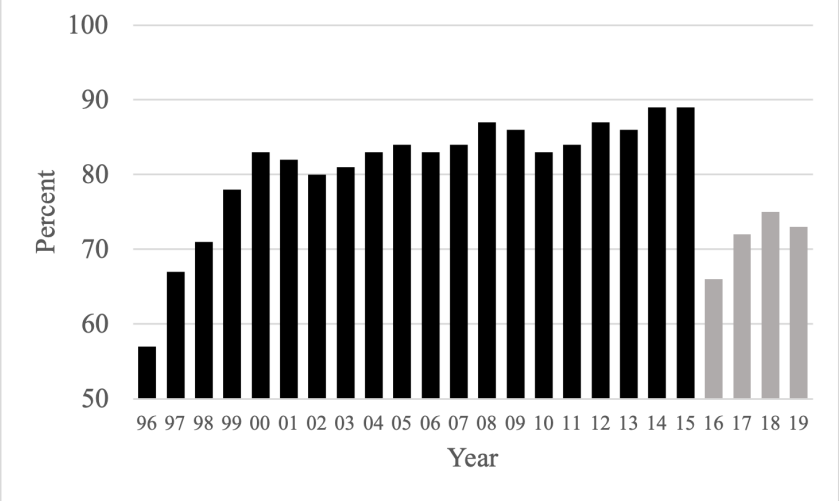

Figure 2. Percentage of students achieving Level 4 or above/Working at expected level in reading in Key Stage 2 tests

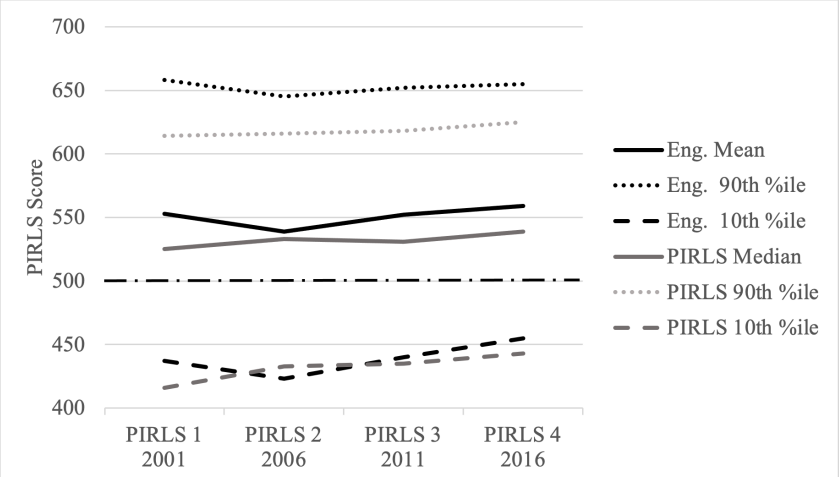

Figure 3. PIRLS mean scores for England and the PIRLS countries with performance levels at the 10th and 90th centiles

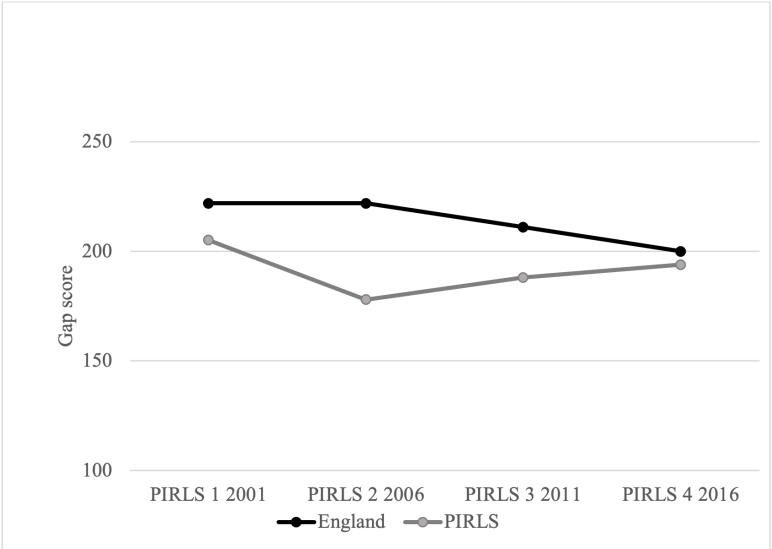

Figure 4. PIRLS attainment gaps between the 90th and 10th centile for England and all participating countries

available from university library databases or from the authors. When people continue to claim that there is no evidence of impact of the Year 1 Phonics Check without acknowledging these statistics and presenting them accurately, it signals that their objection to it is based on something other than objective analysis.

Another unproven criticism of the Year 1 Phonics Check is that it will inevitably cause teachers to skew their teaching towards phonics at the expense of other aspects of reading. The Year 1 Phonics Check is a one-off, five-to seven-minute assessment. The implication that teachers will spend two years teaching towards this single assessment does not put much faith in teachers as professionals. Teachers should, and will, continue to provide instruction and experiences with other aspects of literacy development and assess them accordingly. It is not an either/or proposition. The Phonics Check is an *age-appropriate and valid* curriculum-based assessment that provides useful information about phonics decoding at a critical point in children's reading development.

It is, of course, true that assessment is not just a one-off 'event'. Teachers take note of their students' phonics skills in the classroom each day and use progress monitoring tools, but the Year 1 Phonics Check provides an objective benchmark against which to evaluate formative assessment in the classroom. There are different types of assessment; they do not negate each other. For a teacher who is consistently assessing phonics and decoding with accuracy, the Year 1 Phonics Check will present no challenge whatsoever. Students will achieve well in the assessment if they have had systematic and explicit phonics instruction.

And, finally, there is the assertion that the *Year 1 Phonics Check is unnecessary* because there is a *literacy crisis in secondary schools*. This argument is self-evidently contradictory. The literacy crisis in secondary schools has its roots in primary schools. Almost all of the students who have poor performance in NAPLAN reading tests in Year 7 and 9 have been identified as having poor literacy skills in NAPLAN reading tests in Year 3 and 5. A large proportion of these students have difficulties with reading at the word level that can be *improved with phonics instruction*. Decoding difficulties reduce students' reading volume and experience, stunting their vocabulary growth and comprehension, and creating a *'devastating downward spiral'* of low literacy.

Making sure that all students are accurate and fluent word readers in the early years of school, alongside instruction in vocabulary and comprehension as well as spelling and writing, sets children up for literacy success

Making sure that all students are accurate and fluent word readers in the early years of school, alongside instruction in vocabulary and comprehension as well as spelling and writing, sets children up for literacy success. As described in the *Primary Reading Pledge*, early assessment and intervention including a Phonics Check will eventually reduce the number of students who struggle with reading in secondary school. Again, however, it is not an either/or proposition. Students with reading difficulties at all ages and stages need support.

The introduction of the Year 1 Phonics Check in NSW schools comes after *a voluntary trial* in 520 NSW schools that found that 43 per cent of students met the expected achievement benchmark. Bearing in mind that the trial took place not long after the COVID lockdown, this result is still much lower than ideal. Significantly, though, a survey found that 98 per cent of participating teachers said the assessment provided beneficial information about students' reading skills. The *evaluation of the South Australian trial* in 2017 yielded very similar results for students and positive responses from teachers. Since the trial, results have improved each year of the statewide implementation in South Australia, from 43 per cent achieving the threshold score in 2018, to 52 per cent in 2019, and 63 per cent in 2020.

The Year 1 Phonics Check is a prime example of an evidence-based policy that has been rigorously developed, tested, scrutinised, and evaluated over many years. It has strong research evidence for its *technical and theoretical rationale* and it has growing evidence of the impact in practice. It takes time for changes in early years instruction to take hold and flow through into later years and there are numerous extenuating factors that can mediate the effects, including whether teachers have high-quality professional learning and preparation that allows them to respond to the assessment. Nonetheless, there is good reason to believe that the Year 1 Phonics Check is doing what it was designed to do – assess decoding skills and provide guidance for instruction that will improve reading.

This article originally appeared on The Educator Online.

Dr Jennifer Buckingham (@buckingham_j on Twitter) is Director of Strategy and Senior Research Fellow at MultiLit.

Remote learning didn't affect most NSW primary students in our study academically – but wellbeing suffered

Jenny Gore, Andrew Miller, Jess Harris and Leanne Fray

There have been some reports students fell behind during the remote learning period in 2020.

A report by the *NSW Education Department* found NSW students in Year 3 were up to four months behind in reading in 2020 compared to their 2019 counterparts. Year 9 students were two to three months behind in numeracy.

Modelling by the *Grattan Institute* estimated disadvantaged students – including those from low socioeconomic families, Indigenous backgrounds and remote communities – had lost around two months learning during the remote learning period in Victoria.

However our *research* found only Year 3 students from the least-advantaged schools fell behind academically during the remote learning period. But there was no difference in learning progress between 2020 and the year before in all other Year 3 and 4 students in our sample.

We were able to compare 2019 and 2020

We *collected data* on student achievement in NSW government primary schools during terms 1 and 4 in 2019 and during Term 1 in 2020.

Students in Years 3 and 4 in 2019 sat *progressive achievement tests* in maths and reading in Term 1 in 2019, and then again in Term 4, to see how they had progressed over the year.

We then had Years 3 and 4 students sit the same test in Term 1 of 2020. But then COVID struck.

So we approached the NSW education department about funding collection of the Term 4 data in 2020. We wanted to see if the interruption to normal schooling during the year had affected average student progress from Term 1 to Term 4.

We were uniquely positioned to compare the annual growth in student achievement in 2020 (where the year was interrupted) with our results from 2019.

Students in Years 3 and 4 in 2020 took the same tests as we gave students in 2019. The total of 3030 students across both years, from 97 schools, allowed us to examine the actual effects of the eight-to-ten week system-wide disruption to schooling in NSW caused by the pandemic.

We made sure to compare the results of students who attended schools with a similar Index of Community Socio-Educational Advantage (*ICSEA*). This score takes into account factors such as socioeconomic advantage and whether schools are in a rural area, as well as the proportion of Indigenous students in the school.

We also made sure to compare students with similar baseline test results.

Here's what we found

We found no significant differences, on average, between the 2019 control group and 2020 cohort in student growth in maths or reading.

However, there were some differences when it came to particular groups of students.

Specifically, we looked at the effects for Indigenous students, students in different locations and from different socioeconomic levels (using their school ICSEA).

The *average school ICSEA* in Australia is 1000. Schools in our sample ranged from less than 900 to greater than 1100.

