





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.



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Jenny Baker



» Jenny Baker is a Speech pathologist who has been working in the area of spelling and written expression for over 40 years. She is one of the directors of Fremantle Speech Pathology Services, a busy private practice in Perth that works almost exclusively with school aged children. Jenny is also involved in the clinical education of speech pathology students, equipping them with the knowledge and experience required to operate in school-based settings.

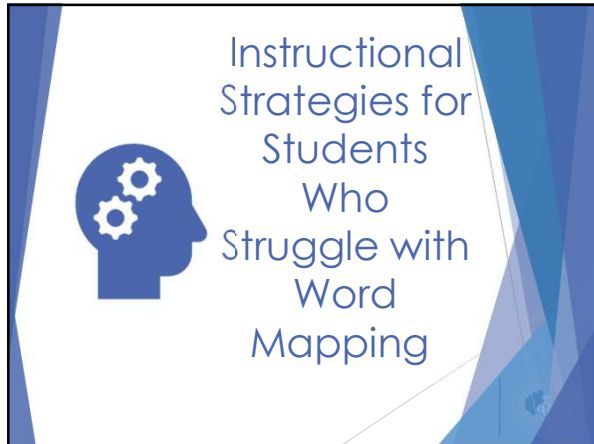
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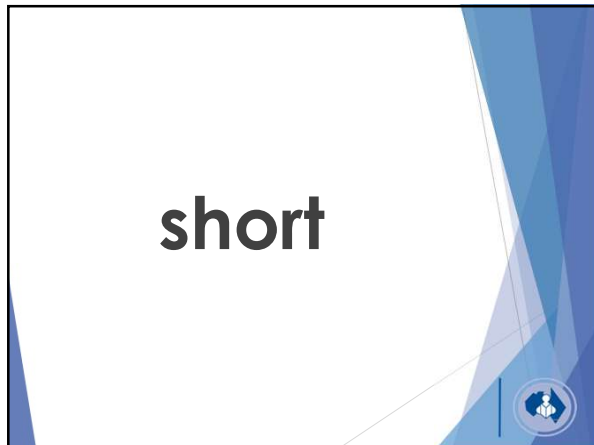
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What is Orthographic Mapping?

Orthographic mapping is the mental process we use to store written words—or symbols—in our long-term memory so we can recognise and retrieve them instantly.

It happens when we connect the **sounds (or meanings)** of symbols to their **visual forms** and do this accurately and repeatedly.

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Learning Roman Numerals and Orthographic Mapping

When learning to read **XCV**, the Roman numeral for 95.


Poor instant recognition
Needs to be worked out - step by step:

1. **X = 10**
2. **C = 100**
3. **V = 5**

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1. Rule = **smaller numeral comes before a larger one**, subtract
2. (e.g., **XC = 100 - 10 = 90**),
3. and when it comes after, you add
4. (**+V = 5**).
5. So:
 1. XC = 90
 2. XC + V = **95**

The first few times, this is slow. You're relying on **logic, memory, and decoding**—just like early readers sounding out "w-i-th" to get "with".




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How Mapping Happens Over Time

With repeated practice:

- You start to instantly **recognise that "XC" means 90**, and "XCV" means 95.
- You no longer need to decode or break it apart.
- You've stored **XCV = 95** as a mental "**sight image**" in your brain.
- It becomes **automatic**—you see it and you know it, without consciously working it out.


This is orthographic mapping in action.



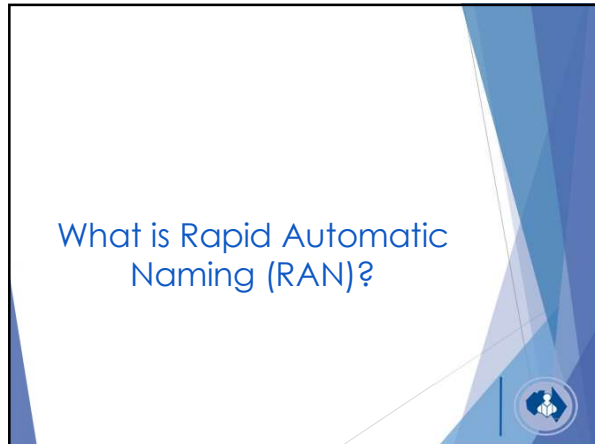
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How This Applies to Words

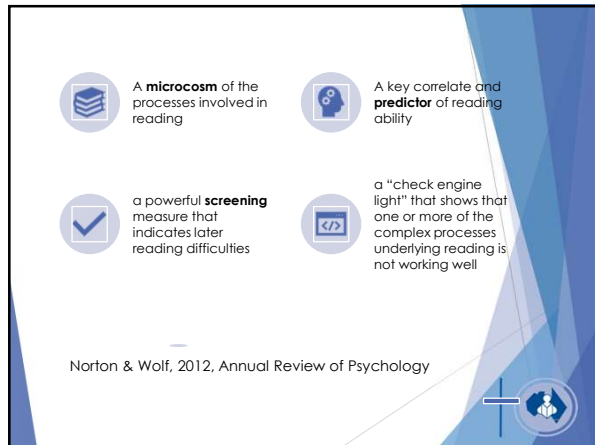
- A child might first sound out **w-i-th** every time.
- But after repeated exposure and correct decoding, they **map** the word to orthographic memory.
- Eventually, they just see "with" and read it instantly (**sight word**)



