2025

BUILDING SKILLED READERS:

BEST PRACTICE IN READING INSTRUCTION

SESSION 1:
Evidence-based foundations of the science of reading
- Dr Jennifer Buckingham
AND
Mastering Decoding and Word Recognition Skills
- Lisa Bellman Ansell & Sarah Collins

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Evidence-based foundations of the science of reading

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Centre for Education Statistics and Evaluation (CESE)

3 March 2025

NSW Department of Education

1

Outline

Science of reading

What children need to learn: scientific evidence-based theoretical frameworks for reading

How best to teach them: effective instruction based on the science of learning

2

2

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Science of reading

3

A definition

"The science of reading is a vast, interdisciplinary body of scientifically-based research about reading and issues related to reading and writing. This research has been conducted over the last five decades across the world, and it is derived from thousands of studies conducted in multiple languages. The science of reading has culminated in a preponderance of evidence to inform how proficient reading and writing develop; why some have difficulty; and how we can most effectively assess and teach and, therefore, improve student outcomes through prevention of and intervention for reading difficulties."

The Reading League, 2022

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In practice, it means

| What children need to learn | & | The most effective way to teach them |

To become proficient readers

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What children need to learn

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What children need to learn

- There is a large research literature showing that there are essential knowledge and skills for reading.
- These components of reading are interconnected and interrelated.
- Scientific evidence-based theoretical frameworks for reading place the components in a structure.

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'Scientific evidence-based theoretical frameworks or models of reading'

Sounds like word salad.

What does it mean?

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Scientific evidence-based theoretical frameworks or models for reading

In other words, based on evidence from scientific research.

Scientific research is conducted using experimental (such as RCTs) and non-experimental methods (such as large sample empirical studies).

There are a number of guiding principles for scientific research:

- Pose significant questions that can be investigated by collecting objective data
- Link research to relevant theory
- Use methods that permit direct investigation of the question
- Provide a coherent and explicit chain of reasoning
- Replicate and generalise across studies
- Disclose research to encourage professional scrutiny and critique

Vaughn & Fletcher (2021)

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Scientific evidence-based **theoretical frameworks or models** for reading

NSW

Theoretical (sometimes called conceptual) frameworks or models are used in all disciplines and attempt to represent the factors that contribute to an occurrence, and the way in which those factors relate to each other.

For researchers, it allows specific hypotheses to be tested and either supported or refuted, and build a coherent evidence base.

In the case of reading, according to Hoover and Tunmer (2020),

"It provides a way for reading professionals to think about reading and its development and gives them mechanisms that, coupled with such understanding, will help them link what children must know to become strong readers to what teaching can best provide through the competent use of available tools."

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Scientific evidence-based theoretical frameworks or models **for reading**

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To be able to read is to be able to decode and understand text.

There is an additional question of what it means to be able to read well or proficiently but we won't attempt to answer that today.

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Why frameworks are useful

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- Increase the likelihood that all of the essential aspects of reading development are included in planning and guidance
- Reduce the likelihood that instruction and assessment might become 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 it is understood, accepted and implemented consistently

12

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Theoretical models with a strong evidence base

There are a number of credible theoretical models of reading but some have become more widely accepted because they have a stronger scientific evidence base and/or have clearer instructional applications.

Three of the most well-known are:

- Simple View of Reading (Gough & Tunmer, 1986)
- Scarborough's Reading Rope (Scarborough, 2001)
- Cognitive Foundations Framework (Hoover & Tunmer, 2019)

13

Simple View of Reading

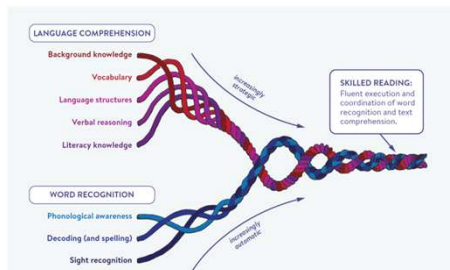Word Recognition × Language Comprehension = Reading Comprehension

Gough & Tunmer (1986). Image from Wheldall et al. (2023)

14

Scarborough's Reading Rope

Scarborough (2001). Image from Wheldall et al. (2023)