When it came to maths, our results showed:

- Year 3 students from less advantaged schools (ICSEA less than 950) showed two months less academic progress in 2020, compared with the students in the 2019 group
- Year 3 students in mid-range schools (ICSEA 950–1050) actually showed two months' additional progress
- Year 3 students showed no significant difference in the more advantaged schools (ICSEA greater than 1050)
- Year 4 students showed no significant difference in progress regardless of school ICSEA.

When it came to reading, we found no significant differences in academic progress between 2019 and 2020, regardless of school ICSEA.

We saw no significant differences in progress in both maths and reading for Indigenous students or those in regional locations. But the smaller sample of students in these groups means these results should be interpreted with caution.

What this means

Our study provides a counter-narrative to widespread concern about how much students fell behind during the remote learning period.

Indeed, the results are cause for celebration. Most students are, academically, where they are expected to be.

However, the lower achievement growth in maths for Year 3 students in lower ICSEA schools must be addressed as a matter of urgency to avoid further inequities.

Student wellbeing did suffer

We also interviewed 18 teachers and principals, asking them about things like student progress and wellbeing during the remote learning period. These interviews *echo concerns raised by others* about the wellbeing of both students and teachers.

They described the learning from home period as one of significant stress, anxiety and frustration for many families.

They also expressed concern about student wellbeing, even after the return to face-to-face schooling.

Supporting student mental health substantially increased the workload of school counsellors, where available, and of teachers and principals in addressing student behaviour.

One principal said:

> *We've got massive amounts of anxiety in our students. From physical behaviour, oppositional behaviours, kids not wanting to come to school. They're melting down at school … I'm only a primary school, so I have no idea how the high schools are handling it.*

They told us the exponential increase in workload during 2020 has taken its toll on teachers, including a significant drop in morale. Teachers and principals described the pressure of supporting remote learning, regardless of students' access to the internet or a computer, combined with teaching children of essential workers who remained at school.

Their work also included developing and delivering online lessons and providing various forms of support to parents. When schools reopened, staff worked to support student wellbeing and re-establish relationships with their classes. They did this without the support of parent volunteers or the balance that comes from non-classroom activities like school assemblies and excursions that typically punctuate life in schools.

Our study provides a counter-narrative to widespread concern about how much students fell behind during the remote learning period

Our research highlights a need to provide ongoing support to all teachers and students to ensure their wellbeing as the 2021 school year progresses. Let's start with expressing immense gratitude to teachers for ensuring student learning despite the unprecedented circumstances of 2020.

This article was written by Jenny Gore (Laureate Professor of Education, University of Newcastle), Andrew Miller (Senior Lecturer in Education, University of Newcastle), Jess Harris (Associate Professor in Education, University of Newcastle), and Leanne Fray (Senior Research Fellow, University of Newcastle), and it originally appeared on The Conversation.

Mentioning the WARs: Let's do the timed WARP again

Kevin Wheldall

Robyn Wheldall

The assessment of reading ability has a long history in educational psychology and special education. Burt, Schonell, Vernon, Neale, to name but a few, all offered what were known as 'reading tests', to assess the progress of children's reading ability, typically expressed as a reading age (akin to the more general concept of mental age).

Children whose performance was substantially behind that of their peers could thereby be identified and offered 'remedial' assistance. One of the things that these tests had in common was that they were quite time-consuming. Even using a very simple test like the Burt took a long time to assess a whole class of children. If only a quicker and simpler measure were available ...

Another problem was that these standardised reading tests could (or should) only be used infrequently; say, every six or twelve months because of practice effects. Some of these tests offered parallel forms but this barely scratched the surface of the problem. Most reading tests are also insensitive to small changes in reading progress. Educators need to monitor the reading progress of low-progress readers on a very regular basis, in order to make instructional decisions well before the conclusion of a program or the end of a school year.

Curriculum-based measurement (CBM) is a method of assessing growth in basic skill areas. One skill area where this has been widely employed is that of reading. Several curriculum-based measures of reading exist but perhaps the most widely used is oral reading fluency (ORF). ORF is measured by a passage reading test, which requires students to read aloud from a passage of text for one minute, to determine the number of words read correctly per minute. Research on CBM of reading dates back to the early 1980s and continues to the present day. As such, CBM of reading has a large and very sound research base. Many studies have provided evidence of the reliability and validity of CBM of reading. ORF has been found to be a valid indicator of general reading ability including reading comprehension.

An essential feature of this assessment method is that test materials are drawn from the students' curriculum, originally taken directly from a basal reading series. By reading a passage of text, the whole skill of reading is measured, rather than component sub-skills. Research has also demonstrated that CBM of reading is an effective means of monitoring reading progress, particularly that of low-progress readers on, say, a weekly or fortnightly basis, using a set of curriculum-based passage reading tests. This information is then used to make instructional decisions such as increasing the intensity or frequency of instruction and is ideally suited for use within a Response to Intervention (RtI) model.

Too good to be true?

We first became acquainted with curriculum-based measurement (CBM) of

Could it really be the case that one could assess reading progress accurately and reliably by asking a child to read from a passage of text for just one minute and then counting the number of words read correctly? We were dubious.

reading in the early 90s, when we began to read the pioneering research of Stan Deno and his colleagues (*Deno, 1992; Deno et al. 1982*). Quite frankly, it all sounded too good to be true initially. Could it really be the case that one could assess reading progress accurately and reliably by asking a child to read from a passage of text for just one minute and then counting the number of words read correctly? We were dubious. To be convinced we had to collect data of our own; we did and we were.

Our first attempts involved using passages of grade-level text from 'real books' from the curriculum, which were judged to be of about the same level of difficulty, as recommended originally by Deno. This proved to be quite challenging even when using readability formulae to estimate similar levels of text difficulty. Moreover, for our purposes, working with low-progress readers differing in age, we needed passages that were not necessarily grade-related – passages that could be used across grades. It was subsequently determined that such passages need not be literally based in the curriculum, defined narrowly (i.e., the actual books children were reading in class). *Fuchs and Deno (1994)* asked, "Must instructionally useful performance assessment be based in the curriculum?" and concluded that it did not. They interpreted the relevant curriculum as the broader concept of reading per se and that specially composed, novel passages could be used equally well.

Doing the timed WARP again

To this end, the first author (KW) wrote a series of 21 200-word passages of narrative text, each comprising a simple short story. We checked and adjusted the draft passages based on the readability measures provided in Microsoft Word, to make them as similar as possible in terms of reading difficulty. But it soon became clear from our pilot studies that this was not sufficient. The only reliable way of developing parallel passages was to try them out on relevant samples of children (Wheldall & Madelaine, 1997). Dr Alison Madelaine was the major contributor to this enterprise, as part of her doctoral studies, and also compiled extensive reviews of the relevant literature (Madelaine & Wheldall, 1999; 2004). Literally hundreds, if not thousands, of students were assessed on successive versions of what became known as the Wheldall Assessment of Reading Passages or WARP, over a period of several years, to establish its psychometric credibility and to provide performance benchmarks for successive school years. The published edition of the WARP comprises three Initial Assessment Passages and ten Progress Monitoring Passages.

What follows is a brief summary of the process by which the current WARP passages were selected and is fully described in Wheldall and Madelaine (2006). This version of the WARP derives from an analysis of a sample of 261 school students from Years 1 to 5 from the same school. As such, and while clearly not constituting a random sample of students in any sense, it comprised almost the total intake of students from Years 1 to 5 (the likely range of the test) from a school that had been shown to be closely representative of the population of school students in

New South Wales over three successive years. This sample of students were all assessed by trained research assistants on all 21 of the 200-word passages.

The results, in terms of basic descriptive statistics and correlations for all 21 passages are provided in Wheldall and Madelaine (2006). In essence, the results of preliminary analyses replicated all previous WARP studies in that all of the WARP passages were shown to intercorrelate very highly ($r \geq 0.95$), with very similar standard deviations. Mean numbers of words read correctly per minute for the 21 passages (i.e., the difficulty levels of the passages) varied, however. This was in spite of attempts to write all of the passages so as to be at the same level of difficulty and using readability measures. Consequently, the two easiest passages were discarded, as were the six most difficult passages, which were appreciably more difficult than the others. This left 13 passages of a very similar level of difficulty, as determined empirically by these results.

A decision was taken to select three passages, which were the three passages most similar to each other, and to deem that the mean score for this basic set of three Initial Assessment Passages be used as a set for 'one-off' testing for screening and/or placement purposes, for termly assessments and reporting, and for evaluation studies, etc. The three passages were very similar in terms of both mean and standard deviation for words read correctly and also intercorrelated very highly both with each other ($r = 0.97$) and mean passage score over the three passages (0.99).

The remaining ten passages from the 13 passages selected on the basis of their similarity to each other were chosen to yield a set of ten Progress Monitoring Passages. Following an initial assessment, these passages could be used weekly over the course of a typical ten-week term to monitor the progress of individual students. (A more reliable index of progress, reducing the error variance, may be obtained by calculating the running mean of these passages over the weeks or by taking the mean of two successive passages given every fortnight.) The ten passages were similar in terms of both mean and standard deviation for words read correctly, every passage mean being within four points of the mean for the three Initial Assessment Passages and the standard deviation varying by no more than three points from that for the average for the three Initial Assessment Passages. The 10 passages also intercorrelated very highly with each other ($r = 0.95$-0.98) and with the mean passage score of the three Initial Assessment Passages ($r = 0.97$-0.98).

Moreover, the passages showed good validity, confirming the results of our earlier studies. In a study comprising 146 low-progress readers, validity coefficients of 0.80 (range = 0.78-0.80) were found between the WARP mean and the reading accuracy measure on the Neale Analysis of Reading Ability (NARA), and of 0.52 between the WARP mean and the NARA Comprehension score (Madelaine & Wheldall, 1998). A subsequent study sampled the full range of reading ability ($n = 50$) and found higher correlations. The average validity coefficient was 0.87 (range for individual passages = 0.84-0.87) between the WARP and NARA Accuracy; 0.71 (range for individual passages = 0.67-0.72) between the WARP and NARA Comprehension; and 0.85 (range for individual passages = 0.83-0.85) between the WARP and the Burt.

Given their similarity to each other and to the Initial Assessment Passages, their use as parallel Progress Monitoring Passages would therefore appear to be warranted for successive use in monitoring reading progress, following a specific intervention, for example. The passages were deliberately ordered for use, so as to distribute the small differences between passages in such a way that they almost cancel each other out (when running means over two successive passages are calculated, for example). It is recommended that these data obtained be graphed to monitor continuing progress of individual students.

We have developed other CBM assessment tools (collectively known as the WARs), as we develop and evaluate our own suite of reading programs. We will describe the other WARs in the next issue of *Nomanis*. For now, however, our experience is showing that CBM is a quick, reliable, valid and cost-effective method of tracking progress in reading, providing valuable information which enables educators to monitor progress regularly and to make appropriate instructional decisions in order to maximise the reading progress of their students. Watch this space for the next time we mention the WARs!