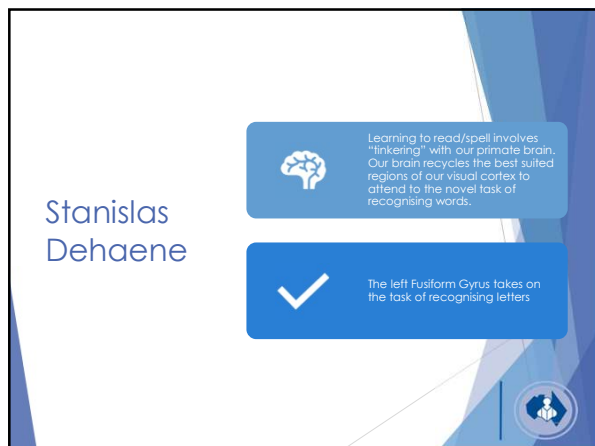
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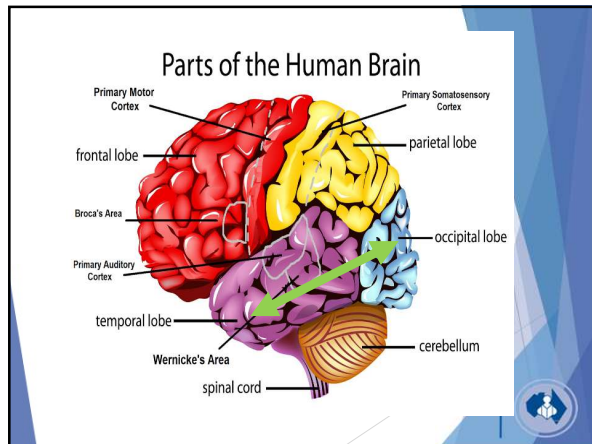
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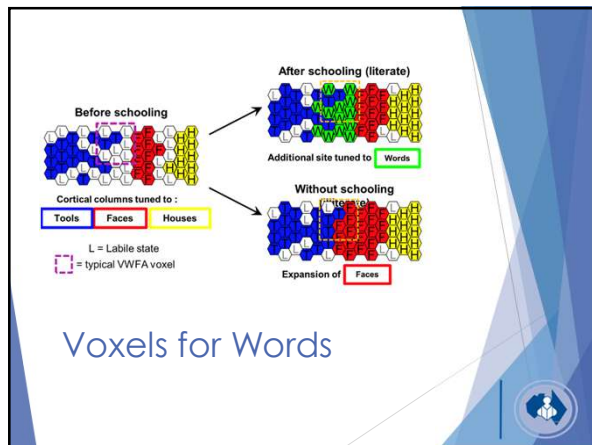
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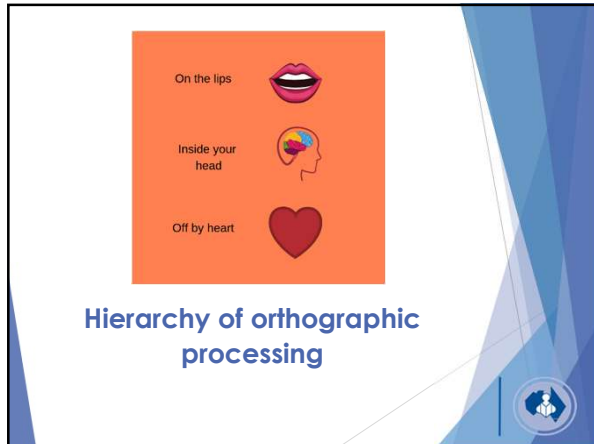
Our brain:

Undertakes neuronal recycling

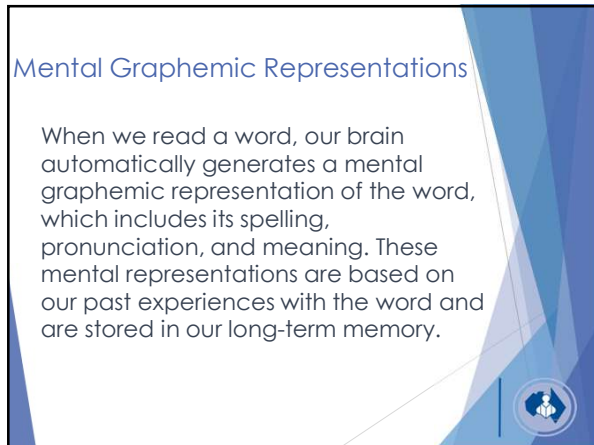
Develops functional connectivity

Establishes neural efficiency

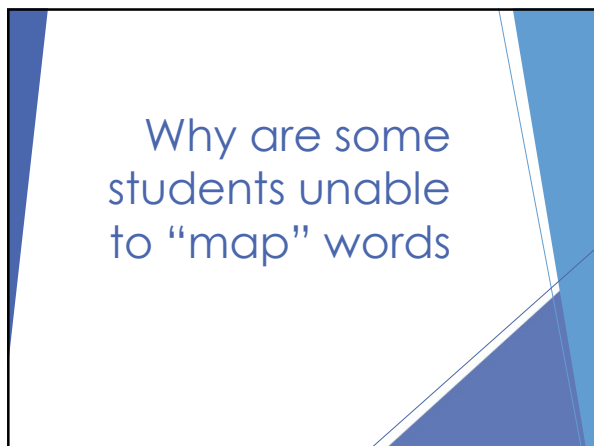
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Orthographic mapping

 Orthographic Mapping is the process that allows students to remember how words look so they can read and spell them automatically.

 It's how we move from sounding out a word to instantly recognising it.

 Some students struggle with this process, which affects their reading fluency and spelling.




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1. Weak Phonemic Awareness

Students need to hear and work with the individual sounds (phonemes) in words. If a child can't clearly hear all the sounds in "ship" (/sh/ /i/ /p/), they won't be able to match them to the right letters.

What to do: Teach and practise segmenting and blending sounds daily.