15

Cognitive Foundations Framework

Reading Comprehension

Language Comprehension | Word Recognition

Linguistic Knowledge | Alphabetic Coding Skill

Background Knowledge and Inferencing Skills

Phonological Knowledge | Syntactic Knowledge | Semantic Knowledge | Concepts about Print | Knowledge of the Alphabetic Principle

Letter Knowledge | Phonemic Awareness
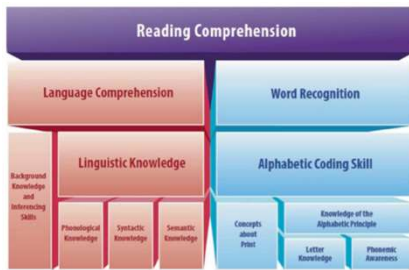
Hoover & Tunmer (2019)

16

16

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How best to teach reading

17

Science of learning

"Put simply, the science of learning is the cognitive science of how students learn, connected with the instructional implications of that science... It is important to note that while there is a degree of academic debate concerning founding principles and models of human cognition, the implications for teaching and learning within classroom settings are generally consistent." - Jha (2024)

"Cognitive" = of or relating to the mental processes of perception, memory, judgment, and reasoning

18

18

Cognitive models of learning

Learning can be thought of as a change in long-term memory

Cognitive models can help teachers understand the conditions that optimise how students **process**, **store**, and **retrieve** information.

This understanding can guide teachers in choosing instructional approaches that enhance learning.
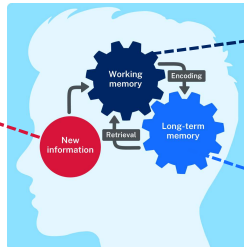
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Working memory

Encoding

New information

Retrieval
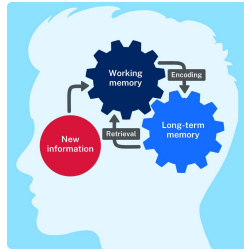
Long-term memory

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Working memory and long-term memory

NSW GOVERNMENT

The learning process starts when **attention** is focused on new information, and it enters working memory
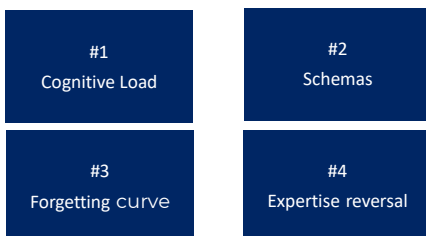
Working memory stores and processes small amounts of information for a short amount time

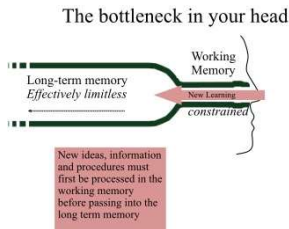**Long-term memory** stores large amounts of information, semi-permanently

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Key concepts in the Science of Learning

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#1
Cognitive Load

#2
Schemas

#3
Forgetting curve

#4
Expertise reversal

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#1   Cognitive load theory

The bottleneck in your head

Working Memory

Long-term memory
Effectively limitless

New Learning

constrained

New ideas, information and procedures must first be processed in the working memory before passing into the long term memory

(Sweller (1988). Image: Greg Ashman https://gregashman.wordpress.com/

22

Cognitive load theory

Cognitive load refers to the demands of processing information in working memory (CESE 2017)

When cognitive load exceeds the working memory capacity of a student, there is a greater risk of:
- misunderstandings
- misinterpretations or confusion
- ineffective encoding in long-term memory
- learning slowing down.

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#2   Schemas

Schemas (also called mental models) "are structures that organise knowledge in the mind." (EEF 2021:31).
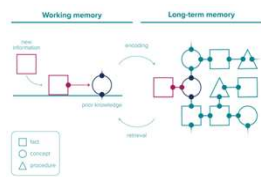

Working memory   Long-term memory

Image adapted from Australian Education Research Organisation Limited (AERO) (2023) How students learn best and licensed under CC BY 4.0.

