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

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



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Why it is important to consider ‘need to know’ vs ‘nice to know’

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

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

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

Simplicity

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

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

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



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

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

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

While it is true to say that speech is the original form of language, and that writing was invented to encode it – and that this is an essential *principle* for students to understand – it is not

necessarily true to say that *instruction* in decoding should also work in this direction. There are a few reasons for this. One is that reading involves translating from print to speech, and effective instruction should focus on the task and skill we want children to learn. Another reason is that effective instruction is also systematic and sequential. It is extremely difficult to devise a logical instructional scope and sequence organised around phonemes. Finally, spellings are more stable than pronunciations and therefore it is easier to accommodate variations in accents and the pronunciation of morphemic units when graphemes or print provide the organising content (Desjardins, 2021).

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

introducing systematic variation, and necessary instances of irregularity can be accommodated by children as they gain confidence and understanding.

Reading irregular words

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

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

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

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

Letter names

In a similar way, there is some debate about whether teaching children letter names in initial reading instruction is confusing and will interfere with their learning of GPCs. There does seem to be some logic to this, but the research evidence leans more towards the teaching of letter names than not, especially for spelling. There are a few reasons. As Rebecca Treiman has said, letter names are stable and consistent ways to refer to graphemes (Treiman, 2021). It is better to say that the grapheme that represents the phoneme /sh/ is spelled <s><h> than to say it is spelled /s/ /h/. That would be even more confusing. Another reason is that most letter names provide a clue to one of its phonemes. For example, the letters , <m> and <s> include their phoneme, while vowel letter names

are the long form of their phoneme. Research has also shown that knowledge of letter names helped children to learn letter sounds (Share, 2004) and is a good early predictor of later reading achievement (Treiman & Wolter, 2021). Many children recognise the alphabet when they begin school; there seems little point in disregarding the knowledge children already have when we know that knowledge will subsequently be necessary.

Syllable types

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

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

But beyond some basic guidance about the functions of syllables (i.e., that all syllables have a vowel sound), how useful is it to spend instructional time on ‘rules’ based on syllable divisions? A study by Devin Kearns found that syllable types are highly unreliable. Depending on the number of syllables and the vowels they contain, open and closed syllable rules predict the correct vowel pronunciation between 18% and 94% of the time (Kearns, 2021). In other research, Kearns (2015) found that students learn

to read multisyllabic multimorphemic words more effectively (assuming they can decode using phonics) by using morphology and vowel flexing, the latter being highly dependent on vocabulary.

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

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

Opportunity cost

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

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

t-e-l-e-p-h-o-n-e

letters (9)

t-e-l-e-ph-o-ne

graphemes (7)

t-e-l-e-ph-o-ne

phonemes (7)

tel-e-phone

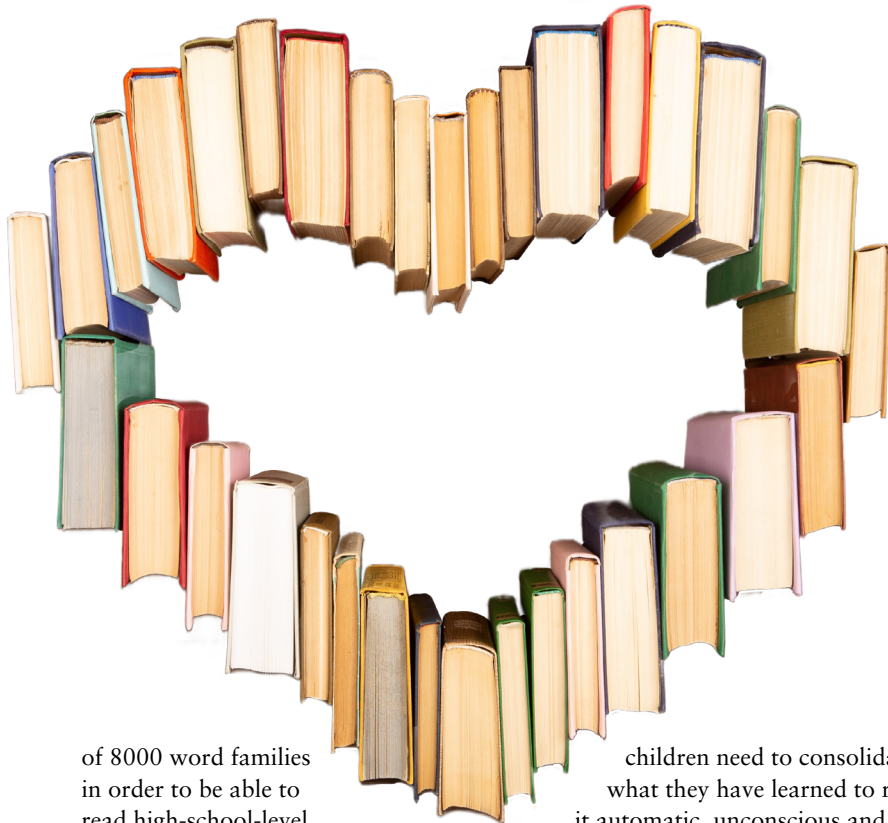
syllables (3)

tele-phone

morphemes (2)



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

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

[Stanislas Dehaene \(2022\)](#) says that three main variables predict success:

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

On the last point, Dehaene says, “One shot learning is not enough –

children need to consolidate what they have learned to render it automatic, unconscious and reflexive” ([Dehaene, 2020, p. 242](#)).

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

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

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a tricky balance, but a necessary one.

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

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

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

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

This is an excerpt from Dr Jennifer Buckingham’s piece, ‘Need to know or nice to know ... What is at the heart of the Science of Reading for teachers?’ The full article is available on [the FiveFromFive website](#).

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