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2. Poor Knowledge of Letter-Sound Matches

Orthographic mapping depends on knowing which letters make which sounds. Students who don't know that "s+h" makes the /sh/ sound can't map "ship" accurately.

What to do: Provide explicit, systematic phonics instruction that builds from simple to complex letter-sound relationships.




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3.

Difficulty Holding Sounds in Memory

Some students have trouble remembering the sound sequence while they try to write or read the word. This makes it hard to make connections between the sounds and the letters.

What to do: Use short, focused activities that link sounds and letters together. Repetition helps!




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4.

Not Enough Practice with Real Words

If students don't get enough successful practice reading and writing words, they won't build a strong memory of how those words look and sound.

What to do: Provide lots of decoding practice with real words in context, using texts they can manage.



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Slow Visual-to-Verbal Linking (mapping)

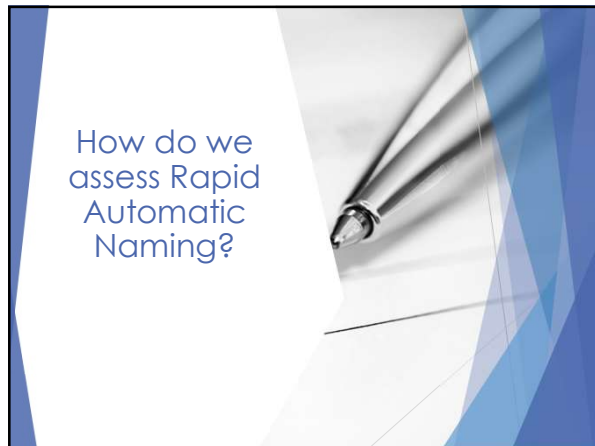
Low Rapid Automatic Naming means it takes longer to link letters or words with their corresponding sounds or names. This slow access disrupts:

- Word reading fluency
- The ability to form clear and stable Mental Graphemic Representations (word images in the brain (in the mind's eye))

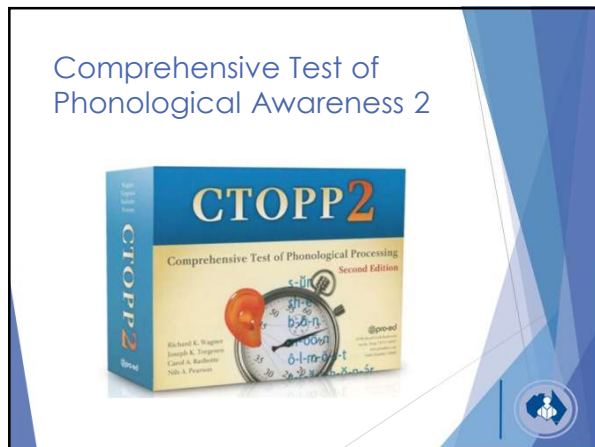
Without this quick, automatic access, the student may not develop strong mental snapshots of words.



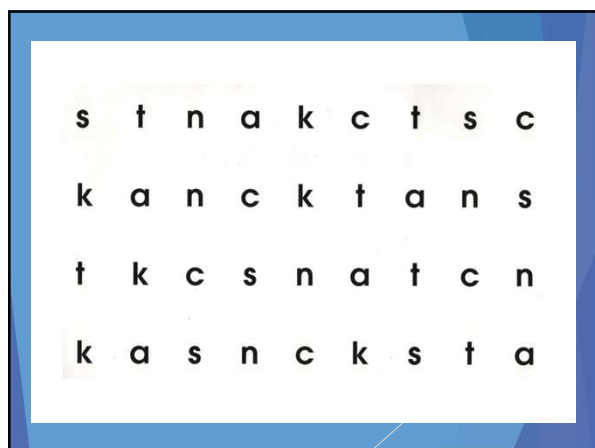
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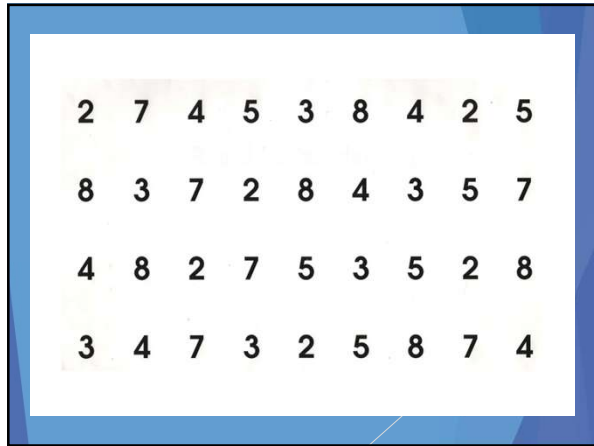
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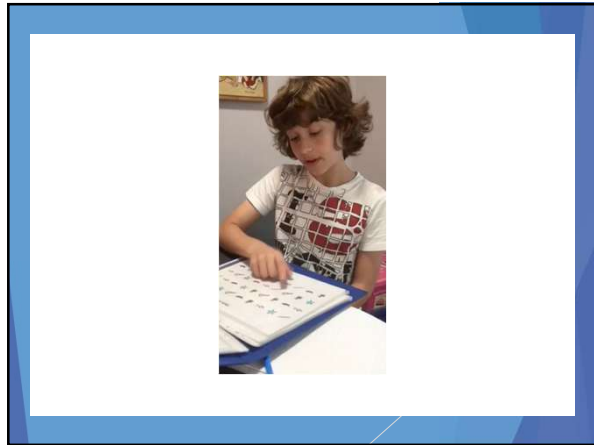
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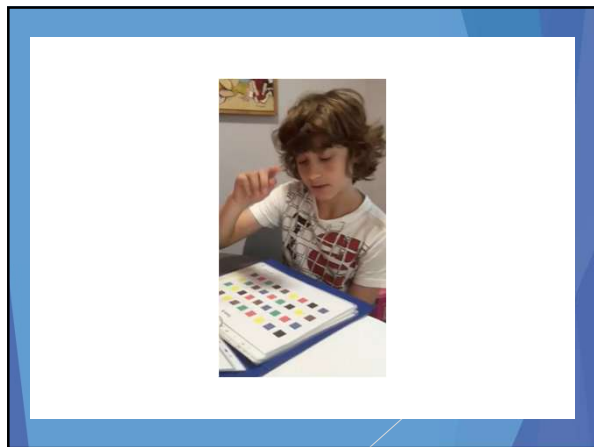
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Loveall, Channell, Philips, &
Conners, 2013 found that
for in grade 2 – 3
children....



