



## Cognitive foundations

Using a theoretical framework for **evidence-based reading** instruction and assessment

## The importance of reading

Literacy – the ability to fluently read and write – is an indicator of individual academic, professional and personal success. It is also an indicator of economic development with the benefits this brings for whole societies. Higher levels of literacy have been associated with higher productivity, higher individual incomes, higher likelihood of employment, higher likelihood of promotion at work, greater participation in civic life, and better health outcomes (NSW Centre for Education Statistics and Evaluation, 2016).

Catholic schools have not been immune to declines in the performance of Australian students in international assessments, which presents both a challenge and an opportunity to Australia's Catholic education systems (OECD, 2019). If we can offer better literacy results for students then we can advance the mission of our Church in many ways. Such improvements would enable more students to succeed in their learning and later life while also supporting civic participation, lifting the national standard of living and extending the reach of our schools. The acquisition of literacy is a key purpose of primary school education and is an essential prerequisite for engagement and success in secondary school.

## The purpose of this paper

One of the three strategic priorities for the National Catholic Education Commission (NCEC) is to 'Support the continual improvement of educational outcomes for all students'. The Educational Excellence Standing Committee has been investigating and developing evidence-based guidance that NCEC can provide to dioceses and schools. This paper sets out an evidence-based framework for teaching and assessing reading that will inform the Commission's deliberations and guide systems and schools in their policy and practice.

## Evidence-based reading instruction

The evidence of what works best in teaching reading literacy is clear: Students need to be able to read words accurately and quickly, coupled with a broad and deep knowledge and facility with language. The combination of these two elements leads to reading comprehension in a scientifically validated model called 'The Simple View of Reading' (Hoover and Gough, 1986). The Simple View of Reading tells us that if either one of these elements is absent or deficient, students will struggle to comprehend written text. Numerous studies have demonstrated this to be the case, with clear implications for instruction, assessment and intervention in schools (Hjetland et al., 2017).

This high-level conceptual model incorporates the five essential elements for instruction that have been identified in rigorous research literature spanning more than four decades. The five essential elements are:

- *phonemic awareness* (the ability to identify and manipulate the smallest distinct sounds in speech, 'phonemes')
- *phonics* (the relationship between phonemes in speech and the letters, or 'graphemes', that represent them in written words)
- *fluency* (the ability to read quickly, accurately and with expression)
- *vocabulary* (the words children understand)
- *reading comprehension* (extracting and constructing meaning from written text using knowledge of words, concepts and ideas).

There is an established body of evidence supporting the need for classroom instruction to include all these elements in a planned and integrated way in each year of primary school, with a code emphasis (phonemic awareness, phonics and fluency) to establish firm foundations in word reading in Foundation and Year 1, shifting to a meaning emphasis (vocabulary and comprehension) from Year 2 on (Nation, 2019). The term 'emphasis' on a particular aspect of reading does not mean it is taught exclusively. Students in Foundation and Year 1 should also be developing comprehension skills, especially through shared reading experiences, and students from Year 2 on will continue to learn the extended phonics code, especially for spelling.

The Simple View of Reading and the five essential elements or 'five keys' to reading provide strong, basic guidance about what needs to be taught and assessed. However, some more comprehensive frameworks can better inform decisions about policy and practice. These are described below. These frameworks do not prescribe a particular pedagogy, however, there are particular teaching methods that are more likely than others to be effective for developing the skills and knowledge defined within the framework.

Effective pedagogy for teaching reading is based on instructional principles drawn from learning sciences. Effective reading instruction is explicit, systematic and sequential, and builds up knowledge and skills in a way that maximises understanding, retention, and generalisation. Evidence supports a particular pedagogy for phonics called systematic synthetic phonics in which student progress is monitored frequently using reliable and valid assessments and, for students who need extra support, intervention is timely and appropriately targeted (Buckingham et al., 2019).

Effective evidence-based reading instruction is beneficial for all students. While some students can learn to read using other teaching methods, systematic, explicit instruction in the five essential elements accelerates reading development for typically developing readers and reduces the possibility of reading failure for children at risk due to social or cognitive factors. While early screening assessments can indicate which children may struggle with reading, there is no way of knowing for certain which children will not make the progress needed to achieve reading milestones. The wisest approach is to give all students the highest quality instruction (Stanley et al., 2018).