24

Schemas influence cognitive load
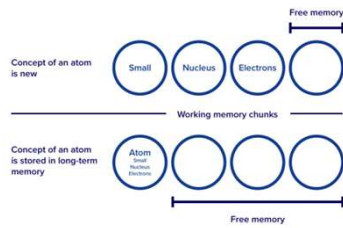

Image adapted from Australian Education Research Organisation Limited (AERO) (2023) Explicit instruction and licensed under CC BY 4.0.
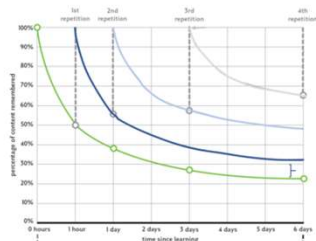
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#3 Forgetting curve

Image credit: Oliver Cavigliolli via Doug Lemov https://teachlikeachampion.org/blog/an-annotated-forgetting-curve/

26

#4 Expertise reversal

When information is very complex or new, it is important that teachers reduce the load on students' working memories as much as possible to maximise learning

When information is easy for students to understand, teachers can gradually increase the complexity of the lesson to maximise students' learning

27

Why explicit teaching works best

Explicit teaching is a set of instructional principles and practices that are designed to maximise the likelihood that students will both *remember and understand* what they have been taught and be able to apply that knowledge in a range of ways.

It draws on the findings of the body of research that comprises the science of learning.

In turn, research on explicit teaching contributes to the science of learning.

28

Explicit teaching is

The key elements of effective instruction are designed to maximise understanding, retention, and transfer.

Systematic	Sequential	Structured
methodical and planned to a high level of detail	the order of content builds skill development	time is allocated to ensure all content and skills are covered and connected

Clear and concise	Cumulative	Mastery
content is presented in small amounts with clear explanations and examples	content and skills are built and revisited through repetition, practice, and recall	students demonstrate mastery or understanding before new content is taught

29

Principles of instruction

- Begin each lesson with a short review of previous learning ('daily review')
- Present new material in small steps ('chunks') with student practice after each step
- Ask questions and check the responses of all students
- Provide models
- Guide student practice
- Check for student understanding
- Obtain a high success rate
- Provide scaffolds for difficult tasks
- Set and monitor independent practice
- Weekly and monthly review

(Rosenshine, 2012)

30

Why explicit teaching works best

	Cognitive load	Schema	Forgetting curve	Expertise reversal
Systematic				
Sequential				
Structured				
Clear and concise				
Cumulative				
Mastery				

31

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Source documents

Jha, T. (2024). *What is the science of learning?* Centre for Independent Studies

NSW Centre for Education Statistics and Evaluation (2020). *What works best.* NSW Department of Education

The Reading League (2022). *Science of Reading: Defining guide.*

Tunmer, W. E. & Hoover, W. A. (2019). The cognitive foundations of learning to read: a framework for preventing and remediating reading difficulties. *Australian Journal of Learning Difficulties*: 24 (1).

Vaughn, S. & Fletcher, R. (2021). Explicit instruction as the essential tool for executing the science of reading. *The Reading League Journal, 2*(2), 4-11

Wheldall, K., Wheldall, R., & Buckingham, J. (2023). *Effective instruction in reading and spelling.* MRU Press.

32

Learning Difficulties Australia

Learning Difficulties Australia is an association of teachers and other professionals dedicated to assisting students with learning difficulties through effective teaching practices based on scientific research.

www.ldaustralia.org

f @LearningDifficultiesAustralia

enquiries@ldaustralia.org

🐦 @LD_Australia

1

We would like to acknowledge the traditional owners of country and their connections to land, sea and community. We pay our respect to their elders past and present and extend that respect to all Aboriginal and Torres Strait Islander peoples today.