Disclosure

Kevin and Robyn Wheldall are directors of MultiLit Pty Ltd, in which they have a financial interest. They receive a benefit from the activities of the company and the sale of its programs and products, including the measure that is the subject of this article.

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Emeritus Professor Kevin Wheldall (@KevinWheldall on Twitter), AM, BA, PhD, C.Psychol, MAPS, FASSA, FBPsS, FCollP, FIARLD, FCEDP, served as Professor and Director of Macquarie University Special Education Centre (MUSEC) for over 20 years prior to his retirement in 2011. He is Chairman of MultiLit Pty Ltd and Director of the MultiLit Research Unit and is the author of over three hundred academic books, chapters, and journal articles. In 1995, he established the MultiLit (Making Up Lost Time In Literacy) Initiative, to research and develop intensive literacy interventions. He is a Fellow of the Academy of Social Sciences in Australia, and in 2011 was made a Member (AM) in the Order of Australia.

Dr Robyn Wheldall (formerly Beaman) (@RWheldall on Twitter), BA, PhD, MAICD, was a Research Fellow at Macquarie University until her retirement in 2011 and now continues as an Honorary Fellow. She is a founding director of the University spin-off company MultiLit Pty Ltd, and is the Deputy Director of the MultiLit Research Unit. She jointly authored 'An Evaluation of MultiLit' (2000) (commissioned by the Commonwealth Government) and has published numerous articles in peer reviewed journals. Robyn has extensive experience in the establishment and implementation of intensive literacy programs in community settings. In 2005 she was awarded a Macquarie University Community Outreach Award for her MultiLit work.

Independent research and the Arrowsmith Program

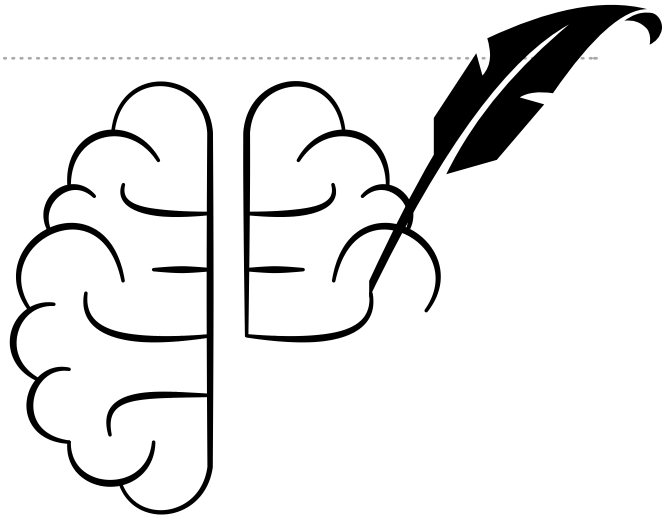
Caroline Bowen

The Arrowsmith Program has promised 'brain training' and increased 'neuroplasticity' since the 1970s. How has it responded to a wave of research findings since then on the acquisition of reading and related skills?

Initiated as a tutoring service in Toronto in the late 1970s by Canadian author, entrepreneur, lecturer, and program director Barbara Arrowsmith-Young, The Arrowsmith Program (Arrowsmith) is promoted as a remedial methodology for specific learning disabilities (SLD) based on neuroscience research and almost four decades' experience of administering its threefold system of "specific cognitive exercises". Arrowsmith emanated from its founder's interpretations of the work of Russian neuropsychologist A.R. Luria (1902–1977) in brain-function localisation theory, neuroplasticity, veterans' recovery from traumatic brain injury (TBI), and investigations by American research psychologist Mark Rosenzweig (1922–2009), who demonstrated that neuroplasticity is lifelong. These interpretations are not supported by Luria's findings, though, and oversimplify Rosenzweig's research (see *Alferink & Farmer-Dougan, 2010* for discussion of the misapplication, in education curricula, of neuroscience research). Referring to Luria's and Rosenzweig's work, in 1977–78 Arrowsmith-Young fashioned a program of intensive, graduated, and strenuous 'cognitive exercises', sometimes called 'brain training', intended to remediate her own multiple, severe learning disabilities, which she claimed "changed her brain" when self-administered (*Brainex Corporation, 2015*). As *Castles and McArthur (2013)* comment, the term *brain training* is somewhat tautological, as all learning happens in the brain. Arrowsmith-Young's disabilities, aspects of which persist, included dyslexia and dyscalculia as well as difficulties with expressive language, "spatial reasoning", logic, "kinaesthetic perception", and incoordination (*Arrowsmith-Young, 2013*).

An 'academic exercise' is work, directly related to curricula, at a school, college, or university, that centres on studying, reasoning, and integrating new knowledge rather than on practical, technical, or underlying skills. For example, learning to read via a structured literacy approach is an academic exercise, directly concerned with denotatively teaching the sub-skills required for reading acquisition and related skills. Structured literacy instruction incorporates "a strong core of highly explicit, systematic teaching of foundation skills such as decoding and spelling skills, as well as explicit teaching of other important components of literacy such as vocabulary, comprehension, and writing" (*International Dyslexia Association, n.d.*).

By contrast, Arrowsmith offers 19 categories of cognitive exercises directed toward's 'brain training'. The exercises are unrelated, or at best, tenuously related to learning to read. Moreover, there is no enlightenment in the works of Luria or Rosenzweig as to the mechanisms whereby the exercises might impact literacy acquisition. Examples of the exercises, which increase in complexity



as the student with SLD works through them, include:

1 Tracing and reproducing letters and numbers from English and other writing systems (e.g., Arabic), and symbols, with an eyepatch covering the left eye. The intent of this pencil-and-paper exercise is to target a skill Arrowsmith-Young calls *Motor Symbol Sequencing* by making the right eye "work harder" (this is not an achievable goal). The exercise is done repeatedly for up to 30 minutes. This is claimed to stimulate the motor cortex in the left hemisphere, so facilitating improved 'tracking' (for reading), more efficient binocular vision, and better responsiveness to visual cues.

2 *Memory for information or instructions* is addressed through having a student listen to the lyrics of a song many times, until they can repeat them from memory. The lyrics are adjusted to become increasingly challenging for the student to remember, as the exercise proceeds. This is said to remediate a deficit in the left temporal lobe.

3 *Broca's speech pronunciation exercise* addresses students' tendencies for mispronunciation and to have small spoken lexicons. Students read, from a computer screen, randomly generated, multisyllabic nonwords (e.g., 'mantieric' and similar sequences), with varying lexical stress; for example: MAN-tie-ric man-tie-RIC man-TIE-ric, over and over. This is intended to help with sound–symbol correspondence, enabling students to learn new words, pronounce words correctly, and to be able to talk and think simultaneously.

The next step in rolling out the program was *not* to circulate the exercises, operationalising them by describing in detail their implementation, so that other adults might follow Arrowsmith-Young's example, or to allow independent researchers to develop evidence of effectiveness. Rather, she commercialised the lessons in 1980 by founding a for-profit school for children with SLD aged six years plus (Grades 1 through 12), which they attend for three to four years in the care of trained Arrowsmith Program teachers. The program has since widened its scope to include youth and adults, too. "Volunteer advocates" are encouraged to promote Arrowsmith to school administrators and the general community. For example, an *Advocacy Guidelines* document is provided, and brochures circulated, prompting parents and teachers to "learn more about advocating for the Arrowsmith Program in your area" and explaining how to go about it.

The Arrowsmith School website read in March 2020, "The Arrowsmith Program is based on the philosophy that it is possible to treat specific learning difficulties by identifying and strengthening cognitive capacities." *Other persuasive Arrowsmith websites* contain real and self-created 'scientific' terminology, apparently to emphasise Arrowsmith's neuroscientific credentials. Clearly defined terms that are commonly used in bona fide neuroscience and related disciplines include 'brain-imaging', 'synapse', 'neuron', and 'neuroplasticity'. The self-created terms found in the Arrowsmith materials include "artefactual thinking", "mental initiative", "cognitive-curricular research", "large scale brain networks", "quantification sense", "spatial reasoning", and "targeted cognitive exercises".

Neuroplasticity

Bishop (2013, p. 248) observed, "Essentially, saying the brain is plastic and not fixed boils down to saying that children can learn new things – hardly a remarkable finding." Nonetheless, many reading interventions and all-embracing "learning disorders" nostrums (explored in *Bowen & Snow, 2017, pp. 220–255*) carry overt or thinly disguised undertakings to "change your, or your child's brain" through "brain training". Arrowsmith-Young claims to have changed her own brain so radically that she overcame serious learning problems, presenting her strategy as a scientific breakthrough-intervention that can be applied to others.

Neuroplasticity is an attested, complex, multidimensional, and primary property of the brain and the subject of extensive peer-reviewed research. Often comparatively limited in adults, it is the brain's capacity to reorganise itself by forming new neurons and neural networks in response to any combination of development, environmental change, new learning, new situations, sensory stimulation, damage, or dysfunction. Most active in infancy and childhood, neuroplasticity sees well-utilised connections or 'synapses' between brain cells strengthening, and disused ones weakening or decaying. By changing neural connections and behaviour, the brain can potentially compensate for the effects of injury (e.g., TBI or stroke), loss (e.g., adjusting to paraplegia or amputation or to losing an eye), conditions (e.g., hearing impairment) and disease (e.g., multiple sclerosis).

Less dramatically, but no less obviously, commonplace activities and experiences change our brains. For example, a good night's sleep, a hearty lunch after an energetic hike, mastering the butterfly stroke, consuming chocolate, reading an illuminating article, learning to pronounce 'covfefe', or laughing helplessly at a friend's hilarious story change the brain.

Brains adapt depending on how they are stimulated, but knowing this simple fact cannot inform teachers and other professionals how the brain should be stimulated (i.e., what exercises should be done) in order to rectify learning difficulties. There is no evidence or underlying theory to support claims that 'cognitive exercises' or 'brain training' can selectively target brain regions to improve performance and improve academic outcomes.

A mental workout for the brain

The Arrowsmith protocol, as described in the Arrowsmith School brochure (dated May 2018) comprises a suite of over 12,000 discrete levels of exercise, refined and updated once annually (at the end of each school year) for each student. The protocol entails: "written, visual and auditory" computer exercises that are asserted to target comprehension, face recognition, landmark recognition, logic, numeracy, reading, reasoning, and visual memory for symbol patterns; auditory exercises that purportedly advance students' memory functions, oral and written expression and vocabulary; and, pen and paper exercises that claim to build "the cognitive capacities" essential to developing the motoric skills needed for "mechanical aspects" of communicating nonverbally, executive functioning, organising, planning and writing.

