
Reading comprehension: Making sense of the existing and emerging evidence

As greater consensus has been reached about how to teach children to decode and read words fluently, the focus of discussion among practitioners and researchers has shifted to reading comprehension. Some of this discussion has centred on the utility of teaching comprehension skills and strategies explicitly as awareness of the central role of background knowledge in reading comprehension has grown ([Smith et al., 2021](#)). The arguments against teaching comprehension skills and strategies are often framed in these ways:

- 1 Comprehension skills and strategies are not generic, transferable competencies
... so it is a waste of time to teach them explicitly.
- 2 Reading comprehension is highly dependent on background knowledge
... so an evidence-based approach to reading comprehension is to always embed instruction in a knowledge-building context.

These two statements are only partly true. Comprehension skills and strategies are not generic; they are used differently by the reader depending on the text and the task ([Catts & Kamhi, 2014](#)). However, they are transferable to the extent that students need to know how to use them appropriately for different purposes. The [Scientific Advisory Committee for the Knowledge Matters Campaign \(2023\)](#) describes these processes as ‘strategies for sense-making’ (para. 13). Research on classroom instruction has shown that it is a waste of time to *over-teach* skills and strategies (otherwise known as a dosage effect – more is not always better), but not a waste of time to teach them explicitly to beginning and struggling readers at all. And, while reading comprehension is highly dependent on knowledge of the topic of the text, for beginning readers there is, so far, limited but promising evidence that embedded or integrated comprehension instruction is effective.

Scientific research evidence doesn’t say *don’t* teach comprehension skills and strategies explicitly; it says don’t *only* teach comprehension skills and strategies explicitly

Some authors differentiate between comprehension skills and comprehension strategies rather than considering them as a single set of cognitive or ‘procedural’ processes as [Grissmer et al. \(2023\)](#) do. However, different authors categorise them in different ways. [Such \(2021\)](#) says that ‘explaining the main idea’, ‘summarising’, ‘making inferences’, and ‘making predictions’ are skills, whereas ‘comprehension monitoring’ (which can include summarising parts of the text) is a strategy. ‘Knowledge of text structures’, ‘vocabulary’, and ‘background knowledge’ don’t fit into either of Such’s categories. [Smith et al. \(2021\)](#) add ‘finding literal information’ and ‘drawing conclusions’ to comprehension skills, and put ‘summarising’ in the strategy category along with ‘re-reading’, ‘self-questioning’ and ‘visualising’. [Shanahan \(2018\)](#) adds ‘recognising supporting



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details’, ‘comparing and contrasting’, ‘evaluating critically’, ‘vocabulary’, and ‘sequencing events’ to comprehension skills, and expands the strategies list to include ‘text structure’ and ‘making connections to prior knowledge’.

[Swain \(2023\)](#) suggests teaching three comprehension strategies – ‘monitoring’, ‘predicting’ and ‘summarising’ – and makes the salient point that ‘finding the main idea’ and ‘summarising’ are essentially the same thing.

All of these authors agree, however, that comprehension strategy instruction is useful (to a point) but comprehension skill instruction is not. Their rule of thumb is that skills are just ways that students demonstrate comprehension and can’t be taught, whereas strategies are meta-cognitive activities that facilitate comprehension and can be taught. While this sounds neat, the interconnected nature of the components of reading comprehension defies making clear distinctions between them, hence the differences in opinion about which is which.

Making inferences is an example of a skill that can be developed through teaching strategies. Deriving inferred meaning from text – going beyond the literal text – is an essential aspect of reading comprehension ([Turner & Hoover, 2019](#)). Making inferences is a non-generic skill that depends on other factors such as understanding of syntax, anaphoric connectives (e.g., pronoun referents) and background knowledge, as well as memory, and is therefore a product of these elements rather than a

single skill that can be taught and applied to any text. However, it is also true that almost all texts require some level of inference, and that not all students know what an inference is, or when they need to make inferences to understand a text. So, although the types of inferences students make, and the information they draw on to make them will depend on the text and the task, there is still something called an ‘inference’. Strategies like comprehension monitoring and knowledge of text types can help students to develop their ability to make inferences. There may not be one type of inference, or a singular way to teach it, and there may be no utility in doing weeks of repetitive ‘inference’ questions, but the concept of inferencing, and how to apply it, can and should be taught ([Catts, 2021/22](#)). Interventions aimed at improving inference making by helping students to know when and how to utilise their background knowledge and vocabulary, and to make connections, have been shown to be effective at improving inferences and have also improved reading comprehension (see [Oakhill et al., 2014](#)).

