What is the Science of Reading?

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WVPEC 5th Annual Hot Topics Conference

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Today's agenda

Defining the science of reading

Overview of evidence-based practices

Overview of classroom contexts

Overview of text selection

Useful resources

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What is the science of reading?

A ***convergence*** of ***accumulated*** findings from research across varied methodologies

Reading processes (basic research on how reading "works")
Reading instruction (applied research)
Implementation (translational research across contexts)

3

It is NOT…

A specific program, practice, or particular aspect of reading instruction

Whole language/Balanced Literacy vs. Phonics

Just because a publisher or someone on social media or elsewhere uses the term "science of reading" does not mean they are actually aligned to what the science tells us.

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Convergence of Accumulated Findings

What to look for in your school contexts

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"Lifelong reading" requires…

World knowledge

AND
Skills and strategies

AND
Motivation and agency

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Instructional Priorities: What Matters *Every Day* for Students

1. Word Study (phonological awareness, phonics, spelling, multisyllabic decoding, vocabulary, morphology)
2. Fluency
3. Knowledge-Building, Vocabulary/Language, AND Comprehension Monitoring Strategies
4. Writing

** Within **all of these four domains**, there should be

ample opportunity for small group instruction

ample attention to motivation and engagement

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Phonological awareness instruction
(grades K and 1, as needed in grades 2+)

Focused on segmentation and blending of phonemes

Coupled with opportunities for students to manipulate letters (once students have some letter-sound knowledge)

5 to 18 hours spread out over time as opposed to longer amounts of total time spent on it

Small, differentiated groups based on needs

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Explicit phonics and word recognition instruction (Grades K-2, as needed in 3+)

There is no one best sequence for introducing phonics elements. Generally,
    Most common consonants + short vowels a, i, o
    Less common consonants + short vowels u, e
    CVC words with continuous sounds
    CVC words with stop sounds
    Blends, consonant digraphs, vowel pairs, long vowels

Generally more effective in small, differentiated groups than whole class.

Application to reading texts, especially with support from the teacher.

Explicit and systematic! No convergent evidence that synthetic approaches (part-to-whole) are better than analytic (whole-to-part) approaches

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Some effective instructional practices

Work with sound boxes (e.g., Elkonin boxes)

Guided sentence writing to teach students to stretch out (segment) sounds while spelling and writing

Short vowel charts, alphabet displays (e.g., pictures that match the letter-sound, e.g., a snake in the shape of S), word walls by patterns/concept

Model letter-by-letter decoding

Word building activities for sequential decoding (word chains)
https://www.youtube.com/watch?v=lJhQEc0YECk&t=14s

Word sorting for word analysis and pattern learning

Teach students to decode longer words by chunking them into small pronounceable units
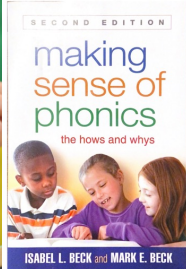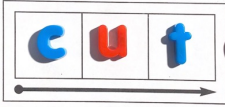Syllasearch video https://www.youtube.com/watch?v=uxVWTwYs72g

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Building Word Reading and Spelling Abilities and Automaticity

Word building (w/sound boxes)

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Building Multi-Syllabic Word Reading, Meaning, and Spelling Abilities, and Automaticity

Syllasearch Morphology

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Ample time spent coaching word reading in connected text

Orthographic mapping is the amalgamation of pronunciation, spelling, **and** meaning of words (including use in context), and needs to be consolidated through reading connected text.

Word Reading Strategies

When I come to a word I don't know…

LOOK at the word and all of the letters.

BLEND all the sounds together from left to right.

s – p – o – t

CHUNK the letters that go together.

sp – ot

Then…
CHECK YOUR ATTEMPT
- Does what I read look correct?
- Does what I read sound correct?
- Does what I read make sense for the sentence?

Finally…
REREAD the sentence from the beginning before moving on.