The intent of the exercises is to capitalise on neuroplasticity, by selectively strengthening the "weak cognitive capacities" underlying students' "learning dysfunctions". Deficits are thereby remediated across 19 localised areas of brain function (or dysfunction), specified and described in a nutshell, with no references to the scientific literature, by Arrowsmith proponents. At no point do students focus on reading in order to improve reading, or spelling in order to improve spelling, or on any other curriculum area – specified in the structured literacy definition (*International Dyslexia Association, n.d.*) above – in order to improve performance in that area.

Scientific discourse, in education, medicine, neuroanatomy, neurophysiology, various branches of psychology, speech-language pathology, and related disciplines, does not support some of the dysfunctions Arrowsmith-Young recognises. These include: the Broca's speech pronunciation deficit – located in Broca's area – detrimental to articulation, vocabulary, and speaking and thinking concurrently; the auditory speech discrimination deficit – housed in the superior temporal lobe – blocking the ability to recognise rhyming words; the symbolic thinking deficit – situated in the prefrontal cortex – giving rise to a short attention span and limiting "mental initiative"; and the "kinaesthetic perception deficit" – positioned in the somatosensory area of the parietal lobe – causing ungainliness, a tendency to crash into objects, and sometimes manifesting as messy handwriting. According to Arrowsmith proponents, the exercises are analogous to a "workout": in this case, a "mental workout for the brain" where "under-functioning areas are treated like weak muscles and are intensely stimulated through cognitive exercises."

Anecdotes from Arrowsmith advocates claim the method is successful for elementary school children, adolescents and adults. They claim when used over three to four years, difficulties with attention, auditory memory, comprehension, dyslexia, logical reasoning, mathematics, problem-solving, processing speed, nonverbal learning, reading, visual memory and writing are all improved.

Specialised schools and self-contained classrooms in mainstream schools

All treatment takes place within six specialised schools: five in Canada and one in the US, or in self-contained classes comprised only of children with the said "learning dysfunctions". Such classrooms have been established in more than 100 mainstream schools, internationally. Between 2005 and 2012, Howard Eaton opened four Eaton Arrowsmith schools, which he owns and operates: three in British Columbia and one in Redmond, Washington. The Eaton Arrowsmith schools solicit international enrolments, with students coming from Australia, Taiwan, the UK and the US/International enrolments at Arrowsmith-Young's Toronto and Peterborough campuses, owned and operated by her, have included students from Australia, the United Arab Emirates and the US.

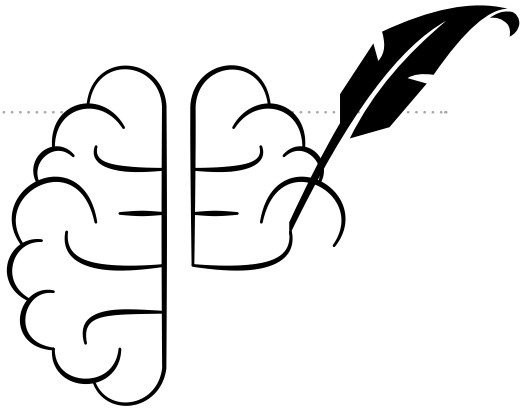
For school-aged students in the full-time program, mornings are spent in mathematics and English classes (two periods), with a student-to-teacher ratio of 7:1, while afternoons are devoted to six periods of the cognitive exercises. This means that the students do not have access to the regular school curriculum and attendant interaction with peers and teachers. Arrowsmith-Young cautions that, "Upon completion of the program some students may require one to two years to gain experience using their newly strengthened cognitive capacities and some students may need tutoring initially to bring academic skills to grade level given their gaps in academic learning."

The Arrowsmith Program Cognitive Profile Questionnaire

Over 30 minutes, this author carefully completed the *Arrowsmith Program Cognitive Profile Questionnaire* as an 'acquaintance' of "Pseudonym" (the name entered in the questionnaire), based on a real typically developing girl approaching her ninth birthday. Pseudo has age-typical literacy acquisition, has completed Year 3 in a New South Wales public school, and was to proceed to Year 4 in late January 2019.

Reflecting Pseudo's abilities, at 8:11 (years:months), the responses to survey items, from a choice of five, were most often marked as "not a problem" (e.g., for "she has a tendency to bump into doorways, objects, or people" "her handshake is weak" "she is bullied" and "her speech sounds slurred"), "sometimes" for several items (e.g., for "she mispronounces words" "she has trouble understanding someone with an accent", "she is teased"; and "she forgets instructions when she is distracted"), and "don't know" for six items ("she forgets what the teacher asked her to do for homework", "she makes careless errors in mathematics", "she has difficulty learning from her mistakes on her exams", "she has particular difficulty learning phonetic based foreign languages" "she is not worried in situations where she should be", and "she has difficulty understanding relational formulas"). None of the items warranted responses of "most of the time" or "all the time."

Seven months previously, at 8:4, Pseudo was lagging behind her peers in reading but was a strong speller with a Peabody Picture Vocabulary Test percentile ranking of 92. From 8:5, she participated reluctantly, but conscientiously in 20 weeks of MultiLit, an intensive, robustly evidence-based literacy intervention program (*Wheldall & Wheldall, 2014*; *Wheldall, et al., 2017*). At 8:11, she was dismissed from MultiLit



Based on the answers you provided, you have identified concerns in the cognitive areas that are associated with:

Recognizing and recalling symbols and symbol patterns.

Problems in this area are linked to difficulty with word recognition, spelling, remembering symbol patterns such as mathematical or chemical equations; slow reading speed. [Symbol Recognition]

---- Notes ---

For assessment and enrollment possibilities in Toronto, please visit Arrowsmith School Toronto

For assessment and enrollment possibilities in Peterborough, please visit Arrowsmith School Peterborough

To enquire about enrollment possibilities in an Arrowsmith Program, contact one of the Participating Schools

To learn more about the Arrowsmith Program, please visit our website

To gain further understanding of these cognitive functions please read Arrowsmith Program's Description of Learning Dysfunctions

Figure 1. Arrowsmith Program Cognitive Profile Questionnaire report for Pseudo 18/12/18

with literacy skills in the 68th to 77th percentiles, with intensive intervention now "not recommended". Pseudo is an articulate, confident, sociable, popular, trumpet-playing child, excelling in sports, dance, music and gymnastics. She reads voraciously and is an enthusiastic 'leader' among her peers. She performs at grade level or above across the curriculum, with no problematic attentional, behavioural, conduct, emotional, perceptual, or school attainment issues (and clearly, no SLD). She has good self-esteem but said the need to do MultiLit made her "feel dumb".

Questionnaire report

The Arrowsmith Program Cognitive Profile Questionnaire report, which remained online for several months, is displayed in Figure 1 (above). It noted that Pseudo had difficulty with symbol recognition. The expected difficulties associated with this were listed as follows: "Poor word recognition, slow reading, difficulty with spelling, trouble remembering symbol patterns such as mathematical or chemical equations". The report contained an unresponsive link to enrolment possibilities at "participating schools".

Arrowsmith options

Alternatives to the full-day program were offered in the form of Eaton Arrowsmith (half-day), Eaton Arrowsmith (part-time), Magnussen Motor Symbol Sequencing Program Summer, Cognitive Intensive Program Summer, Cognitive Extension Program, Eaton Arrowsmith Adults (full-time), Eaton Arrowsmith Adults (part-time), Cognitive Enhancement Program for Children (part-time) and Cognitive Enhancement Program for Adults (part-time).

Some schools across Canada have embraced Arrowsmith, which has affiliates (licensees) hosting self-contained classes in Australia, the Cayman Islands, South Korea, Spain, Malaysia, New Zealand, Thailand and the US. Arrowsmith-Young maintains a strict policy that only schools that have been established for five or more years, with an enrolment of at least 100 students, are eligible to "lease" the program. A Program Coordinator is assigned to each site to offer training, support, and professional development in the Arrowsmith "methods and communication". Prospective Arrowsmith teachers undertake a three-week teacher training course that includes "a comprehensive Reference Manual and ongoing web-based professional development seminars throughout the year".

In terms of outcomes, the March 2020 *Arrowsmith website section for frequently asked questions* indicates, "Students that we have followed up to 30 years after completion of the program have maintained their improvements. Once the improvements are in place, it is hypothesised that the individual maintains this gain by using the cognitive area in everyday functioning." There is no mention of the additional two years' experience, or the possible need for tutoring to bring schoolwork up to speed.

The question of evidence

In 2018, 2019 and 2020, the Arrowsmith Frequently Asked Questions page of the website read: "The Arrowsmith Program Research Team headed by Arrowsmith Program Director, Barbara Arrowsmith-Young, Arrowsmith Program Executive Director, Debbie Gilmore is currently working with researchers to design and conduct studies in various disciplines, including education, psychology, and neuroscience. These studies will investigate the changes in the brain as well as academic, cognitive, emotional and social outcomes that occur for students engaged in the Arrowsmith Program. It is expected that the results of these current studies will be published in peer-reviewed journals upon completion."

The exact content of the Arrowsmith Program has always been proprietary, with only approved, paying, licensed schools, and Arrowsmith-trained teachers having access to it. It is not available, therefore, to the general public, or to independent researchers such as neuroscientists, wishing to scientifically examine it for evidence that it works. So, despite its longevity, Arrowsmith has not been scrutinised empirically, impartially, and rigorously for *Olswang's (1998)* four E's of treatment outcomes. What are its effects (what does it do?), efficacy (does it produce intended outcomes, or could change be accounted for by something else that is happening in a student's life?), effectiveness (does it do what it sets out to do?), and efficiency (does it produce a result using more

or less materials, equipment, time, energy, human resources and money than competing interventions?). On the question of cost, *the fees are by many standards high*, and if the licensee is a private school, families pay school tuition and Arrowsmith fees.

Because the science of intervention for slow- or low-progress readers and children with related learning difficulties has moved on (*Seidenberg, 2017*) alongside neuroscience (*D'Mello & Gabrieli, 2018*) since Arrowsmith-Young's revelations in the late 1970s, there are more questions to be asked. Has the program (or have the programs) been subject to internal development? Has Arrowsmith been streamlined over time such that some components were discarded, and others added in light of new research, thereby leaving the 'essentials' or active ingredients of the method? What is the mechanism whereby the Arrowsmith exercises selectively enhance performance in discrete brain areas, thereby improving 'underlying' skills, with a flow-on to academic achievement?