Writing instruction is not covered in this document, but it is acknowledged that the reading and writing processes have a reciprocal relationship, and that literacy involves these two complementary skills.

## Implementing evidence-based reading instruction in Catholic schools

These elements of evidence-based instruction can be applied across Catholic schools within the context of existing funding arrangements and curriculum requirements. Usually, it is a matter of replacing less effective practices with proven effective practices, rather than adding to literacy programming and to the workload of teachers. A number of dioceses have set the clear and specific goal of enabling every student to be a competent reader at each stage of their education by providing teachable material and useful resources, asserting that the existing workforce is capable of turning the tide on declining student results.

Successful models have involved system-led professional development that describes the evidence justifying the approach and explains how it can be applied. This has taken the form of, not just theoretical professional learning, but also demonstration, opportunity to practice, and classroom coaching and feedback. It is essential for teachers to have comprehensive and ongoing professional development that builds and maintains their knowledge of effective, evidence-based teaching strategies. Some systems have also made available evidence-based published curriculum resources for reading in the early years. While this approach may require greater investment in the short-term, the upfront cost of proven programs increases the likelihood of an enduring and effective impact. In the longer term, there is the opportunity for a return on the investment by attracting and retaining more students and reducing costs associated with resource-intensive intervention.

## Effective implementation relies on effective assessment and intervention

Successful models for enhanced reading results also involve the system developing and providing effective assessment tools that teachers can easily access and apply to gauge the reading progress of their students and ensure students are on-track to achieve reading proficiency by the end of primary school. This is essential to ensuring that students benefit from the improved instructional techniques being applied in the classroom and to enable teachers to intervene to extend students where necessary.

Short, simple, and immediate feedback ‘formative’ assessments are being encouraged in many jurisdictions as one of the most effective ways for teachers to ensure their students are learning and assist any who need extra support. The Australian Education Research Organisation has identified formative assessment as one of the evidence-informed teaching practices that can make a difference to student learning (Australian Education Research Organisation, 2021).

One example of formative assessment that can be easily applied is the Year 1 Phonics Screening Check that has been created by the Australian Government (available at <https://check.literacyhub.edu.au/>), or the similar checks that are compulsory for government schools and available to non-government schools in South Australia and New South Wales. The check allows teachers to identify students who are in need of extra literacy instruction support in the vital early years, and schools that may need more support to provide effective instruction.

The South Australian experience shows the check has enabled teachers to substantially lift student decoding ability. Since the check was first applied across all public schools in 2018, schools have seen a 28 percentage point increase in the number of Year 1 students able to achieve the expected level in decoding – from 43 per cent to 71 per cent (Government of South Australia, 2023). This is an incredible turnaround in outcomes in just four years. In NSW, an evaluation of the phonics check trialled in 2020 found that 43 per cent of students met or exceeded the phonics benchmark, the same starting point as SA. The NSW evaluation also revealed that teachers strongly support the check. It found that over 98 per cent of teachers who responded to surveys viewed the check as beneficial and said it had an impact on their classroom practice, including where to target support (New South Wales Department of Education, 2021). The Year 1 Phonics Check should be used along with other assessments that capture different aspects of reading.

Catholic schools around Australia use a variety of assessments for both formative and summative purposes. Some have been used for a long time, and sometimes without a clear sense of the validity, reliability or utility of the data they provide. As with instructional practices and programs, it is just as important to remove the burden and distraction of unnecessary assessments as it is to introduce good ones. An evidence-based model or framework can help to make these decisions.

## Using an evidence-based theoretical framework for reading to guide literacy strategies at the system and school level

Proficient reading requires the development of multiple interrelated skills over time. Learning to read text with comprehension requires a sequential, cumulative, and parallel progression of acquisition of knowledge and skills (Marslen, 2023). An evidence-based theoretical framework for reading defines and classifies the knowledge and skills required for reading and explains how they are related to each other.