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Table 4.3 The Thorndike-Lorge Magazine Count of High-Frequency Words

Word	Frequency of Use	Cumulative Percentage of Use
1 the	236,472	.0515
2 and	138,672	.0817
3 a	117,222	.1072
4 to	115,358	.1323
5 of	112,601	.1568
6 I	89,489	.1763
7 in	75,253	.1926
8 was	58,732	.2055
9 that	55,667	.2176
10 it	52,107	.2290
11 he	49,268	.2397
12 you	42,581	.2490
13 for	39,363	.2576
14 had	34,341	.2651
15 is	33,404	.2723
16 with	32,903	.2795
17 her	31,824	.2884
18 she	31,087	.2932
19 his	30,748	.2999
20 as	30,693	.3066
21 on	30,244	.3132
22 at	26,250	.3189
23 have	24,456	.3242
24 but	23,704	.3292
25 me	23,364	.3345
Sum = 1,535,783		
Total number of words = 4,591,125		

From Thorndike, E. L., & Lorge, I. (1944). *The Teacher's Word Book of 30,000 Words.* New York: Columbia University.

Building Fluency with HF Words

Table 4.4 Zeno High-Frequency Word List

the	as	but	about	Your	how	also	back
of	are	by	up	Which	than	down	where
and	they	were	said	Do	two	make	know
to	with	one	out	Then	may	now	little
a	be	all	if	many	only	way	such
in	his	she	some	these	most	each	even
is	at	when	would	no	its	called	much
that	or	an	so	time	made	did	our
it	from	their	people	been	over	just	must
was	had	there	them	who	see	after	
for	I	her	other	like	first	water	
you	not	can	more	could	new	through	
he	have	we	will	has	very	got	
on	this	what	into	him	my	because	

From Zeno, S. M., Ivens, S. H., Millard, R. T., & Duvvuri, R. (1995). *The Educator's Word Frequency Guide.* Reprinted by permission of Questar Assessment Inc.

Reutzel, D. R., & Cooter, R. B. Jr. (2019). *Teaching Children to Read: The Teacher Makes the Difference. Eighth Edition and E-Book Edition.* Boston, MA: Pearson Education. ISBN 978-0-13-474253-3.

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Read It, Make It, Write It

Students have 3-4 words at a time as a focus. These are written on index cards/sticky notes/whiteboard.

1. Read It.
   - T: What is this word? What are letters in this word (touching the letters)? What are the sounds you hear in this word (sound out word or word parts – touching the letters)? What's the word? (If student cannot initially read the word or reads it incorrectly, the T says: This word is _____. What is the word?)
2. Make It.
   - T: Take magnetic letters (or tiles) and make the word ___.
   - (After S makes the word) T: Can you touch and say the letters in the word _____?
   - T: What's the word?
   - (You can make the word with letters 2-3 times)
3. Write It.
   - (Take away magnetic letters and cover the word) Can you now write the word (on paper or whiteboard)?
   - (After the students write, show the word) T: Can you check your spelling with this version by pointing to the letters as you say them? What's the word?

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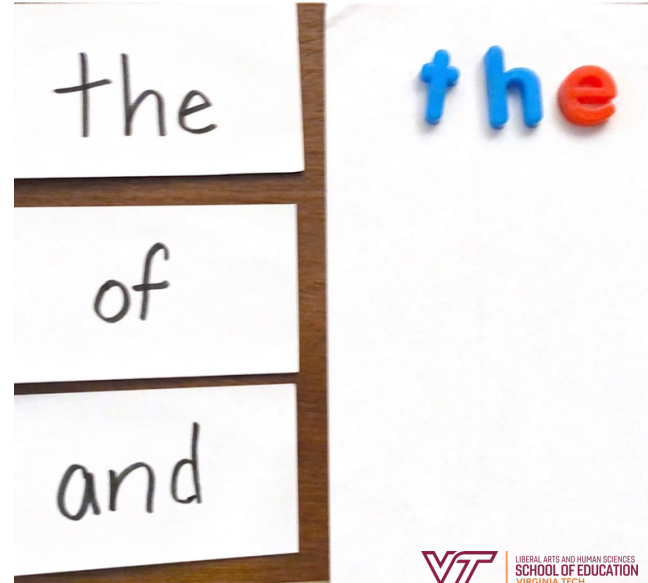
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Fluency

Accuracy + Automaticity + Prosody

Wide reading (abundant opportunities to read texts connected to interests daily)

Silent reading using **scaffolded** approaches (R5, ScSR), **not** SSR or DEAR

Depending on the needs of the students, different assisted reading strategies can be used to support more prosodic and accurate reading.