Widespread criticism

Scholars and practitioners, well-versed in evidence-based education (EBE) in teaching circles, and evidence-based practice (EBP) in clinical modalities of neurology, psychology, and speech-language pathology, have taken issue with the claims of Arrowsmith-Young and other Arrowsmith proponents like Norman Doidge (*Doidge, 2007*) and Howard Eaton (*Eaton, 2018*). Critics claim Arrowsmith is unsound because its scientific rationale is wanting, is unsupported by juried research evidence, and is based on the premise that reading and other aspects of learning will be improved by working on supposed 'underlying' abilities. Prominent among the many international critics are Dorothy Bishop (psychologist, see *Bishop, 2015*), Anne Castles, Genevieve McArthur (*Castles & McArthur, 2013*), and Max Coltheart (*Coltheart, 2014*; *Jacks, 2016*), Linda Siegel (cognitive psychologist, see *Siegel, 2012*), and Pamela Snow (cognitive psychologist and speech-language pathologist, see *Snow, 2015*; *Bowen & Snow, 2017, pp. 234–236*).

A search in March, 2020 of the Google Scholar, ProQuest Central, ProQuest Social Sciences Premium Collection, Web of Science, and Education Resource Information Center (ERIC) databases returned no papers with the term 'Arrowsmith Program', or variations of it, in the title. Nonetheless, the Arrowsmith publicity and marketing materials refer repeatedly to "peer reviewed research" (e.g., *Brainex Corporation, 2015*), "over the last several decades" and electronic sources point to screen shots of conference posters – which is not equivalent to peer-reviewed publications. The Arrowsmith Program offers studies with small sample sizes of five, seven and 15 participants, as well as in-house reports and testimonials from satisfied consumers. Testimonials are unconvincing in intervention contexts due to inherent cherry-picking bias, the absence of accounts from dissatisfied clients, the lack of a distinction between who did and did not benefit (no program has a 100 per cent success rate) and why, or the unexpected or negative consequences for at least some recipients.

Flawed science

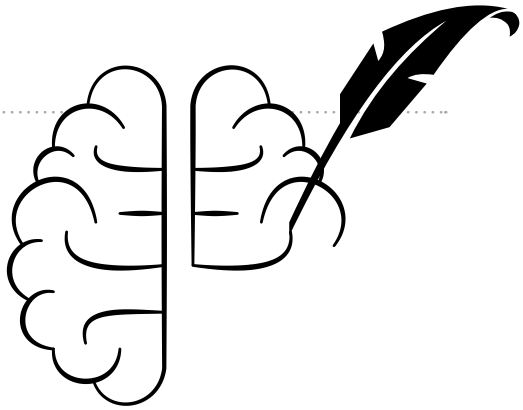
Full text of one published, peer-reviewed paper by *Weber and colleagues (2019)* is available. They recruited 28 full-time Arrowsmith school students aged 9:5–16:8 in their first academic year of a three- or four-year Arrowsmith Program, with an average school attendance rate of 9.2 months. Reportedly, the students had histories of "learning challenges" but there is no indication that they had confirmed diagnoses of learning disability. Of them, 9/28 performed within normative expectations in all academic domains at baseline, and 19/28 performed below age expectations on at least one measure of reading, writing or mathematics (implying that one or some of them had measurable difficulty in just one academic domain). They completed pre- and post-intervention Woodcock-Johnson cognitive and achievement tests (*McGrew, et al., 2007*) and underwent magnetic resonance imaging (MRI) within two weeks of those tests. Weber and colleagues concluded that Arrowsmith may be associated with improvements in cognitive and academic skills, while stressing that their results were preliminary, and analyses were mostly "exploratory" in nature.

The authors readily acknowledged that the study had limitations. The most serious deficiency was the lack of control group comparisons. This was unexpected, because in 2016 the director of the Brain Behaviour Lab where the research was conducted, wrote, "We are now planning to study a total of 90 children from three groups: 1) children with learning disabilities who are enrolled in the Arrowsmith program, 2) children with learning disabilities who are enrolled in other educational programs, and 3) typically developing children who are matched for age and sex" (*Boyd, 2016*).

Without controls, all the authors show are modest improvements in reading, writing and math, and no improvements in working memory and auditory processing, over the school year. The design does not allow a reader, or the researchers themselves, to determine whether gains were due to 1) Arrowsmith; 2) concomitant engagement with the normal curriculum (comprising academic exercises, explained above); 3) development – this is unlikely because standard scores should adjust for age, although when the follow-up period is brief enough, sometimes a child's score can be calculated relative to the same age-band on two occasions, and then it does become an issue; or 4) a combination of all or some of these.

There are three other issues related to the testing: potential practice effects, regression to the mean, and blinding (masking).

- **Practice effects:** It is usually assumed that standardised tests are not subject to practice effects, but they often are, as they are not designed for repeated administration.
- **Regression to the mean:** In statistics, regression to the mean is a phenomenon in which data even out; so, a variable that is outside the norm eventually tends to return to the norm. In other words, if a variable is extreme the first time you measure it (in this instance, low), it will be closer to the average on the next measurement occasion. Regression to the mean



is an issue for Weber et al. because they used the same pre- and post-test measures with low scores at baseline.

- **Blinding (masking):** In clinical research, the term blinding refers to concealing, from one or more individuals involved in a study, which participants are assigned to a treatment group, and which are put in a control group. Its purpose is to reduce the risk of bias. Group allocation can be masked if there is a control group, but not otherwise. If the graduate research assistants who performed the tests were fully informed, they knew that the 28 students comprised a treatment group, and that they were Arrowsmith students, so presumably students with SLD.

Reviewing the further limitations of their study, Weber et al. noted their small sample size, the lack of additional years of longitudinal data for analysis, and the possibility that the neuroimaging analyses may have been limited. Certain weaknesses were not mentioned in the limitations section of the report. Weber et al.'s descriptions of the exercises in the program add nothing that cannot be determined via an online search. It is unclear, therefore, to what degree the Arrowsmith hierarchy cooperated with the researchers, other than contributing as a donor to the Brain Behaviour Laboratory. For example, was the policy of only allowing approved, paying, licensed schools and Arrowsmith-trained teachers to know the content of the program (specifically each child's program), relaxed? Whatever the case, a reader still does not know exactly what Arrowsmith students must do in performing the 19 categories of exercises. Weber et al. note that the exercises are individualised for each student, but, again, with no details of 1) how the "individualisation" is achieved; 2) how the 28 individualised intervention plans might differ from each other; or 3) what the 28 students practised. Finally, because the students' intervention is not described in adequate detail, independent replication will be challenging.

Future opportunities

There are longstanding ideology-versus-science differences within the education landscape among those who disagree about how children should best be taught to read, with whole language proponents in the ideologic corner and evidence-focused phonics proponents in the other. This notwithstanding, there is broad agreement on the centrality of the 'five big ideas' of reading instruction described and recommended in the outcomes of the three (to date) national inquiries into the teaching of reading: one each in the USA (*the National Reading Panel in 2000*), Australia (National Inquiry into the Teaching of Literacy; *Rowe, 2005*) and the UK (the Independent Review of the Teaching of Early Reading; *Rose, 2006*). They are vocabulary, comprehension, fluency, phonemic awareness and phonics-based instruction *(Bowen & Snow, 2017, pp. 223–225; Buckingham et al., 2013*). Children (and adults) with reading difficulties also need those five, in a combination that is individualised, and closely monitored for each student. The delivery should be intensive, explicitly focused on reading per se and not a set of disparate sub-skills, individualised according to expert initial and regular ongoing assessment (and not only annual assessment).

Over time, a scalable solution to the high incidence of SLD in general, and reading difficulties in particular, would begin with pre-service educators (trainee teachers) having solid grounding in EBE and the five big ideas, exemplified by the structured literacy approach (*Spear-Swerling, 2019*). A focus on EBE at university and in teachers' continuing professional development activities might help teachers become more critical, information-and-research-literate consumers of the scientific literature. They would then be better equipped to discern effective literacy instruction methods, whether for typically developing children or for children and older individuals with SLD. Such teaching strategies would be grounded in high levels of evidence and have good fidelity when implemented in real-world classrooms. Teachers who are so armed are well prepared to implement evidence-based instruction themselves, across typical and atypical populations. Furthermore, they are in a strong position to guide families, colleagues, and school administrators toward appropriate, efficacious, and efficient literacy instruction methodologies for SLD populations, including low- and slow-progress readers.

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Caroline Bowen (@speechwoman on Twitter), AM, PhD, worked in Australia as a clinical Speech-Language Pathologist (SLP) for 42 years, retiring in 2011. She is known in SLP circles for her www.speech-language-therapy.com website and interests in children's speech sound disorders (SSD), the internet for SLP professional purposes, the role of families in intervention, and the influences of science and pseudoscience on health and education professional practice. Bowen has authored numerous articles around these topics and several books. Since 2005 she has presented SSD- and/or EBP-related continuing professional development events in 21 countries. Caroline is a Senior Honorary Research Fellow in Linguistics at Macquarie University in Sydney, Australia; an Honorary Research Fellow in the School of Health Sciences (SLP) at the University of KwaZulu-Natal in Durban, South Africa; and an Adjunct Fellow, Graduate School of Health, University of Technology, Sydney. She is also a Certified Practising Member of Speech Pathology Australia, a Fellow of the American Speech-Language-Hearing Association, a Life Member of the NSW Private Practitioners' Network of Speech Pathology Australia, a Life Member of Speech Pathology Australia, and an Honorary Fellow of the Royal College of Speech and Language Therapists. She was honoured with an AM (Member of the Order of Australia) in 2018.

Sugata Mitra and the Hole in the Research

Tom Bennett

In *The Shawshank Redemption*, Andy Dufresne escapes from the titular jail by finally crawling through the sewage pipe, clawing his way, hand over hand, through a river of turds before he emerges into a storm that washes him clean. It's a good scene. Every time I read someone claim that children will teach themselves maths and English if you only give them a computer, I feel like I'm watching that scene, but in reverse.

I'm talking about Sugata Mitra, of course. *According to a coy headline* for an article that appeared a few years ago on *TES*, 'Internet learning boosts performance by seven years'.

> *Pupils can perform at more than seven years above their expected academic level by using the internet, a pioneering study has concluded. Professor Sugata Mitra found that eight- and nine-year-olds who were allowed to do online research before answering GCSE questions remembered what they had learned three months later when tested under exam conditions. Now the Newcastle University academic is giving undergraduate-level exams to 14-year-olds, and has told TES that these students are also achieving results far beyond their chronological age. Professor Mitra, whose famous Hole in the Wall experiment showed how children in a Delhi slum could learn independently if given access to the internet, argues that his latest work in the UK could challenge the entire exam system. A reliance on testing memory means that other cognitive skills are not being adequately stretched, he believes.*

Professor Mitra is famous for his "Hole In The Wall" experiment:

> *In the initial experiment, a computer was placed in a kiosk in a wall in a slum at Kalkaji, Delhi and children were allowed to use it freely. The experiment aimed at proving that children could be taught by computers very easily without any formal training. Mitra termed this Minimally Invasive Education (MIE)…. This work demonstrated that groups of children, irrespective of who or where they are, can learn to use computers and the Internet on their own with public computers in open spaces such as roads and playgrounds, even without knowing English. Click here for more*

These are big claims indeed, and many people have believed them, some of them with Monopoly cheque books. Mitra won the TED prize in 2013 (which now seems designed solely to annoy me) and US$1 million. Many more sponsors have queued up to support it, which must be the first time anyone has queued up to put money *into* a hole in the wall.