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alphanumeric RAN (letters + numbers) was
related more strongly to mental graphemic
representations
sope
saop
sowp
soap



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non alphanumeric RAN (colours and
objects) was more strongly related to
Generic Orthographic Knowledge (GOK)
ckar for car
blknt for blanket
niyht for night



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CTOPP-2: Summary of Phonological Processing Performance

	Percentile Rank	Composite Score	Description
Phonological Awareness The ability to process and manipulate sounds in words. It includes a student's ability to understand that letters represent sounds, how sounds are blended, and how those sounds can build words.	82	114	Above Average
Phonological Memory The ability to hold a sound in one's short-term or working memory.	45	98	Average
Rapid Symbolic Naming The ability to retrieve language information from long-term or permanent memory, which is required for recognition of syllables and words.	8	79	Very Low

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TOC - Test of Orthographic Choice

Answer Sheet

(a)	can / rain
(b)	door / deer
1	cap / cape
2	hut / hurt
3	glance / glance
4	cloak / cloak
5	swell / melt
6	churn / chop
7	sauce / source
8	chase / chase
9	caw / cork
10	snail / snail
11	leaf / leaf
12	chuck / chuck
13	swell / swell
14	moat / moat
15	foot / rule
16	snail / snail
17	caw / cork
18	huff / hood
19	mop / mope
20	stroke / stroke

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Intervention

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What does David Kilpatrick tell us about intervention....?

- ▶ Rigorous PA training
- ▶ Repeated Reading / Spelling
- ▶ Aim to have every word a **SIGHT** word
- ▶ Don't spend too much time on unnecessary tasks of phonological awareness
- ▶ focus on synthesis and analysis but build in more complex manipulation at a later phase



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Kilpatrick (2015)

"Students are more likely to read words they have learned to spell than spell words they have learned to read."



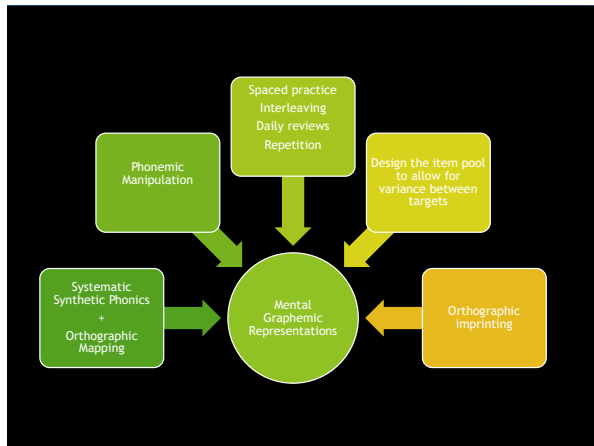
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What is the goal of an effective Spelling/Reading program....?



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Phonological Awareness – Hearing and manipulating sounds

To read or spell "pouch," the student must:

- Segment the word into its individual **phonemes**:
/p/ /ou/ /ch/
- Recognize that:
 - /p/ is a single consonant sound
 - /ou/ is a vowel team (like in "out" or "shout")
 - /ch/ is a consonant digraph (two letters, one sound)

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Orthographic Mapping – Storing words in memory for instant retrieval

To store "pouch" as a sight word:

- The student must connect the **sounds** they hear to the **letters** that represent those sounds (graphemes)
- This requires:
 - Knowing that "**ou**" makes the /ou/ sound
 - Knowing that "**ch**" represents /ch/
- When these sound-letter correspondences are practiced and solidified, "pouch" becomes instantly recognizable and spellable



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Semantics / Vocabulary – Knowing what the word means

Understanding what a "**pouch**" is (e.g., a small bag, a kangaroo's belly pocket) gives the word **meaningful context**. This helps:

- Anchor the word in long-term memory
- Guide spelling through mental associations (e.g., linking "pouch" with "ouch" or "couch" patterns)



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David Share + Linnea Ehri Self Teaching via Orthographic