1. Repeated readings of short texts.
   a. Can be done each day with students choosing books previously read from a book bin or bag.
2. Repeated readings of a particular passage or part of a book.
   a. Generally, 3-5 times at the most. These can also be recorded and listened to for the student to reflect on reading.
3. Choral reading
   a. Either the students chorally, or the students with the teacher chorally.
4. Echo reading
   a. Teacher reads a page and all students repeat the page attempting to sound like the teacher.
5. Readers Theater
   a. Scripts that are practiced and performed for other groups – no props or costumes – generally practice the script over three days and perform on day 4.
6. Read Aloud
   a. Of course, model fluent, expressive reading during any read aloud portion of the time.

*Note: **Do not** use popcorn reading or other forms of round robin reading. This is repeatedly shown to be detrimental to students' fluency development, comprehension, and identities as readers.

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Building Conceptual Knowledge (K-5)

Engage

Connect to interests (and/or pique situational interests w/in curricular topics) by contextualizing relevance and novelty

Generate questions with students

Read Aloud/video viewing/images/hands-on work

Build background knowledge (e.g., conceptual mapping)

Engage in lots of discussion

Generate questions with students

Introduce key vocabulary connected to the mapping

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Read aloud (K-5)

Develop conceptual understanding and background knowledge through sets of texts or series that are thematically related

Model appropriate reading fluency (expressive reading)

Provide child-friendly definitions of words and concepts

Engage students in discussions involving higher-order thinking

Also…

Develop print concepts, alphabet knowledge, and phonological awareness

Model application of decoding strategies, text structure, comprehension strategies, vocabulary strategies

Use reading aloud to demonstrate segmenting and blending sounds (decoding)

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Vocabulary (K-5)

Oral language (incl. vocab) abilities in preschool/K predict reading achievement in grades 3+

- Providing Rich and Varied Language Experiences
- Teaching Specific Word Meanings Directly
- A Comprehensive Approach
- Teaching Word Learning Strategies
- Fostering Word Consciousness

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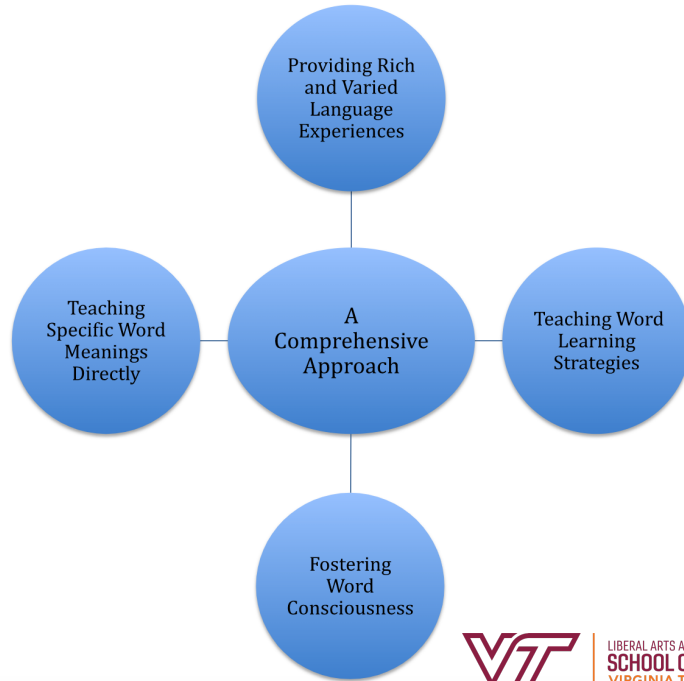
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Wonderful Words!

- physical characteristic
- adaptation
- survive
- observe
- habitat

- fossa
- lemur
- fearsome
- predator
- prey
- powerful
- mimic

What Do You Do With a Tail Like This?
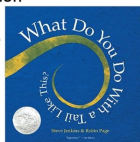
Animal Adaptations

FOSSA
A Fearsome Predator

I See a Kookaburra!

- camouflage

Animal Defenses
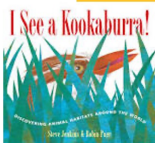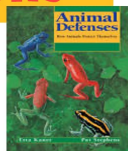
- analyze
- conclude
- data
- experiment
- hypothesize
- record

Animal Adaptations to meet needs and survive

- Rabbits turn white in winter to hide from predators.
- Chris and Martin can use wings to help them travel.
- People can use claws to grab things.
- Chris can use strong fast cheetah

Filling the classroom with rich language experiences to hear, speak, read and write the words many, many times.