Unfortunately, Donald Clark has fairly comprehensively debunked many of the HITW claims, *most notably here*. The allegedly miraculous learning hotspots had been largely vandalised and cannibalised; those that were left were dominated by older male children who used them not for teaching themselves Mandarin or critical race theory, but playing games and, I imagine, downloading stag flicks. It seems to me that the more outlandish the magic bullet claim in education, the more someone is willing to pay to subsidise it – and the less critical people become of it. But Mitra's work taps into zeitgeists that are very, very groovy indeed: student-guided learning, the perpetually-approaching-but-not-quite-here-yet tech revolution of education, and the need to replace the ossified dogma of factory-farm learning.

His web page lists science fiction as one of his interests. I fear this passion has bled into the research. It's proper to play the ball, not the man, so I'll confine my comments to pointing out that Professor Mitra has a BSc, a MSc and a PhD in physics, not cognitive psychology, education or anything apparently related to learning, classrooms or pupils. Still, feel free to have a punt, mate, everyone's an expert in education.

"The findings on primary pupils answering GSCE questions were revealed in a paper published to little fanfare earlier this year," the feature in TES says. There may well be a reason nobody got their trumpets out.

Christian Bokhove of the University of Southampton has written *an important blog* about what he calls predatory journals; publishing platforms of ill repute where *caveat emptor* should be the reader's watchword, where almost anything can be published for instant, superficial credibility. He refers to Beall's List, a searchable database of journals that act more like vanity presses for desperate academics than respectable outlets for peer review. Read *more here*, but suffice it to say that Professor Mitra's work appeared in a very, er, boutique publication that features on Beall's List. Which, of course, isn't to say it isn't perfectly respectable. Of course. I'm just saying it's on that list.

Besides, there was a little bit of brass action when it came out – just more of a 'Last Post' than a fanfare.

You can find *the actual publication here*. In essence, what Professor Mitra and co did was this: they took groups of eight- and nine-year-old students, assigned a group research task to them exploring a specific question relevant to a GCSE exam, tested them for recall, and then tested them a few months later. The Year 4 pupils performed better in the later test. Professor Mitra's conclusions contained the ideas that a) students could self-organise their own learning with minimal input from a facilitator (which is essentially the conclusion of the 'Hole In The Wall' caper), plus b) they remembered it so well that it showed our exams over-emphasised factual recall at the expense of other faculties.

It's quite a read. To my mind, it represents a lot of what can go wrong in educational research. The design of the experiment is quite odd. *It's explained succinctly here*.

But for brevity's sake, I'll mention my highlights. For a start, it's based on – wait for it – 23 students. You heard me: 23 students. Roll that about for a while, really rub your tongue around it. That's tiny, – statistically meaningless. Secondly, are we somehow saying that students who collaboratively learn from the internet will improve as time passes with no intervening intervention? Holy smoke, we just invented educational cold fusion.

You'll forgive me for not being particularly impressed by hand-picked students taking part in a test where they're made to feel special, given a thin slice of a syllabus to work on, and then tested for that exact piece of syllabus …and then scaling up that work into a magic GCSE grade. Give me a page of quantum physics to memorise, then ask me about it. Can I have a PhD?

The claim that children can teach themselves perfectly well using only a computer seems, to my poor mind, utterly unproven. I've taught a loooot of pupils with largely unfettered access to computer-based projects, and unless you hover like a drone on some of their shoulders, they'll be cruising Fifa emulators and googling PewDiePie all lesson. What about them? This belief in the power of children to self-organise and self-tutor is, to me, a faith-based position. Who needs those bloody teachers, eh? Because that's what this seems like to me: a somewhat brutal rejection of the power of teacher-guided education.

Further, the project seems to be pursuing an utterly overt agenda of disputing the way we assess pupils. Lord knows we've got leagues to go in this area, but presenting a tiny case study as some kind of evidence that we over-teach facts isn't helpful. It seems like more of a pub philosopher's opinion on education, a kind of "Who needs school when you've got Google?" for the Kardashian generation.

I've seen Professor Mitra speak, and I have absolutely no doubt that he is committed entirely to the education of children, and to this idea as a possible solution to the global education deficit. Unfortunately, this isn't it, and good intentions are a worthless currency when almost everyone in the educational ecosystem has them. I would care less about this but people with money are listening to him. People with educational budgets are wondering if all they need to do is cut a few teachers and buy a few laptops, teachers eager to impress or improve are binding children to group work and self-led projects when they should be … well, teaching them.

Children matter too much for their one chance for education to be blown on the roulette wheel of unfathomably bad science. Here's to all the teachers trying to make a difference.

This article originally appeared on the author's blog, Tom Bennett's School Report.

Tom Bennett (@tombennett71 on Twitter) is the founder of researchED, a grassroots organisation that raises research literacy in education. Since 2013, researchED has visited three continents and six countries, attracting thousands of followers. In 2015, he became the UK government's school 'Behaviour Tzar', advising on behaviour policy. He has written four books about teacher training, and in 2015 he was long-listed as one of the world's top teachers in the GEMS Global Teacher Prize.

After a year of digital learning and virtual teaching, let's hear it for the joy of a real book

Kathryn MacCallum

We know COVID-19 and its associated changes to our work and learning habits caused a marked increase in the use of technology. More surprising, perhaps, is the impact these lockdowns have had on children's and young people's self-reported enjoyment of books and the overall positive impact this has made on reading rates.

A *recent survey* from the UK, for example, showed children were spending 34.5 per cent more time reading than they were before lockdown. Their perceived enjoyment of reading had increased by 8 per cent.

This seems logical – locked down with less to do means more time for other activities. But with the increase in other distractions, especially the digital kind, it's encouraging to see many young people still gravitate towards reading, given the opportunity.

In general, most children still read physical books, but the survey showed a small increase in their use of audiobooks and digital devices. Audiobooks were particularly popular with boys and contributed to an overall increase in their interest in reading and writing.

There is no doubt, however, that digital texts are becoming more commonplace in schools, and there is a growing body of research exploring their influence. *One such study* showed no direct relationship between how often teachers used digital reading instruction and activities and their students' actual engagement or reading confidence.

What the study did show, however, was a direct, negative relationship between how often teachers had their students use computers or tablets for reading activities and how much the students liked reading.

These findings suggest physical books continue to play a critical role in fostering young children's love of reading and learning. At a time when technology is clearly influencing reading habits and teaching practices, can we really expect the love of reading to be fostered by sitting alone on a digital device?

The limitations of ebooks

In schools and homes we often see ebooks being used to support independent reading. As teachers and parents, we have started to rely on these tools to support our emerging readers. But over-reliance has meant losing the potential for engagement and conversation.

Studies have shown children *perform better* when reading with an adult, and this is often a richer experience with a print book than with an ebook.

Reading when we're young is still a communal experience. My own seven-year-old is at the age when reading to me at night is a crucial part of his development as a reader. Relying on him to sit on his own and read from his device will never work.

Studies have shown the extra features of ebooks, such as pop-ups, animation and sound, can actually distract the learner, detracting from the reading experience and reducing comprehension of the text

This is not to deny the usefulness of ebooks. Their adoption in schools has been led by the desire to better support learners. They provide teachers with an *extensive library* of titles and features designed to entice and motivate.

These embedded features provide new ways of helping children decode language and also offer vital support for children with *special needs*, such as dyslexia and impaired vision.

The research, however, suggests caution rather than a wholesale adoption of ebooks. Studies have shown the extra features of ebooks, such as pop-ups, animation and sound, can actually distract the learner, *detracting from the reading experience* and *reducing comprehension* of the text.

The book as object

Real books may lack these interactive features but their visual and tactile nature plays a strong role in engaging the reader.

Because books exist in the same physical space as their readers – scattered and found objects rather than apps on a screen – they introduce the *role of choice*, one of the big influences on engagement.

While generally a reluctant reader, my child loves to flick through books and look at the pictures. He might not necessarily read every word, but books such as *Dog Man*, *Captain Underpants* and *Bad Guys* have provided a fantastic opportunity to engage him.

We have even managed to link reading with our children's favourite online games. Their *Minecraft* manuals have become valuable resources and are even taken to friends' houses on play-dates.

Many of our books are not in the best shape, evidence they are lived with and loved. Second-hand shops and school fairs provide a cheap option for adding variety, and libraries are also valuable for supplementing the home shelves.

Keeping it real

Cuts to library budgets and collections, such as have been announced recently by *Wellington Central Library*, threaten to further undermine the role of the physical book in children's lives.

School libraries, too, are often the *first space to be sacrificed* when budgets and space restrictions tighten. This encourages the uptake of digital books and further reinforces a reliance on technological alternatives.

Of course, digital technology plays an important role in supporting children to engage and learn, often in *powerful new ways* that would otherwise be impossible.

But in our haste to adopt and rely on 'digital solutions' without clear justification or consideration of their effective use, we risk undervaluing the power of objects made from paper and ink.

As we emerge from a pandemic that has accelerated digital progress, we can't let these developments obscure the place of real books in real – as opposed to virtual – lives.

This article was written by Kathryn MacCallum, Associate Professor, University of Canterbury, and it originally appeared in The Conversation.

Two sides of a single coin – speech-to-print, print-to-speech – let's not devalue the currency

Anna Desjardins

In the world of reading instruction, the terms 'print-to-speech' and 'speech-to-print' have become confusing and unnecessarily divisive. This is because they have been used to categorise both the composite skills required for competent reading and spelling, and whole frameworks within which these composite skills can be taught.

When referring to the composite skills involved in spelling and reading (at the word level):

- **Print-to-speech** skills are those required for **decoding**. To read words, graphemes (letters and letter combinations) must be translated into speech sounds, then blended together to produce spoken words in our vocabulary.
- **Speech-to-print** skills are those required for **encoding**. To write words, spoken words must be segmented into speech sounds and these sounds must then be translated into graphemes.

Both of these skills rely on a knowledge of phonics (how speech sounds correspond to graphemes) and, consequently, phonics instruction is one of the crucial elements required in any comprehensive approach to teaching literacy (alongside explicit instruction in phonemic awareness, fluency, vocabulary and comprehension).