By using an evidence-based framework to guide decisions on curriculum and assessment, a school or school system can:

- Increase the likelihood that all the essential aspects of reading development are included in planning and guidance
- Reduce the likelihood that instruction and assessment might become too heavily skewed toward one set of skills or knowledge
- Reassure school leaders and teachers that a policy or professional learning focus on one aspect of reading does not mean that others are dismissed or neglected
- Provide a structure that is understood, accepted and implemented consistently.

And, by extension:

- Improve literacy achievement for all students in all years
- Generate resourcing efficiencies for schools and systems.

## Scientific evidence-informed theoretical frameworks of reading

Three interrelated but conceptually distinct notions have to be considered in developing an approach to reading instruction and assessment: skilled reading, reading acquisition, and reading instruction. The first is concerned with the cognitive processes that take place as we engage in skilled reading. The second focuses on the cognitive capacities that students must develop to acquire the skills necessary for becoming fluent readers. The third focuses on what teachers actually do when working with beginning readers to most effectively facilitate the acquisition of those cognitive capacities that are required to learn to read. A sound understanding of the first and second notions are prerequisites to addressing the third, which will be addressed in a separate paper.

There are various acceptable definitions of skilled reading in recent Australian curriculum documents (see, for example, Catholic Education South Australia's Literacy and Numeracy Strategy published in April 2023). These definitions provide an overall description of literacy but a more structured conceptualisation of the core components of reading comprehension: that is, the essential cognitive capacities (skills and knowledge) required to develop strategies to achieve the objective.

A number of theoretical frameworks have been formulated based on scientific reading research (also known as the Science of Reading). That is, they draw on scientific studies and have been tested using scientific methods. Table 1 lists the theoretical frameworks widely regarded as the most well-founded.



Table 1. Theoretical frameworks of reading and learning (adapted from Wheldall & Bell, 2023)

Theoretical framework	Intended purpose
Simple View of Reading (Gough & Tunmer, 1986)	Straightforwardly illustrates the theory that reading comprehension is the product of two underlying areas: word recognition and language comprehension.
Scarborough's Reading Rope (Scarborough, 2001)	Depicts the skills involved in skilled reading as metaphorical strands in a rope.
Reading Systems Framework (Perfetti & Stafura, 2014)	Describes how key components required for reading comprehension (from visual input through to complex comprehension processes) interact with one another during the reading process.
Cognitive Foundations Framework (Tunmer & Hoover, 2019)	Expands on the Simple View of Reading to specify in more detail what skills contribute to reading comprehension via word recognition and language comprehension.
Active View of Reading (Duke & Cartwright, 2021)	Includes active self-regulation (executive function and motivation) as a key contributor to reading and explicates a bidirectional relationship within the Simple View of Reading.
Construction-Integration Model (Kintsch, 1988)	Describes the process by which a text's meaning is constructed, based on the reader's background knowledge and the text content itself.
Triangle Model (Seidenberg & McClelland, 1989)	Depicts three key pieces of information (or 'units') that are processed when reading a single word (or nonword) – semantics, orthography and phonology. The contribution of each unit depends on the word and the reader's skill.
Ehri's alphabetic phases (Ehri, 1995)	Describes the developmental phases that readers move through when acquiring the ability to read words.

Three of the theoretical frameworks in Table 1 relate to accurate and efficient word recognition and have value in understanding the code-related and lexical aspects of reading (Dual Route Cascaded Model, Triangle Model, and Ehri's alphabetic phases) but have limited usefulness for developing classroom literacy lessons where reading comprehension is the overall objective. Others address language and text-based comprehension (Construction-Integration Model) with an implicit understanding of the need for efficient word recognition but with insufficient detail to guide instruction and assessment.

The five 'big ideas' or 'keys' to reading that have been identified in major reviews of scientific reading research (see Castles et al., 2018) do not comprise a theoretical framework of reading per se, because although it has been well-established that they are necessary, interdependent, and interrelated, when presented as a list of components they do not form a conceptual framework. Nonetheless, given that they are necessary, any evidence-based framework should include them.

Of the frameworks listed in Table 1, there are five evidence-based theoretical frameworks that deconstruct and define the subskills involved in reading and how they lead to *reading comprehension*. They are described in more detail below.