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Comprehension (K-5)

High-level discussions of content and concepts, including developing reasoning abilities

Text structures and their use in promoting understanding

Comprehension monitoring strategies (e.g., inferring, questioning) using challenging or difficult texts

Scaffolded practice in strategy use during purposeful opportunities for using strategies (i.e., grade-level or challenging texts)

Sentence construction (syntax)

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Promoting Comprehension

Establish coherence across thematically-related texts and concepts

Set a **content-focused** purpose
    knowledge goal & sub-knowledge
    goal questions
    "As we read right now, think
    about…"

Engage in lots high-level questioning and talk

Figure 5   Concept Web for Defiant

In what ways was Desperaux showing defiant behavior towards the other mice?

In what ways were the Colonists showing defiant behavior towards England?

Defiant
Someone who is *defiant* boldly challenges or resists something.

How does being defiant affect other people?
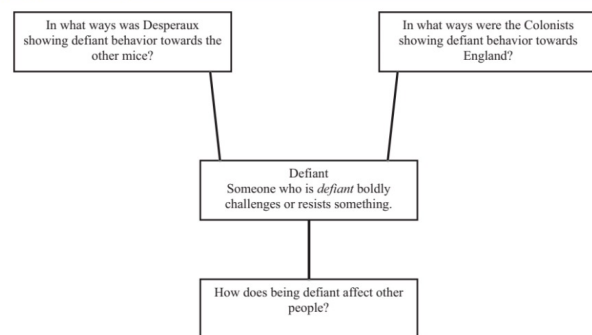
R T   *The Reading Teacher*   Vol. 67   Issue 7   April 2014

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Connect that purpose to strategy use to self-regulate and monitor understanding

"On the other hand, strategic readers are readers who prepare themselves for reading events and employ a range of strategies before, during, and after reading flexibly and adaptively to scaffold their own understanding, with the end result being comprehension–that dialogic interaction with content, knowledge, and experiences, **not just** strategy use"
(Robertson et al., 2017, p. 6)

Comprehending – Text Reading Routines

Before you read, skim through the text and ask yourself….

- What is the author trying to tell me about in this text?
- What might I learn?
- What do I already think I know about this?
- Do I need to learn more about this topic before I start?
- Why do I think the author wrote this?

While you are reading, ask yourself….

- Am I learning what I thought I'd learn?
- What questions is the author making me think about?
- Is anything confusing me? How can I fix it? Do I need to reread any parts?
- Why did the author write the text the way they did?
- Am I finding any interesting words I didn't know?
- What important ideas is the author trying to make?
- Am I reading too fast or too slow?

After you read, ask yourself…

- What did I learn?
- How would I summarize what I read?
- How would I retell this text to someone else?
- What does this text make me think about?
- How can I use the information I learned?

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Writing to Deepen Understanding (K-5)

Writing improves reading and reading improves writing.

Engage in lots of discussion and oral rehearsal

Spend just as much, if not more, time planning to write

Write to learn (e.g., responses, annotations, organizers)

Write related to the topic of study

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Classroom Context

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Motivation and Engagement

Daily opportunities for choice in reading and writing

Regular opportunities to collaborate with peers during reading and writing

Establish relevant, knowledge-based purposes for children to read and write beyond assignments and school expectations, e.g., enjoyment, interests, answering their questions about the world

Regular opportunities to build excitement about reading and writing, e.g., book talks.

Avoid using incentives that are non-reading related or using reading as punishment

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Small Group Instruction

Use a variety of targeted, flexible grouping strategies (*not solely based on measured "reading level"*) based on lesson purpose and student needs.

Ensure that children use most of their time actually reading and writing ("eyes on print" volume matters!)