2

Lisa Bellman Ansell & Sarah Collins

Lisa Bellman Ansell: B. Ed- Honours)
Literacy consultant & presenter
Kids Ink founder & educator

Sarah Collins : B. Ed, M. Ed (Literacy Intervention)
Literacy presenter
Kids Ink founder & educator

Lisa & Sarah are both qualified teachers with additional training in evidence-based literacy instruction. After seeing children falling through the gaps in their local catholic and state education settings, they founded **Kids Ink** to ensure that all children in their community could access high quality literacy instruction.
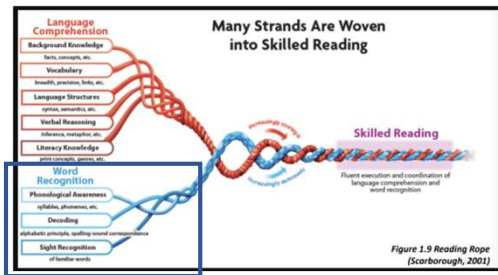
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Mastering Decoding
and
Word Recognition Skills

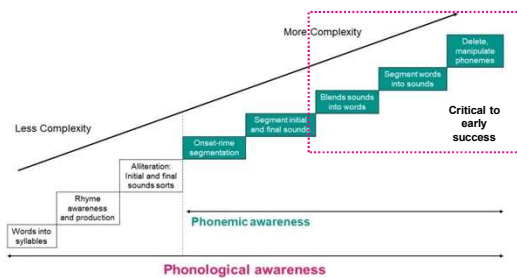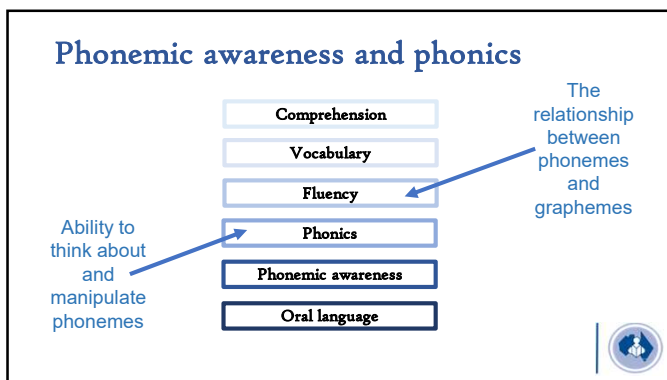By Lisa Bellman Ansell & Sarah Collins

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The Reading Rope

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Phonological Awareness Continuum

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Phonemic awareness and phonics

Comprehension

Vocabulary

Fluency — The relationship between phonemes and graphemes

Phonics

Ability to think about and manipulate phonemes → Phonemic awareness

Oral language

8

Phonemic awareness and phonics

Dr. Linnea Ehri (…) strongly believes the benefits of these two areas of teaching to be reciprocal…

'the teaching of PA enhances the decoding skills taught in phonics, and the phonics instruction helps students to develop the phonemic sensitivity children need to gain.'

It would be erroneous to conclude that these skills need be taught separately.
Timothy Shanahan

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Sound Swap
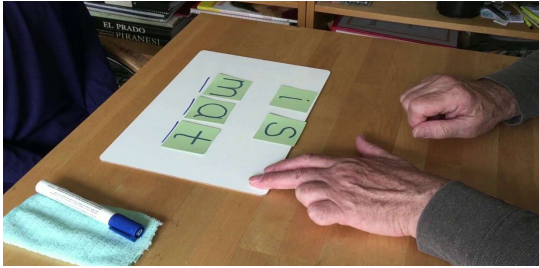
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Effective phonics instruction includes...
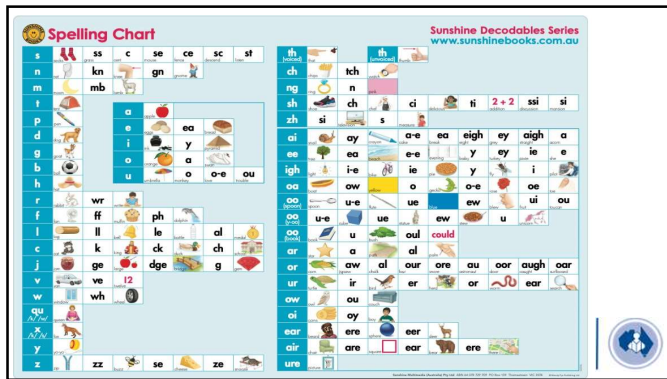
The alphabetic code

- All 44 phonemes in a systematic order
- Different spellings of each phoneme (graphemes)