# Theoretical frameworks of reading comprehension

## 1. The Simple View of Reading: The keystone theoretical model

At a fundamental level, reading requires code-related skills and language-related skills. These skills develop concurrently with effective instruction. The Simple View of Reading is depicted in Figure 1 and provides a powerful and practical conception of the essential nature of reading. The multiplication function denotes that if either code or language skills are absent (zero), reading comprehension is impossible (zero). Each factor is comprised of a set of underlying sub-skills and knowledge, each of which, if absent, will weaken a student's reading comprehension ability.

The two factors in the Simple View of Reading do not develop separately or sequentially but in parallel. However, they can be measured as distinct skills and knowledge bases. The phonic decoding skills that allow word recognition can be assessed without the influence of language comprehension or vocabulary knowledge through the use of non-word decoding assessments. Language comprehension without the influence of word reading skill can be measured by aural assessments in which a passage is read aloud to a student and their comprehension assessed through oral questioning. In the practice of reading, these skills merge.

The Simple View of Reading does not prescribe pedagogy. The scientific evidence-base is strongly in favour of explicit and systematic teaching as being the most effective instructional approach for students to acquire these essential skills for reading but instruction is not inherent to the model.

Three of the following four theoretical frameworks described in this document build upon the Simple View of Reading, which has repeatedly been shown to be a robust and valid model in scientific reading research over several decades (Hjetland et al., 2019; Language and Reading Research Consortium & Chiu, 2018). The Reading Systems Framework includes the factors that comprise the Simple View of Reading, but it has a different superstructure.

The other frameworks in this document provide a greater level of detail regarding subskills than the Simple View of Reading, which allows for a more targeted approach to curriculum and assessment. Like the Simple View of Reading, all of the frameworks are neutral with respect to pedagogy. They describe the broad sets of skills and knowledge students need to acquire for reading. They do not prescribe how they should be taught. Nonetheless, it is notable that the authors of these frameworks all acknowledge the evidence base supporting the use of systematic and explicit instruction for teaching reading.



Figure 1. The Simple View of Reading (Gough & Tunmer, 1986; Wheldall & Bell, 2023)

### Language comprehension:

The ability to extract and construct literal and inferred meaning from linguistic discourse represented in speech.

### Word recognition:

The ability to accurately and quickly derive a representation from printed input that allows access to the appropriate word meaning contained in the internal mental lexicon.

### Reading comprehension:

The ability to extract and construct linguistically based meaning, both literal and inferred, from written text.

Tunmer & Hoover (2019)

## 2. Scarborough's Reading Rope (Scarborough, 2001)

Scarborough's Reading Rope (Figure 2) depicts reading as consisting of two major strands (consistent with the Simple View of Reading) and multiple sub-strands, each of which can be taught in focused ways but must be integrated over time for skilled reading to occur. The code-related skills must become automatic and the comprehension-related skills must be used in ways that are appropriate for the reading purpose.

The Reading Rope has the advantage of being well known and is intuitively understandable. It lacks a reference to fluency but this is implied in the 'increasingly automatic' developmental trajectory of the Word Recognition strand. However, unlike the Cognitive Foundations Framework, it does not illustrate the hierarchical or nested relationships among the skills.

## The many strands that are woven into skilled reading

### Language Comprehension

Background Knowledge  
(facts, concepts, etc.)

Vocabulary  
(breadth, precision, links, etc.)

Language Structures  
(syntax, semantics, etc.)

Verbal Reasoning  
(inference, metaphor, etc.)

Literacy Knowledge  
(print concepts, genres, etc.)

### Word Recognition

Phonological Awareness  
(syllables, phonemes, etc.)

Decoding (alphabetic principle,  
spelling-sound correspondences)

Sight Recognition  
(of familiar words)

Increasingly strategic →

Increasingly automatic →

### Skilled Reading

Fluent execution and  
coordination of word  
recognition and text  
comprehension.