We cannot teach every word in a spelling system

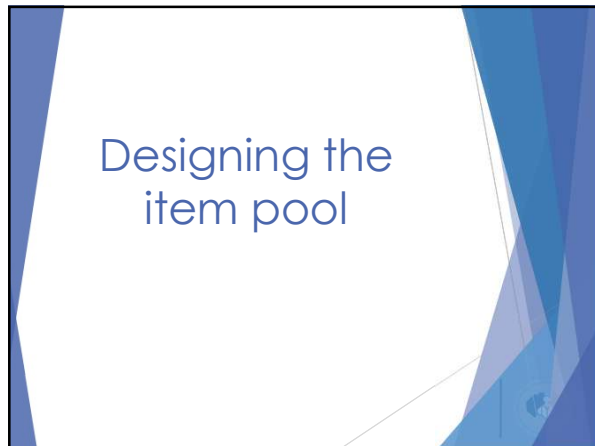
Students teach new words to themselves

Connections between a word's pronunciation and its letter sequence are made

Typically developing students require 1 – 4 exposures



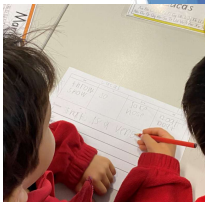

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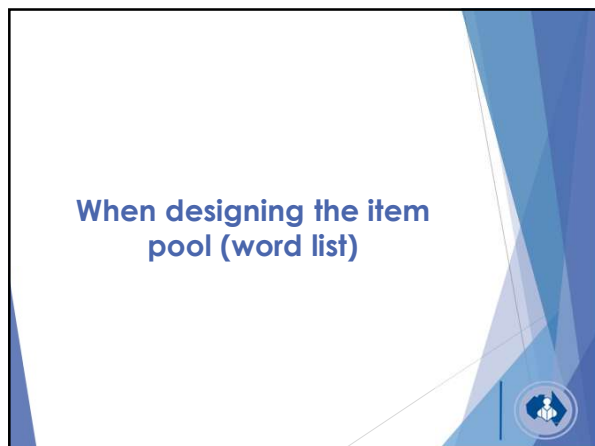
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Word Choice – The Item Pool

- ▶ We 'manipulated' the item pool and selected words that maximised the phonological, orthographic & linguistic properties of the words.
- ▶ The aim is for students to get "traction" on the selected few words. Other words could be introduced a short time after the initial set.
- ▶ Revision/ interleaving / interspacing were important factors to consider.





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- ▶ Align with the reading program – Sounds Write or UFLI Programs
- ▶ Manipulate the number of spellings introduced at one time.
- ▶ Give consideration to statistical probability of a word containing that spelling and therefore the number of words represented by each spelling




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- ▶ Considered the "usability" of the words and the grammatical categories they come from - verbs, nouns or adjectives
- ▶ Selected words that are not taught but are included in the assessments



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Selected words that are not taught but are included in the assessments



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Spellings of /eɪ/

- | | |
|-------------------|-----------------|
| ▶ ai explain | ▶ ae vertebrae |
| ▶ a paper | ▶ ea break |
| ▶ ay holiday | ▶ ee puree |
| ▶ a-e demonstrate | ▶ e-e fete |
| ▶ eigh weight | ▶ au gauge |
| ▶ ei vein | ▶ ao gaol |
| ▶ ey obey | ▶ aigh straight |
| ▶ e café | |



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Word Selection

ake

ain

- | | |
|---------|---------|
| make V | train N |
| take V | brain N |
| lake N | rain N |
| shake V | chain N |
| wake V | stain N |
| bake V | drain N |
| cake N | |
| fake A | |
| snake N | |



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Word Selection

ate

ail

- | | |
|-----------|---------|
| mate N | frail A |
| hate V/N | rail N |
| late A | nail N |
| date N | snail N |
| gate N | fail V |
| crate N | trail N |
| plate N | |
| skate V/N | |
| state V/N | |



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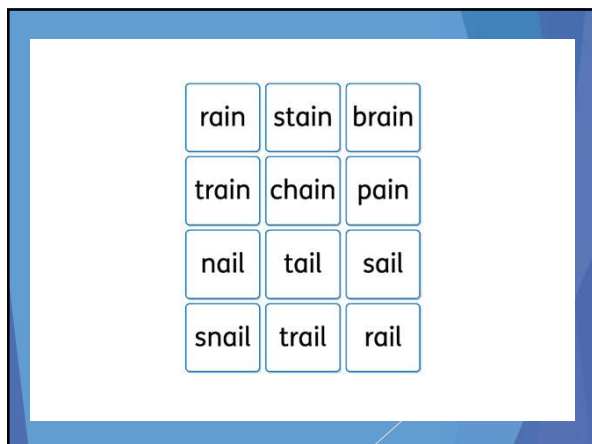
When selecting words for
a Year 1 class,
consider these variables.....

Word	Grammatical category (most common usage)	Usability for a Yr 1	Selection
	V = Verb N = Noun A = Adjective Ad = Adverb	V = Very common C = Common U = Uncommon	== = 1 st choice == = 2 nd choice * = 3 rd choice
mate	N	C	**
skate	V	C	**
hate	V	V	***
date	N	V	***
Kate	N	C	**
late	A	V	***
rite	N	U	*
slate	N	U	*
gate	N	V	***
state	N	U	*
crate	N	U	*
plate	V/N	U	*
spate	N	V	***
spate	N	U	*

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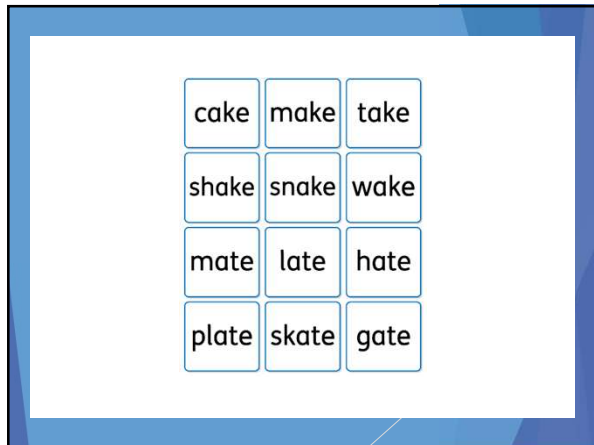
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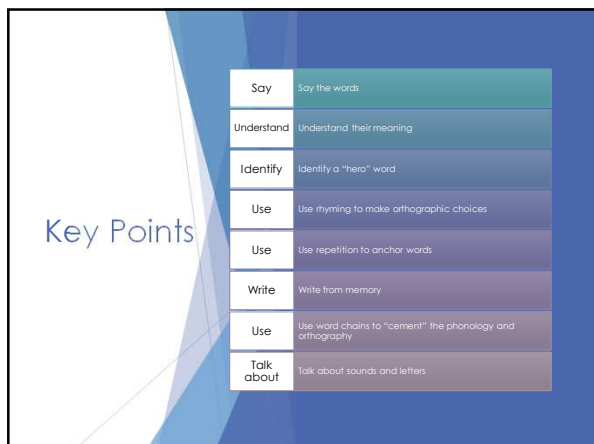
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Marley