Phonemic awareness and phonics skills

- Blending phonemes to read words (decoding)
- Segmenting phonemes in words to spell (encoding)
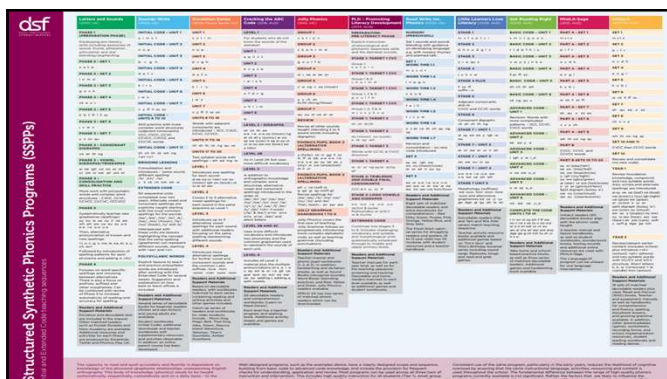- Manipulate phonemes/graphemes in words to read and spell

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Effective phonics instruction includes...

The alphabetic code

- All 44 phonemes in a systematic order
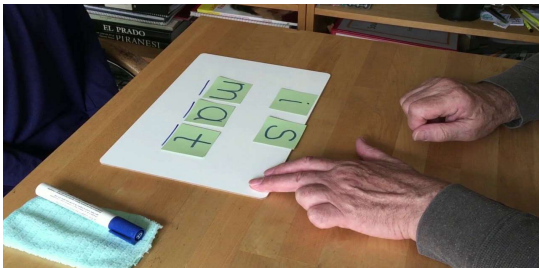- Different spellings of each phoneme (graphemes)

Phonemic awareness and phonics skills

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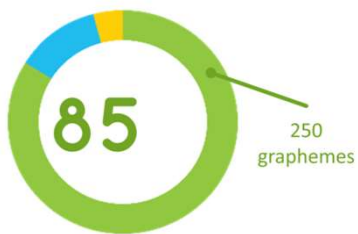- Manipulate phonemes/graphemes in words to read and spell

16

Sound Swap

17

How regular is English?

85

250 graphemes

18

Decoding

Word	#	Sounds	Graphemes
mat	3	/m/a/t	m a t
cheese	3	/ch/ē/z/	ch ee se
quit	4	/k/w/i/t/	qu i t
weight	3	/w/ā/t/	w eigh t
fox	4	/f/o/k/s/	f o x
kissed	4	/k/i/s/t/	k i ss ed
swing	4	/s/w/i/ng/	s w i ng

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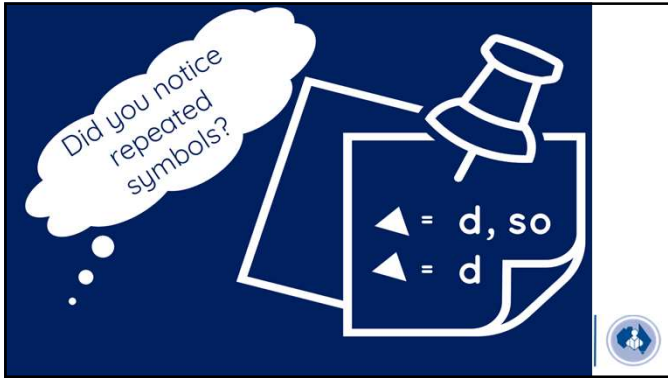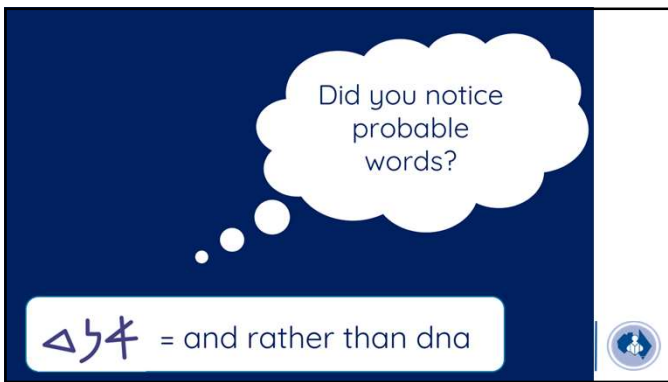|											
/a/	⚡	at	/f/	⚲	fat	/n/	ϟ	net	/t/	✕	tag
/b/	ϟ	bat	/g/	⌐	got	/o/	O	odd	/u/	Y	up
/k/	ﾘ	cat	/h/	Ħ	hat	/p/	⌐	pat	/v/	I	vet
/d/	△	dog	/i/	℥	it	/r/	٩	rat	/w/	﬩	wet
/e/	∃	end	/l/	ﾚ	let	/s/	w	sat	/z/	⊥	zen
			/m/	ﾘ	mat				/th/	⊗	thin