Figure 2. Scarborough's Reading Rope (Adapted from Scarborough, 2001)

### 3. Cognitive Foundations Framework (Tunmer & Hoover, 2019)

The Cognitive Foundations Framework is an expansion of the Simple View of Reading and was developed by the same researchers. The Cognitive Foundations Framework operationalises the Simple View of Reading and makes it better positioned to help teachers and curriculum planners decide what and how to teach reading (Moore, 2021). The terms in Figure 3 can be translated into language that is more readily understood in the context of curricula and classroom teaching. For example, knowledge of the alphabetic principle incorporates phonics and word recognition, semantic knowledge is vocabulary, and syntactic knowledge is grammar and sentence structure. The addition of a separate component for background knowledge recognises that it is distinct from linguistic knowledge, albeit connected.

It is clear in this framework that the two components of the Simple View of Reading provide the superstructure. The components are hierarchical in the sense that higher components depend on the development of the lower components but there is a reciprocal relationship among them. Four of the 'big 5' are also evident in the components of phonemic awareness, knowledge of the alphabetic principle, semantic knowledge and the specific comprehension skills of linguistic knowledge, and background knowledge and inferencing. Fluency is not named in the framework; it is incorporated under Word Recognition, which is described as "the ability to recognize printed words accurately and quickly to efficiently gain access to the appropriate word meanings contained in the mental lexicon (Hoover & Tunmer, 2021, p. 403). They do not make a distinction between word reading automaticity and connected text reading fluency. In terms of instruction and assessment this is a progression of skill.

The representation of the components of the Cognitive Foundation Framework in boxes or cells does not suggest that the skills develop or should be taught completely in isolation. They are interdependent but identifying and defining them helps to ensure that they are all included in instruction.

### 4. Reading Systems Framework (Perfetti & Stafura, 2014)

The Reading Systems Framework is not as well-known as other theoretical frameworks. It presents a network of word and text-level processes that eventually lead to reading comprehension. Each step in the process represents a potential 'pressure point' where reading comprehension can break down. The Reading Systems Framework describes the relationships between the various processes and the order in which they typically occur, and includes the word, language, and knowledge aspects of reading. However, it is not an intuitive model and does not lend itself readily as a guide for curriculum and assessment. The authors do not present it as such, rather as a way of experimentally testing hypotheses about specific reading processes and how and why students struggle to comprehend.