- ▶ Year 4
- ▶ Developmental Language Disorder
- ▶ Going for a Dyslexia diagnosis
- ▶ Had over 50 sessions UFLI and Sounds Write
- ▶ Mother has processing difficulties + Aphantasia




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Teaching rhyming and sound analysis




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On the lips




Inside your head



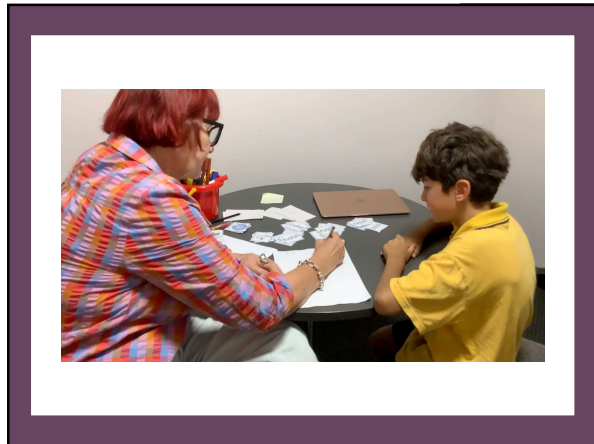
Off by heart



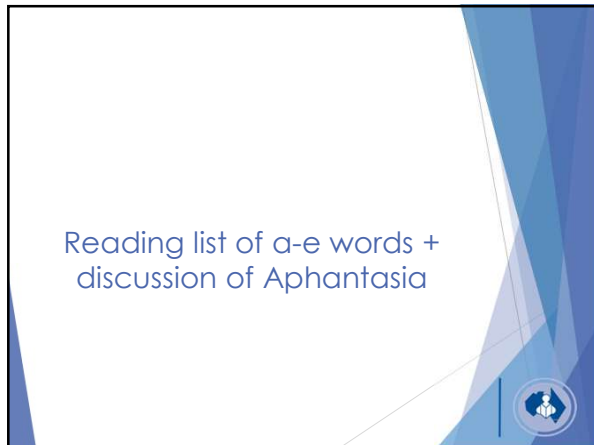
Hierarchy of orthographic processing



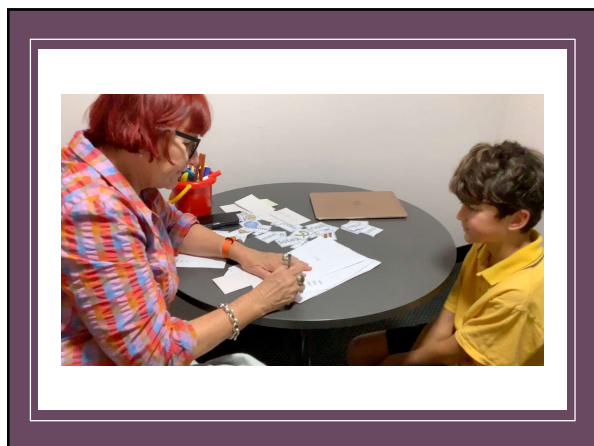
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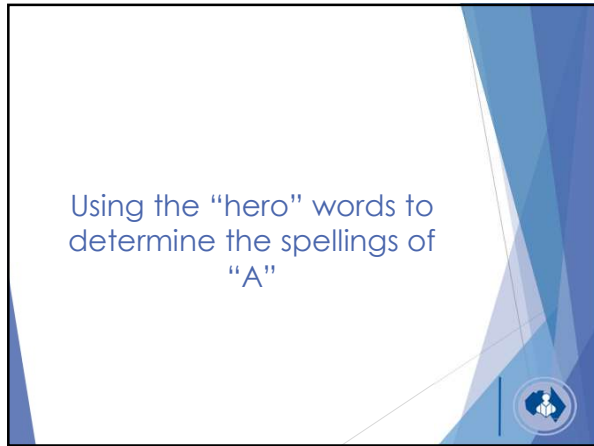
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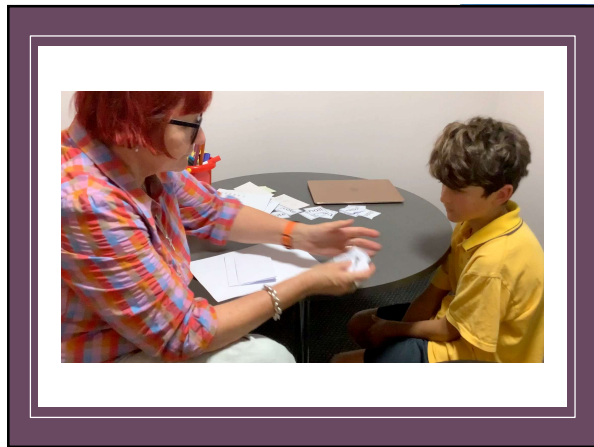
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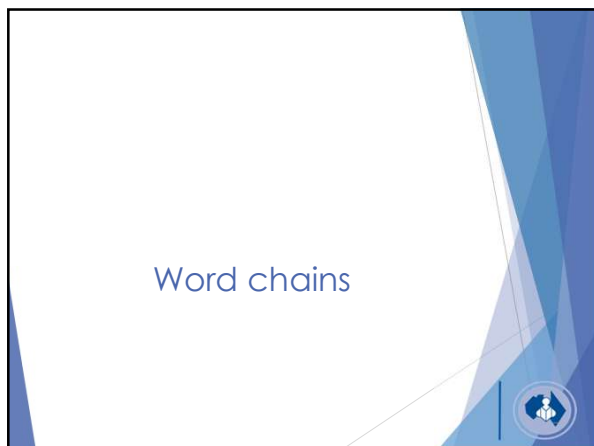
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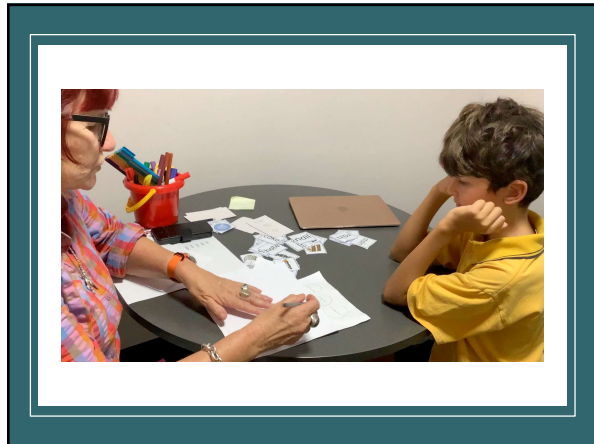
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Phonemic and graphemic manipulation