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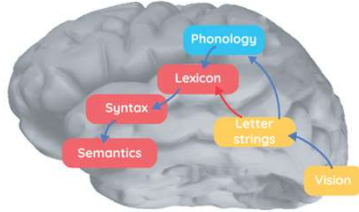Did you use a memory aid like pen and paper ?

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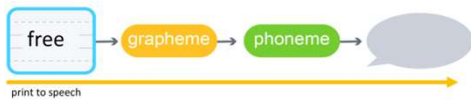23

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How do we read?

Deheane & Cohen

25

Reading Process

1. Identify graphemes in the word
2. Say the phonemes represented by the graphemes
3. Blend the phonemes together to say the word
4. Connect to lexicon and self-correct, as necessary

free → grapheme → phoneme →

print to speech

26

Effortless recall

cough

c ou gh

/k/o/f/

/cough/

Phonemic awareness ← → Phonics

27

Orthographic mapping

"Orthographic mapping is the process readers use to store written words for immediate, effortless retrieval.
It is a means by which readers turn unfamiliar words into familiar, instantaneously accessible sight words."

-David Kilpatrick, 2015

28

"Fluency has a transformational impact on the reading process: it is the point at which component skills are so automated and highly integrated that maximum cognitive energy is available to focus on meaning."

Konza, 2014

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Evidence suggests that phonics teaching is more effective when children are given immediate **opportunities to apply** what they have learned to their reading.

(Hatcher, Hulme, and Ellis, 1994)

30

What are decodable books?

- Phonetically controlled texts
- Designed for practising the skill of decoding, and ultimately fluency
- Steady progression of phonemes, building on previous knowledge
- Real story with characters, plot, fluent language and story structure
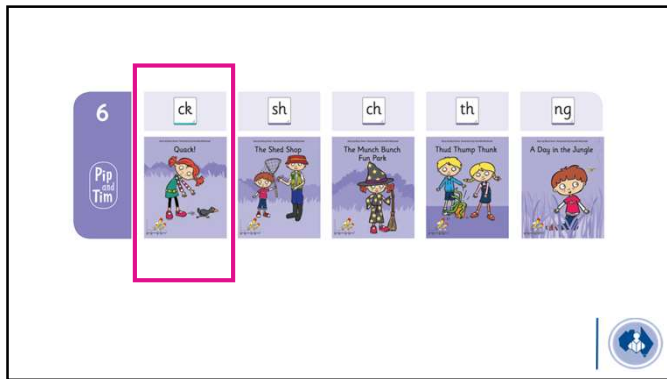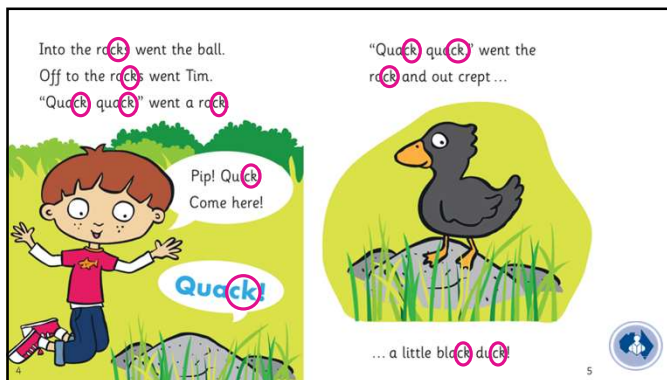- Promote vocabulary development