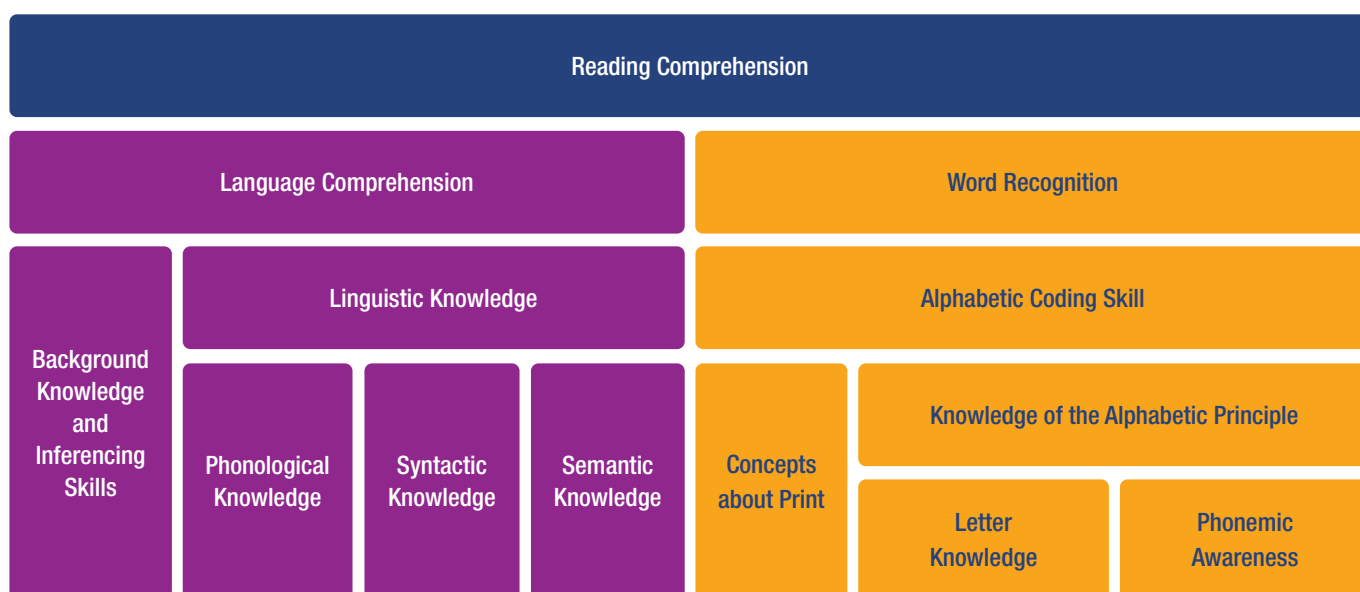


Figure 3. The Cognitive Foundations Framework (Adapted from Hoover & Tunmer, 2019)



## 5. Active View of Reading (Duke & Cartwright, 2021)

The Active View of Reading was proposed to address alleged gaps in the Simple View of Reading and the Cognitive Foundations Framework. According to Duke and Cartwright (2021), all of the constructs in the Cognitive Foundations Framework are present in the Active View of Reading, although they may be labelled or grouped in different ways. They nominate morphological awareness and theory of mind as missing from the Cognitive Foundations Framework, however morphological awareness is implicit in both word recognition and linguistic knowledge. Theory of mind is not included in the Cognitive Foundations Framework and nor is 'active self-regulation', which includes motivation, engagement and executive function.

Arguably, the Active View of Reading mischaracterises the Simple View of Reading and Cognitive Foundations Framework as being based on the premise that word recognition and language comprehension are entirely independent and develop separately. These two factors can be measured separately, but Hoover & Tunmer (2021) acknowledge that they influence each other in development. Furthermore, unlike the components of the Cognitive Foundations Framework and the Reading Rope, the additional meta-cognitive factors in the Active View do not have as extensive an evidence base for their direct effects on reading comprehension, especially with respect to whether they can be taught in school and should therefore be included in instruction. In the case of motivation and engagement, evidence tends to favour a causal direction whereby motivation develops a consequence of reading ability (i.e., being able to read well creates the motivation to read) rather than the reverse, although there is some reciprocal influence through reading volume (Toste et al., 2020; van Bergen et al., 2018). The Active View of Reading Framework retains the superstructure of the Simple View of Reading and the Reading Rope, but does not depict the hierarchical, nested relationships between the variables.

## Conclusion

The first two theoretical frameworks, the Cognitive Foundations Framework and the Reading Rope, have the clearest links with curriculum and assessment and the strongest and most enduring evidence base. They are extensions of the Simple View of Reading, which provides a robust evidence foundation.

While the Reading Rope is well known and intuitively appealing, the Cognitive Foundations Framework incorporates more up-to-date research on reading and the graphic representation demonstrates the hierarchical and nested relationships between the elements. The Active View of Reading can also accurately be described as an evidence-based framework, and is largely consistent with the other frameworks, but has less descriptive power.

A recent report published by the Australian Education Research Organisation recognises the utility of the Cognitive Foundations Framework for defining and understanding the component processes of reading comprehension (de Bruin et al., 2023). The Cognitive Foundations Framework does not prescribe methods of teaching but the skills defined within the Framework are most likely to be acquired using high impact, explicit and systematic instruction (Castles, Nation & Rastle, 2018).

The Cognitive Foundations Framework is therefore recommended as the most comprehensive and useful evidence-based reading framework for systems and schools. It is aligned with other well-known and widely used models and reflects up-to-date findings from scientific research. The Cognitive Foundations Framework can be used as a reference to ensure that teaching and learning covers the knowledge and skills necessary for the development of proficient reading comprehension.

## Reflection Questions

- How do theoretical frameworks help us to understand the sub-skills required for reading?
- What resonates with you about the frameworks?
- Why is it important that a theoretical framework is evidence-based?
- Do teachers and leaders in your school/system need professional learning and/or further reading to understand evidence-based theoretical frameworks and how they can be used to improve reading instruction?
- Which of the components of the Cognitive Foundations Framework are included in reading instruction and assessment in your school/system?
- Which components are not included? What steps can you take to include them?
- How might this position paper influence literacy practices and interventions within your school/system?



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