Build in advanced phonological awareness activities

strain

- ▶ What is the third letter?
- ▶ What is the last letter?
- ▶ Remove the /r/
- ▶ Swap /t/ for /p/
- ▶ Swap /sp/ for /br/
- ▶ Remove the /b/
- ▶ Add /t/ to the front
- ▶ Swap /n/ for /l/


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What is Reading Fluency?

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Why do we need Fluency?




- Frees up 'brain space' to think about
 - Inferencing
 - Problem solving
 - Vocabulary
 - Prior knowledge
 - Making links to other texts
 - Synthesis of ideas
 - Self-monitoring

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Accuracy


Accurate word reading is dependent on the ability to decode words efficiently and the process of 'orthographic mapping'.



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Rate

The goal is to achieve a pace that allows for appropriate phrasing that acknowledges punctuation and changes in tone, but which is quick enough to enable comprehension.



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READ AS QUICKLY AS YOU CAN
BUT
AS SLOWLY AS YOU NEED TO:
FIND THE "SWEET SPOT"



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Prosody


Prosody means reading with expression – like natural speech



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Some facts.....


- ▶ Students need to read at a rate of approximately 90-100 wcpm for basic comprehension.
- ▶ For most students this should be achieved by the end of Year 2.
- ▶ Throughout the upper primary years, fluency should typically reach around 100-120 wcpm and higher again in secondary school.
- ▶ Skilled adult readers read at approximately 180 wcpm, depending on the text (higher for fiction and lower for non-fiction, on average).



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► Average oral reading fluency rates for independent level texts (texts that are able to be read with an accuracy rate of more than 95%. Konza (2012))

- By end of Year 1 60 wcpm
- By end of Year 2 90-100 wcpm
- In Years 3 to 6 100-120 wcpm




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Repeated Reading

Several important characteristics of a Repeated Reading lesson must be present in order for it to be optimally effective.

- Modelling of fluent reading
- Positive feedback and correction from adults
- Goal setting, reinforcement, and self-monitoring
- Previewing potentially unknown words before reading
- Cueing students to focus on pace and meaning as they read
- At least four repetitions of the same text (standard Repeated Reading) or a sufficiently similar text ('Varied Practice')



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Select a reading that a student can **read with 90 - 95% accuracy**.

Preview the topic and potentially **tricky vocabulary** within the text to support meaning.

Time the student reading for 1 – 2 minutes.

Calculate WCPM

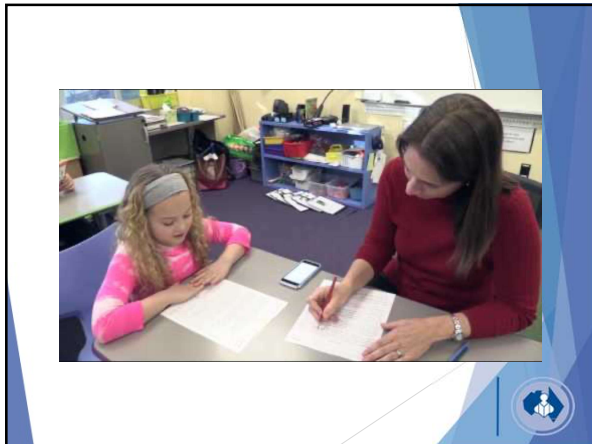
Over the next few days, read the passage again as home practice (**no more than 3-4 times**)

Repeat the 1 – 2 min timed reading (**expecting a 10% gain from first to last**)

If no improvement, **select an easier passage**.

Once 10% gain in WCPM is achieved, read another passage at the same level until target rate is achieved.

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85



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Reading Practice
Say the sounds and listen for the word:

4-sounds		5-sounds
desk	gets	stops
lamp	text	drink
lots	help	sends
hits	stop	tests
hums	cross	

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The two and three syllable words included in this book: laptop, himself, humming, begins, presses, fantastic.

Reading Practice of Polysyllabic Words:

2 syllables:	3 syllables:
be-gins	fan-tas-tic
lap-top	
press-es	
him-self	
hum-m-ing	

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Sam has a desk.
He has a lamp and a laptop
on his desk.