So far, so good. We know children need to be able to translate from print-to-speech when reading, and from speech-to-print when writing. We can help them develop these skills by teaching them phonics. However, now we hit a snag, because phonics can be taught in different ways and, unhelpfully, a dichotomy has developed between phonics instruction categorised as print-to-speech versus instruction categorised as speech-to-print.

What do these labels mean in the context of instruction? Given the definitions above, you could be forgiven for thinking that in one approach children are taught only how to decode or read, while in the other they are taught only how to encode or spell. But this is not what is intended.

When used to categorise the whole framework within which phonics is taught:

- **Print-to-speech** approaches take as their starting point the graphemes of English and teach how these graphemes correspond to sounds. A sequence of lessons is organised around the 70+ phonograms of English, along with a number of spelling rules (typically, these approaches will work on a simple to complex trajectory, starting with single letters of the alphabet, and then progressing to various letter combinations).
- **Speech-to-print** approaches take as their starting point the 44 phonemes (or speech sounds) of English and teach how these correspond to a number of different graphemes. This can be done in stages, teaching more frequent

graphemes first and returning to the same phoneme later down the track to teach less frequent graphemes, or children can be presented with all possible grapheme representations for a single phoneme at once. These approaches will also typically include work on spelling patterns.

The development of these two modern instantiations of phonics instruction can be best understood by taking a look at the history of phonics instruction more broadly.

Phonics instruction can be traced back as far as the Ancient Greeks. The Greeks introduced vowels to their alphabet expressly to be able to represent the sounds of spoken language more efficiently and archaeological remains on shards of Greek clay pots testify to the fact that the sounds different letters made were explicitly pointed out by means of syllable-building activities (*Foster, 2004*). Our Roman alphabet is descended from the Greek alphabet and the idea that phonics instruction would be a useful way to gain access to the Roman alphabetic code has similarly been around for a long time. For example, some of the oldest approaches to teaching reading in the United States in the late 1700s favoured a phonics approach and this remained the standard for over a hundred years. Then, in the 1920s to the late 1960s, the consensus in the US turned towards teaching whole words by sight (*Chall, 1989*). Dissatisfaction with this whole-word approach grew, however, and a newer wave of phonics-based approaches began to appear by the 1950s.

Print-to-speech methods

The advent of a number of more modern phonics instruction techniques can be attributed to work done in the 1930s and '40s by Samuel Orton and Anna Gillingham (*Nicholson, 2011*). In particular, Orton wanted to move away from the then-popular whole-word approach, because he thought that relying on visual processes alone was likely to cause reading problems. He recommended teaching children the sounds of the letters and how to blend the sounds together to reproduce the spoken form of the written word. Gillingham later put the Orton-Gillingham (OG) ideas into a manual written with Bessie Stillman (*Gillingham & Stillman, 1960*; *1997*).

With the push to reintroduce phonics to reading instruction programs in the US in the 1960s, various OG approaches sprang from Orton and Gillingham's work and they are still around today. Though they differ quite substantially, they all tend to take a print-to-speech tack, teaching a list of phonics rules organised around the letters and phonograms of English. As OG approaches multiplied, however, they became a disparate bunch. They are perhaps best known nowadays for including a simultaneous, multisensory component to their instruction – children might trace a letter on paper, in the air or in sand, and they are instructed to pay attention to how their mouth feels when producing the sound a letter makes (at the same time as they see the letter and hear the sound). This kinaesthetic dimension of instruction has been suggested to be especially beneficial for children who are struggling to learn to read. However, even contributors to the handbook *Multisensory Teaching of Basic Language Skills* concede that the research evidence supporting this position is, at best, inconclusive (*Carreker, 2011*; *Farrell & Sherman, 2011*).

Several reviews of studies investigating OG methods have found that the evidence-base for their effectiveness is inadequate (*Ritchey & Goeke, 2006*; *Stevens et al., 2021*) and when explicit, systematic phonics instruction methods with and without a multisensory component are directly compared, no advantage has been found for a multisensory approach, either for typically developing children or those with dyslexia (*Schlesinger & Gray, 2017*). Nonetheless, OG methods do teach phonics in a systematic way and we do know that systematic phonics instruction (of some kind) is critical when teaching literacy (*National Institute of Child Health and Human Development, 2000*; *Department of Education, Science and Training, 2005*; *Rose, 2006*).

Unfortunately, by the 1980s, phonics was again largely abandoned in the US and other English-speaking countries in favour of the whole-word approach (this time slightly modified and renamed 'whole language'). But as researchers have continued to amass a wealth of evidence demonstrating, incontrovertibly, the effectiveness of phonics instruction (and particularly of synthetic phonics instruction) for teaching reading, phonics-based approaches have begun to flourish again in the US, the UK and Australia. Now that phonics is becoming increasingly accepted, debate has turned to a more fine-grained issue: how best to organise and present the grapheme-phoneme correspondences that must be taught.

Print-to-speech approaches take as their starting point that the spelling system is stable over time and organise instruction around a systematic sequence of graphemes. However, note that although their sequence of instruction may be organised in this way, print-to-speech methods do not rule out using speech-to-print aspects of instruction; for example, they typically include phonemic awareness activities, designed to cue children into the speech sounds in words in the absence of print. It's also important to note that within this framework, children do not only work on the skill of decoding; they engage in both reading and spelling words.

Speech-to-print methods

Speech-to-print approaches, on the other hand, organise instruction around a systematic sequence of phonemes. These have developed, perhaps, in response to what can seem to be unnecessarily

The idea of starting with what the child knows (speech) and mapping new knowledge (print) onto that seems like a good one

long lists of phonics rules in some print-to-speech approaches. The idea is that instead of organising instruction around 70+ phonograms, a sequence of lessons can be organised around the 44 phonemes of English. Similar to the print-to-speech methods, however, within the determined sequence of speech-to-print lessons, children engage in both encoding and decoding activities.

These methods take as their starting point that speech is primary: historically, speech preceded writing systems, and developmentally, speech is acquired before reading or writing skills. The idea of starting with what the child knows (speech) and mapping new knowledge (print) onto that seems like a good one. However, it's worth bearing in mind that knowledge of speech sounds is unconscious, so linking phonemes to graphemes is not necessarily any easier than linking graphemes to phonemes. In fact, just like print-to-speech methods, speech-to-print methods need to be coupled with phonemic awareness activities to help children become consciously aware of the speech sounds in words.

It is also not necessarily straightforward to design a speech-to-print scope and sequence for synthetic phonics instruction. Think for a moment about what a sequence based only on considerations of speech might look like. Faced with choosing which of the 44 phonemes to teach first, it might seem logical to start with sounds that are maximally distinct from each other. This can certainly be helpful – teaching consonants that differ in voicing, place and type of articulation in close succession (e.g., the voiced bilabial nasal /m/ and the voiceless dental fricative /s/) will make distinguishing these sounds for children very easy as teachers engage in phonemic awareness activities. However, determining the sequence on these considerations alone will also lead to some illogical decisions. For example, the short vowel sound /i/ (as in 'igloo') is high and front in the mouth, with no lip-rounding. The vowel sound with the opposite characteristics, and therefore the most maximally distinct, is /aw/, which is low and back in the mouth, with lip-rounding. Should these two sounds be taught in close succession? This would involve teaching children the link between /i/ and the single letter 'i' and the link between /aw/ and at least one digraph 'aw' or 'au' or 'or' (or possibly an even more complex grapheme like 'ore', 'augh' or 'ough'). Rather, the complexity of various grapheme choices, along with the frequency with which they appear in words, need to be considered alongside speech sound differences.

Another possible instantiation of the speech-to-print approach is to teach all possible graphemes for a phoneme when that phoneme is introduced. This means children are presented with large amounts of information (e.g., learning six possible ways to read or spell the sound /aw/), some of which is not immediately useful to them and can lead to cognitive overload. Some spelling choices for a sound are infrequent; some may occur in words that are too sophisticated for five-year-old children. Take the seemingly innocuous /i/ vowel example above. In an approach that teaches all possible graphemes for a sound, /i/ would need to be linked with both 'i' and 'y'. Although, as a single letter, 'y' is a relatively simple grapheme, it tends to be used to represent the /i/ sound in words of Greek origin which are outside the experience of most five-year olds (e.g., 'myth', 'symbol', 'system', 'oxygen', 'crypt', 'hymn', 'cygnet'). This example illustrates that even when the complexity of the grapheme choices remains manageable (single letters), and the spelling choices appear in a large number of words, usefulness of those words to a child just learning to read should also play a role in determining what gets taught when.

In fact, Louisa Moats, who promotes a speech-to-print approach in her aptly titled book *Speech to Print (2020)* and elsewhere (*Moats, 2021*) does not recommend providing all of the graphemes that represent each phoneme at once. Instead, she recommends a simple-to-complex sequence, teaching common correspondences and patterns before less common ones. Following this advice, we would teach children the common /s/ – 's' association, before teaching them the less common /s/ – 'c'

association in words like 'city', 'cement' and 'cymbal', for example.

Which instructional approach is best?

In essence, the print-to-speech vs. speech-to-print debate has set up a false dichotomy in how reading should be taught. As should now be apparent, the distinction between the two frameworks is not dramatic, because both approaches agree that a sequence of sound-grapheme correspondences needs to be taught explicitly and systematically. And both approaches, if well-designed, need to take into consideration both speech and print when determining that sequence. While there is no 'gold standard' order of grapheme-phoneme correspondence (GPC) instruction, there is general expert consensus that GPCs should be introduced on the basis of:

- teaching graphemes that represent continuous speech sounds early to facilitate blending;
- teaching simpler graphemes before digraphs and trigraphs;
- teaching more frequent, common graphemes before those that occur less frequently;
- teaching graphemes that occur in useful words for young children before those of foreign origin that occur in more sophisticated vocabulary; and
- when possible, teaching graphemes that represent speech sounds that are easily distinguished from each other before those that are more similar.

While some children with reading difficulties may need to be taught every phoneme-grapheme association explicitly, the over-arching aim of either approach should be to move towards spending progressively less time on explicit phonics instruction and more time on reading connected text, to foster the self-teaching required for automatic reading skills to develop (*Share, 1999*).

Finally, in any good sequence of phonics instruction (be it a print-to-speech method or a speech-to-print method), children need to engage in phonemic awareness activities and in activities that require them to apply their phonic knowledge in both directions:

- From print-to-speech (e.g., by producing the sounds that individual graphemes make, by blending these sounds to read single words, and eventually by reading sentences and short passages).
- From speech-to-print (e.g., by identifying and writing the graphemes associated with phonemes, by segmenting spoken words into individual phonemes in order to spell words, and eventually by writing short sentences and passages).