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Stage 1

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Teacher Notes
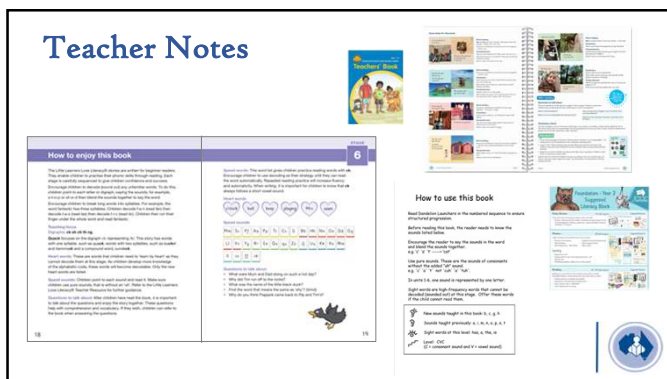

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What are common words?

- Are not decodable by the reader
- They contain parts that may need to be learned "of by heart"

37

Speed words

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Sounds Write

PLD

Little Learners Love Literacy

40

Decodable Readers Australia

Sunshine Phonics

Snappy Sounds

41

Phonic Books

MultiLit

42

How do I use decodable books?

small group reading	take home reading
partner reading	cross curricular work
Independent reading	re read with expression
speed words and word sorts	Dictation

book analysis
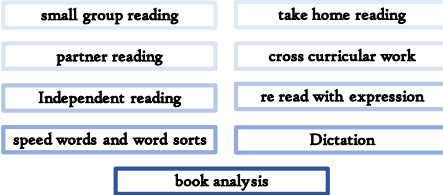
43

Should I send decodable books home?

- Crucial to build fluency and confidence

- To reach mastery children should read the book several times

44

Free downloads

45

Evidence Based Instruction

"Whether it is a child or adult who wants to learn to read, the information they need to know and the process they need to go through is exactly the same.

For this reason, **a structured synthetic phonics approach is suitable** for beginning readers and those struggling to learn to read and spell, **regardless of age**."

DSF SPELD

SYNTHETIC PHONICS, TAUGHT IN A SYSTEMATIC WAY IS THE APPROACH MOST LIKELY TO RESULT IN SUCCESSFUL OUTCOMES.

46

Cumulative Scope & Sequence

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Teach reading & writing together

Decode (read)

cat → grapheme → phoneme

Encode (spell)

phoneme → grapheme → cat

48

Revision & Spaced Practise
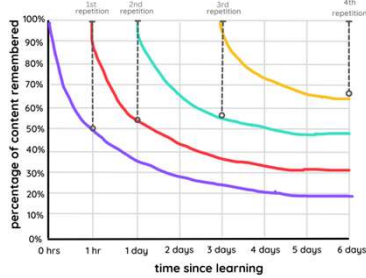
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An explicit teaching approach

I Do | We Do | You Do It Together | You Do It Alone

50

Instructional Routines

- Reduce amount of new information to process
- Reduce teacher planning time
- Learn new things faster
- Keep students' attention

"PREDICTABILITY BREEDS TRUST, WHICH CREATES THE SPACE TO RAISE EXPECTATIONS."

51

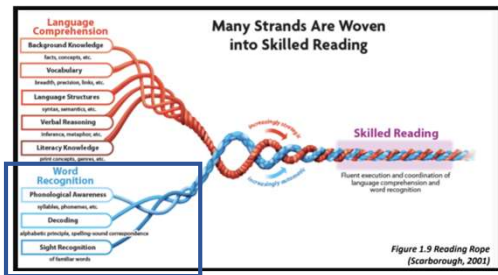"Students cognitive energies must be divided between the task and the content.

However, if an instructional routine is used students can place their attention solely on the content, which is **exactly** where we want them to focus."

Anita Archer
Explicit Teaching, p.195

52

The Reading Rope

Figure 1.9 Reading Rope
(Scarborough, 2001)

53

"Helpful for all children,
Harmful for none,
Crucial for some"

C. Snow and C. Juel (2005, p. 158)

54

Thank you

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55