He has a pot of pens and a lot of lists.
His desk is a mess!

89

Sam has lists of jobs he must do.


He has lots of lists.

He has lots of jobs.


Sam is fed up but he must get on.

90

He sits at his desk.
His laptop is old.
It is on but it is humming.



91



Sam gets cross. He hits the laptop.
It stops humming!

92

The Laptop

Sam has a desk.
He has a lamp and a laptop on his desk.
He has a pot of pens and a lot of lists.
His desk is a mess!
Sam has lists of jobs he must do.
He has lots of lists.
He has lots of jobs.
Sam is fed up but he must get on.
He sits at his desk.
His laptop is old. It is on but it is humming.
Sam gets cross. He hits the laptop. It stops humming!

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How Scooping Assists Orthographic Mapping



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Students read more quickly when they are able to break text into syntactic and semantic phrases and clauses 'on the fly'

(Sabatini et al., 2019)



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What is Scooping?


- ▶ Scooping involves drawing **curved lines** or "**scoops**" **under phrases or word groups** in a sentence to show how they should be read together, rather than word-by-word.
- ▶ It visually chunks the sentence into meaningful parts.



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Supports Phrasing and Expression


- Scooping helps students see how words belong together in meaningful phrases.
- This encourages **natural rhythm and intonation**, making their reading sound more like spoken language.



97

Reduces Word-by-Word Reading


- Many developing readers read in a choppy, robotic way.
- Scooping trains the eye and brain to group words together, leading to **smoother, more automatic reading**.



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Improves Comprehension


- Reading in chunks rather than isolated words makes it easier to **understand the meaning** of what's being read.
- It mirrors how our brain processes spoken language—through phrases, not individual words.



99

Supports Working Memory


- Chunking reduces the cognitive load while reading.
- It helps students hold and process more information in their **working memory**, which is critical for understanding longer or more complex sentences.



100

. Builds Confidence

- When students read more fluently, they **feel more competent and motivated**.
- Scooping can be scaffolded and gradually removed as fluency develops.




101

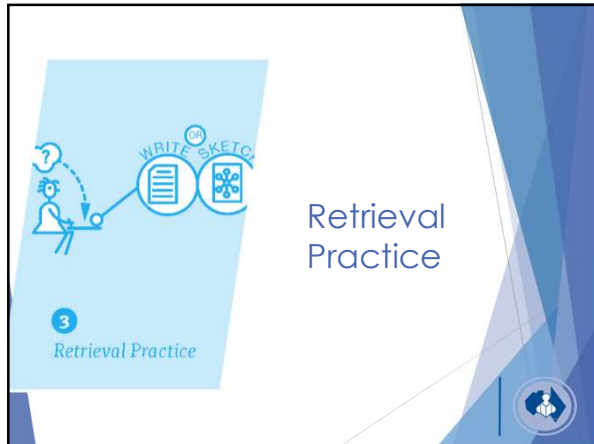
Understanding How We Learn: A Visual Guide Yana Weinstein

► <https://www.learningscientists.org>

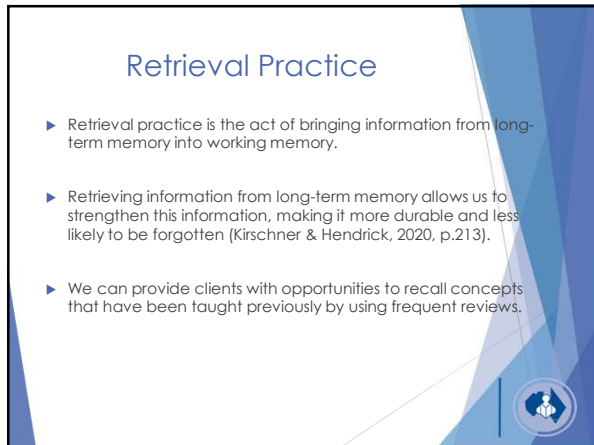
1. Evidence-based education and the science of learning
2. Basics of human cognitive processes
3. Strategies for effective learning
4. Tips for students, teachers, and parents.



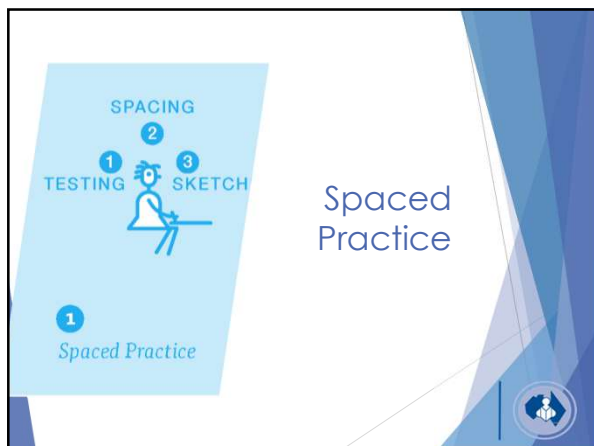
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Spaced Practice

- ▶ Spaced practice involves scheduling your study sessions at regular intervals.
- ▶ Spaced practice is beneficial as it helps to counteract Ebbinghaus' forgetting curve, wherein we begin to forget knowledge and skills immediately upon learning them (Weinstein & Sumeracki, 2019, p. 88).
- ▶ By providing students with regular opportunities to review prior learning, they are far more likely to transfer knowledge and skills into long-term memory. At my school, we review prior learning every day.



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Interleaving

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Interleaved Practice

- ▶ Interleaved practice is the idea of studying a range of topics during a single study session, as opposed to focussing on a single domain (usually called blocked practice).



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