Much criticism of teaching comprehension skills and strategies has arisen because there are extreme versions of instruction in which the skill or strategy itself is viewed as the final product and therefore is the focus. This is the wrong way around. Comprehension skills and strategies are part of the process and not the product. In an evidence-based approach to comprehension instruction, skills

and strategies are taught explicitly and cumulatively, and gradually integrated ([Oakhill et al., 2014, 2023](#)). The objective of teaching comprehension strategies explicitly is to make them metacognitively transparent and understandable to children so they can apply them in their reading, and then go on to use them implicitly.

Phonics instruction provides an analogy. Some children work out the alphabetic code and don’t need a lot of systematic explicit phonics instruction. Others work it out over time with minimal guidance, albeit more slowly than with explicit instruction. But a significant proportion will not learn to decode without explicit instruction. Since we don’t know in advance which children will be in which category, the most efficient course of action is to teach all children explicitly rather than take a wait-to-fail approach. Teaching the alphabetic code in a transparent and explicit way *for a limited time at the right time* gives students insight into written language that they then go on to use automatically and mostly unconsciously.

Likewise, some children will move fluidly from decoding to comprehension. However, for other children this is not a given. Comprehension involves the construction of a mental model of a text. This requires knowledge (background knowledge, vocabulary, text structures), as well as skills (retrieving and connecting background knowledge and vocabulary, making inferences, understanding grammar and syntax) and strategies (comprehension monitoring). Not all

children know how to do these things. And those that do know how, don't always use them.

Given that research tells us that poor comprehenders have difficulties with certain skills and strategies, and can improve them with explicit instruction (Peng et al., 2023), it makes sense to include them in Tier 1 instruction. Explicit instruction in comprehension strategies *for a limited time at the right time* has a strong and large experimental research base collected over several decades. Done properly, it is scientifically evidence-based practice. Petscher et al. (2020) include comprehension strategies among the set of practices that have 'compelling evidence in the science of reading' for younger and older students (p. 5).

As stated by Smith et al. (2023),

"[T]here is a significant evidence base related to reading comprehension instruction in middle-to-late elementary years that states that skills that contribute to comprehension need to be explicitly taught to students and that, particularly for less advanced readers, teachers cannot rely on incidental exposure and implicit coverage of skills as methods of teaching reading." (pp. 10–11)

Teaching reading comprehension explicitly

Teaching comprehension explicitly involves systematic instruction in the sub-skills involved. Explicit and systematic instruction requires skills to be taught in a somewhat decontextualised way, at least at first. The skill being taught needs to be explained and many examples need to be provided. Students need to practise using the skill they have learned. This necessarily involves the use of text. This text can be drawn from a larger unit of study and/or can be selected specifically to demonstrate this concept and skill. Taking it from a larger unit of study is a good idea if possible, but if a relatively small amount of time is spent on explicitly teaching the strategy, the source of the text is not make or break. The strategy being taught should then subsequently be applied and integrated

with other strategies in studying larger units of work (either literature or other knowledge-building content). This will allow students to develop their skills as they acquire knowledge, and vice versa.

The stage of reading development is critical. Willingham (2006/07) says that comprehension strategy instruction isn't likely to be effective before third or fourth grade – not because of available evidence that content-embedded comprehension instruction (or any other comprehension instruction) was more effective, but rather because of an assumption that students are still learning to read accurately and fluently before Grade 3 so reading comprehension strategy instruction will be beyond their abilities. Hirsch (2016) makes the same assumptions in his recommendations. However, students who have had an explicit and systematic reading instruction program in Kindergarten and Year 1 are typically reading text at a level that does allow them to focus on comprehension in Year 2, so Willingham's and Hirsch's advice should be adjusted to reflect reading ability rather than grade level.