These are reciprocal skills, based on the same underlying knowledge (*Joshi et al., 2008*; *Moats, 2005*), and research has shown that instruction in one supports the other (*Gersten et al., 2020*; *Graham & Santangelo, 2014*; *Møller et al., 2021*).

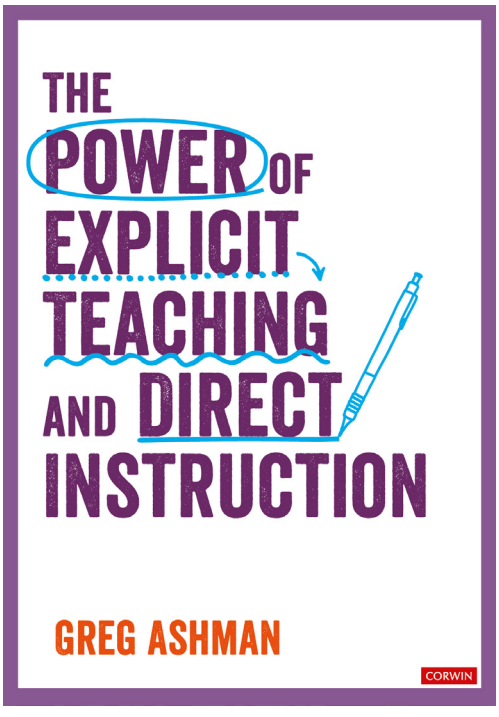
This link is backed up by brain-scanning research showing that there exists a neurological circuit for reading, and that this involves a fast and **bi-directional** connection between visual and phonological areas of the brain (*Dehaene, 2013*). In other words, there is physical support (in the shape of a bundle of axons) for the behavioural research – the implication is that to optimise the establishment of this circuitry during reading instruction, children should be systematically taught how letters map to speech sounds and vice versa, and should work on these connections in two directions: from print to speech, and from speech to print. There is no need for these two terms to be pitted against each other, when in fact, they are two sides of a single coin.

Anna Desjardins has a Research Masters in Linguistics from the University of Amsterdam and a PhD in Cognitive Science from Macquarie University. Her PhD thesis is related to child language acquisition. She currently holds positions in the MultiLit Research Unit and Product Development at MultiLit.

In essence, the print-to-speech vs. speech-to-print debate has set up a false dichotomy in how reading should be taught

Book review:
The Power of Explicit Teaching and Direct Instruction

Nicola Bell



Earlier this year, Greg Ashman released his second book, *The Power of Explicit Teaching and Direct Instruction*. Those who are familiar with Ashman's blog, *'Filling the Pail'*, will recognise the no-nonsense frankness with which the author writes. Mostly, he deals with topics using facts and research evidence, though there's a sizeable pinch of sass thrown in, too.

Ashman addresses a few key questions in the book, the two main ones being *what* should we teach, and *how* should we teach it? The *what* question relates largely to whether it is worth teaching subject-specific content knowledge, or whether more generic skills, such as critical thinking or problem-solving, might better prepare students for life beyond school.

Ashman sits staunchly in the *knowledge* corner, and with good reason. From an empirical perspective, there is very little research evidence to support the long-term teaching of "thinking skills", like *memory*. From a psycho-philosophical perspective too, Ashman argues that it's hard to conceptualise a separation between thinking and knowledge. As he says in the first chapter (p. 12),

> *Rather than seeing the mind as a set of library shelves and knowledge as the neatly ordered books that fill those shelves, perhaps we should see the mind as a set of tools made out of knowledge. Knowledge is what you think with. Knowledge is the mind.*

So then, it would seem reasonable to decide that teaching content-specific knowledge is the way to go. But what knowledge are we talking about, here? Or rather, *whose*? After all, the shared knowledge we've accumulated in areas of literature, art and science, both in Australia and in other Western countries, is dominated by "an overabundance of dead white men" (p. 14).

This is a very big question – bigger than what any individual teacher should need to grapple with. For that reason, Ashman doesn't offer a straightforward solution. (Also, there isn't one.)

He does, however, suggest that knowledge and works of art that have endured are worthy of teaching. As has been stated elsewhere, this accumulation of enduring cultural knowledge is evolving to become ever more inclusive. And it should continue to do so, just as long as society does the same.

Having discussed the *what*, Ashman then moves on to the *how*. Specifically, he focuses on explicit teaching and direct instruction – unsurprising, given the book's title. As well as comprehensively describing the history of research that has been conducted to support the principles of explicit instruction, Ashman justifies these findings with reference to cognitive learning models. These links between observable student achievement and invisible student cognition are very valuable, and they are made even more

poignant when contextualised by snippets of Ashman's own experiences in the classroom.

> *As a young science teacher, I remember being amazed by a more experienced colleague who would teach science practical skills in [a step-by-step] way. She would say things like 'I want you to pick up your test tube and place it in a rack and then put that in front of you to your right. Let's see. Josh – that's your left. Good. Now, I want you to pick up the spatula.' It blew my mind because I was asking my own students to conduct entire investigations in an atmosphere bordering on chaos. What's more, her students looked as if they were enjoying themselves, whereas mine seemed distracted.* (p. 124)

Ashman draws specific connections between explicit teaching and cognitive load theory – the latter being the subject of his ongoing PhD research. Beyond that, he also outlines how knowledge of the theory can be exploited and embedded into effective teaching practice.

Throughout the book, Ashman's arguments are clearest when the *what* and *how* questions are kept separate – in other words, when knowledge-based instruction is contrasted with skills-based instruction, or when explicit teaching is contrasted with an enquiry approach. He does sometimes blur the lines, and it was in those sections of the book that I got a little lost. That said, and as Ashman acknowledges early on, those who favour a knowledge-based curriculum tend also to favour an explicit or direct method of teaching. So, some conflation between instructional content and instructional method was perhaps inevitable. Regrettably, things in real life are just not as clear-cut as I would like them to be.

The book also contains a chapter on differentiation, which, while not directly linked to explicit instruction, has obvious implications for classroom teachers. Ashman's perspective is that our understanding of differentiation – that is, "treating children differently, depending on their needs" (p. 64) – is misapplied in practice, and may be a mechanism for increasing inequality. This is a fair point: if students are given tasks that only align with their background, interests or ability level, they miss out on exposure to a lot of other challenging and valuable content. I am therefore persuaded of the need to narrow or more clearly define what 'differentiation' means, though I am not as convinced as Ashman that the term needs scrapping altogether.

In all, *The Power of Explicit Teaching and Direct Instruction* will be a useful addition to my reference bookshelf. Ashman writes well, and he effectively weaves together elements of the empirical, the practical, and the philosophical. For me, the book's greatest strength was its contextualisation of instructional techniques within a cognitive science framework (see the excerpt below, for an example).

Nicola Bell (@NicolaBellSP on Twitter) works in the MultiLit Research Unit as a postdoctoral research fellow. She has a PhD from the University of Queensland on the topic of literacy development in children with cochlear implants, and her research interests extend to language and literacy development in all school-aged children.

When it comes to academic pursuits, it is critical to ask: what are these hidden subcomponents that need to be developed in order to deliver a relatively expert performance? Take, for example, a question on the 2018 VCE English examination sat by 18-year-olds in Victoria, Australia. Having read the play Medea by Euripides, they were asked to write an essay on the topic, "'Disloyalty is the greatest crime in this play.' Discuss."

First, they must be able to read. They must have the background knowledge to understand what they read and understand class discussions. They must read Medea and learn key facts and concepts related to it. They must also be able to write an essay. This will require them first to be able to form letters, write words and then write sentences. They will need to be able to structure these sentences into coherent paragraphs which they are then able to weave into a coherent essay. Perhaps more mundanely, they must be able to finish writing the essay in the time given, which will require a great deal of experience of writing.

Writing is perhaps an example of an area that we often attempt to teach in a top-down fashion. Primary school students write stories or recounts of what they did at the weekend. Standardised assessments require students to write coherent arguments, so students write these over and over again, and the teacher provides 'feedback' in the form of a written comment at the end of each piece. Such feedback cannot hope to be corrective to all the possible spelling errors, run-on sentences, misunderstandings of content, unsophisticated vocabulary use and so on that may be present in an extended piece of writing, so teachers often focus on just one or two points. We are saying to students, 'Do this complex task badly and then we will point out a couple of the ways in which you did it badly'.

It is as if a football coach eschewed all drills and exercises, and insisted on coaching football players by requiring them to play entire games of football, remaining silent as they do so and then, at the end of each game, giving each player a couple of handwritten sentences on how to improve for next time: 'What went well is that your passing was largely accurate. You should work on your tackling and your position on the park.' (pp. 57-58)

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What is Applied Behaviour Analysis (ABA)?

Kevin Wheldall, Micaela Rafferty, Jill Hellemans and Mark Carter

Statement of the problem

There is a recent and common misconception that Applied Behaviour Analysis (or ABA) refers solely to an intervention for children with autism. This is not the case. ABA has been successfully applied for more than 50 years in many fields, including general education, special education, behavioural medicine and public health, organisational behaviour management and sports science. ABA is a scientific approach to behaviour change with the goal being to address socially significant problems for individuals, groups and society at large.

Proposed solution

It is proposed that greater attention be paid to disseminating and recognising the complete scope and practice of Applied Behaviour Analysis in order to develop greater awareness amongst parents and professionals regarding the empirically validated principles and procedures that make up this well documented science.

The theoretical rationale – how does it work?

Based on the operant psychology of B.F. Skinner and his associates, ABA was classically defined by Baer, Wolfe and Risley in 1968. ABA is a set of criteria by which the utility and effectiveness of interventions are judged, rather than a set of specific procedures or interventions. These criteria include that an intervention must be applied (address practical real world problems), behavioural (focus on change in behaviour) and analytic (provide a believable demonstration that change in behaviour is related to the intervention).

ABA provides a systematic approach to the assessment and evaluation of behaviour. It consists of well defined and empirically validated principles and procedures for assisting individuals to change behaviour and for teaching new skills. Features of ABA include assessment of the interaction between the behaviour and its environment, analysis of the purpose of a behaviour, and matching of interventions to these functions. Typically, interventions involve the manipulation of the antecedent events and/or consequences of behaviour.

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

Since 1968, the *Journal of Applied Behavior Analysis* and many other publications have disseminated high quality behavioural research across a wide variety of educational and other settings, addressing numerous important social and educational questions. Fifty years of systematic research in families, homes, communities and schools has dramatically increased our understanding of behavioural principles and our ability to implement interventions successfully to address significant social problems in the real world.

Conclusion

ABA is a far more encompassing methodology of behaviour change and is not limited solely to application within in the field of autism. The ultimate goal in ABA is to achieve meaningful, lasting and generalised behaviour change that is socially significant to the individual.

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