Embedding comprehension instruction in a content-rich curriculum – what is the evidence?

The evidence showing that background knowledge is a strong contributor to comprehension (and vice versa) is strong and not contested (Hwang et al., 2022). And a knowledge-rich curriculum has value that exceeds its contribution to reading comprehension. Knowledge is important in its own right.

However, when it comes to reading comprehension *instruction* in K–2, scientific reading research does not reject explicit instruction in comprehension strategies and does not yet provide strong support for the contention that comprehension instruction must always be embedded in a knowledge-building curriculum. Yes, students in those years should have a content-rich curriculum. No question at all. But when it comes to the way that content is integrated and combined with comprehension instruction for *beginning* readers, the best way to do this is yet to be established.

There is mixed research evidence demonstrating embedded or integrated comprehension instruction is an effective

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approach for beginning readers, that is, from K–2. It is appealing and makes sense in many ways; however, at the moment, the evidence supporting it is promising but not uniformly strong and most studies are quite recent. It is also not always clear what such instruction looks like, with resultant misunderstandings of the process.

According to Cabell and Hwang (2020),

"the testing of integrated literacy and knowledge-building approaches is a growing area of inquiry, and there have been relatively few experimental studies in K–2 settings and even fewer that have tested content-rich [English Language Arts] instruction" [p. S102].

It is worth reading the studies of content-embedded comprehension instruction in full but the evidence can be summarised as follows. Two publications in the list below are of the Core Knowledge Curriculum, which is often described as content-embedded reading



comprehension instruction; however, as described in more detail in the next section, this is not necessarily an accurate description for this curriculum in K–2.

- [Cabell and Hwang \(2020\)](#) describe two randomised control trials with Kindergarten students who had the Core Knowledge Curriculum. The trials resulted in large effect sizes for proximal (i.e., taught) vocabulary, science knowledge, and social studies knowledge; small effect sizes for standardised assessments of expressive vocabulary and science knowledge; and no effect for standardised receptive vocabulary, linguistic comprehension, or social studies knowledge. The study is continuing with first grade students but published results are not yet available.
- [Smith et al. \(2021\)](#) looked at the relationship between knowledge and reading in upper-middle primary school but didn't review studies of embedded instruction. They conclude that knowledge partially compensates for reading skill deficiencies.
- [Hwang et al. \(2022\)](#) published a meta-analysis of content-integrated reading instruction. There was a wide range of effect sizes for measures of vocabulary and comprehension, from small negative and small positive to large negative and large positive. The most positive effects were for researcher-developed, proximal assessments rather than standardised assessments, which is

typical but means that they need to be interpreted carefully. Fifteen studies included students in K–2. It is not clear which if any studies involving older students were measuring the effects of instruction in K–2.

- [Grissmer et al. \(2023\)](#) found that students attending schools that implemented a knowledge-building curriculum (Core Knowledge) from Kindergarten to Grade 6 had significantly higher literacy (combined comprehension and writing) scores in Grades 3 to 6 than students who attended schools using a variety of other undescribed methods of reading instruction. The assessment was specifically designed to measure learning of the Common Core standards. Participating students were mostly from high-to-middle income families. Students in the one low income school had even stronger results.

How does the Core Knowledge Curriculum teach and develop reading comprehension?

The elementary/primary school Core Knowledge Curriculum is a set of lesson plans to be delivered sequentially in each year level from Kindergarten to Grade 6. It covers Language Arts (i.e., literacy), Mathematics, Science, History and Geography, Visual Arts, and Music ([Core Knowledge, 2023](#)). There are teaching manuals, student reading materials and whiteboard slides for all units of work. Teaching materials

are written by a variety of authors. All materials are free to download but there are substantial costs for schools associated with printing them.

The method of teaching reading and knowledge-building with the Core Knowledge Language Arts Curriculum changes from Kindergarten to Grade 6. In Kindergarten, Grade 1 and Grade 2, there are two separate, parallel instructional components – ‘Reading’ (print awareness, phonemic awareness, phonics, word analysis, and fluency) and ‘Read-alouds’. The rationale for Read-alouds is to expose beginning readers to language and information that exceeds what they would be able to access through reading. There is little expectation that reading will be the vehicle for knowledge acquisition at this point. The texts used for Read-alouds – both fiction and non-fiction – are suggested in the Core Knowledge Sequence for that year, and teachers are encouraged to use texts focused on a single topic for a sustained period of time – about two weeks. During Read-alouds, students do not see the written text but instead are provided with pictures that illustrate aspects of the text. The Read-aloud is followed by a structured whole class discussion that encourages the literal and analytical skills that enable comprehension. These include summarising, predicting, making global and text-based connections, activating prior knowledge and making inferences. These skills and strategies are gradually introduced to the ‘Reading’ component using texts specifically chosen for these activities, which are not necessarily on

topics linked to the Read-aloud texts, but do follow a broad theme (e.g., animals) over a number of weeks.

From Grade 3, these two components are linked, with the topic content in the domain units being incorporated into the Reading and Writing components. From Grades 4 to 6, literacy skill development in reading comprehension and writing is integrated with the domain units and novel studies.

This developmental trajectory is important to note because it shows that reading instruction in the early years involves explicit instruction in both phonic decoding and the so-called ‘procedural skills’ associated with reading comprehension. The knowledge-building component is largely oral at first and gradually introduced to print and independent reading. Although [Grissmer et al. \(2023\)](#) describe ‘integration and focus across all grades and subjects’ (p. 42), the two elements are not integrated in the early grades, and not until students have developed sufficient reading fluency to engage with written texts in a way that builds reading proficiency and knowledge in a reciprocal way.

What is the take-home message?

The take-home message is *not* that comprehension instruction embedded in a sequential knowledge-building curricula is a bad idea or doesn’t work. It’s a terrific idea for many reasons and is almost certainly the best approach for middle-to-upper primary ([McKeown et al., 2009](#)). It’s logical, persuasive and very appealing to embed reading comprehension instruction in interesting and useful content as soon as students are able. Right now, however, scientific research evidence doesn’t yet specify that it is the *only* or most scientifically evidence-based approach to reading comprehension instruction for younger students and should therefore replace other approaches. [Petscher et al. \(2020\)](#) describe content-embedded reading comprehension instruction as “promising but not (yet) compelling” (p. S273). It’s still okay to teach comprehension skills and strategies explicitly and quickly *and* build knowledge, initially side-by-side and then increasingly together.

[Grissmer et al. \(2023\)](#) form this conclusion from their research on the Core Knowledge Curriculum:

“The results of this study would suggest that there are two separate but complementary, cognitive processes involved in development and learning: ‘skill building’ and ‘knowledge accumulation’. Perhaps the phrases that better capture cognitive development would be - ‘skill begets skill; knowledge begets knowledge; and almost certainly - skill x knowledge begets skill x knowledge.’” (p. 11)

Similarly, [Christodoulou \(2022\)](#), a long-time proponent of knowledge-rich curricula, says,

“[K]nowledge & skills are a false dichotomy. Ingredients and cakes are also a false dichotomy! You can’t be pro-cake and anti-ingredient!! If we accept that knowledge and skills are a false dichotomy, then we should also accept that knowledge and skills are NOT on a pendulum. The pendulum is the wrong metaphor. The right metaphor is a pathway, a ladder or a journey.” (para. 4)

Responsible teachers, curriculum developers and program publishers that have a commitment to the science of reading need to rely on the existing evidence while keeping an eye on the emerging evidence. The emerging evidence base around content-embedded instruction should be monitored and incorporated as appropriate.

In the meantime, as [Duke et al. \(2021\)](#) write,

“Scientific research has revealed many individual instructional practices and combinations of practices that foster reading comprehension development. Some conversations about reading comprehension engage an either/

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or approach, such as these two statements, respectively: (1) Don’t teach strategies; build knowledge. (2) Don’t focus on comprehension; focus on word reading. This tendency does not reflect research findings and does not maximize the likelihood that we will meet the needs of all developing readers ... As a field, we can advocate for particular research-supported instructional practices without denigrating other research-supported instructional practices.” (p. 664)

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