Coach children as they engage in reading and writing
    Comprehension and monitoring strategies
    Phonics knowledge and decoding strategies
    Rereading for fluency

Ensure that meaning making is the ultimate focus of the small group text reading work

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Time spent by students in reading instruction by school effectiveness level

	Minutes spent in whole group	Minutes spent in small group	Minutes of independent reading	Minutes writing in response to reading	Minutes in other independent activities	Total minutes in reading
Most effective schools	25	60	28	14	7	134
Moderately effective schools	37	26	27	15	7	112
Least effective schools	30	38	19	9	17	113

Table 3.1; Taylor, B. M., 2011, p. 54

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Table 2. Examples of the Four Dimensions of Literacy Instruction in the Individualizing Student Instruction (ISI) Reading Intervention

Content dimension	Management dimension	
	Teacher-child managed	Child managed
Code focused	The teacher is working with a small group of students at the teacher table. The children are learning how to use prefixes and suffixes to decode multisyllabic words.	Working individually and in pairs, students are completing spelling activities from their core reading curriculum, including phonics rules.
Meaning focused	The teacher is discussing a book with a small group of students. Each student takes a turn discussing the main ideas and why characters acted the way they did.	Students are reading books in the library corner.

Note: Examples are from the second-grade intervention.
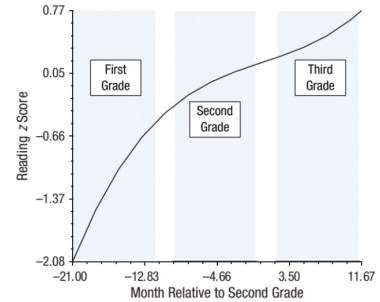
Fig. 4. Fitted mean growth curve for students' reading scores from the fall of first grade through the spring of third grade for all students (end of second grade = 0 months).

Connors et al (2013). A longitudinal cluster-randomized controlled study on the accumulating effects of individualized literacy instruction on students' reading from first through third grade. *Psychological Science, 24*(8), 1408-1419.

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Text Selection

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Using leveled texts

Using leveled texts "did not solve the access problem but, instead, made it worse" (Adams, 2011, p. 9).

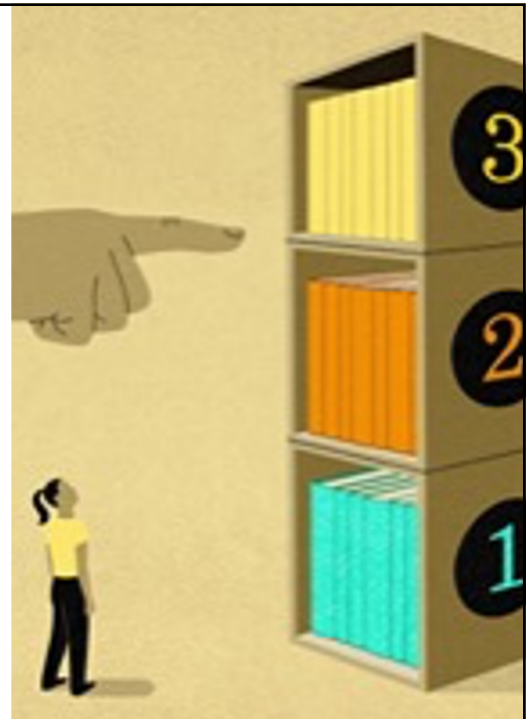Holds students back, especially in grades 2+

Fewer opportunities to engage with the sophisticated language, concepts, and linguistic structures

Fewer opportunities for developing critical thinking processes

Fewer opportunities for discussion and higher-order questions

Fewer opportunities for increasing reading volume

Adams, M. J. (2011)

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Using texts with high decodability

Good argument for using "decodables" as *part of the text repertoire* in the *very early* stages of reading instruction.

"Beyond the initial stages of reading, however, the case for decodable books weakens."

Castles, A., Rastle, K., & Nation, K. (2018). Ending the reading wars: Reading acquisition from novice to expert. *Psychological Science in the Public Interest, 19,* 5-51.

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Using grade-appropriate texts

Solely reading aloud complex text has not solved the access problem either for older students.

It supports listening comprehension, yet they do not have the *reading* experience of grappling with the complex syntactic structures, poly-syllabic words, or conceptually-rich vocabulary and language.

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A combination based on instructional purpose

Supporting early decoding and fluency

Decodable and easier-level texts

AND

Supporting knowledge, stamina, vocabulary development, decoding of multisyllabic words, fluency development, engagement and interest

Complex or grade-appropriate texts

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Why should all students have access to complex texts?

When some students have access to and opportunity to read complex text and others do not, the reading gap **widens** and contributes to a **knowledge gap**.

Reading, just like learning in general, is a **cognitive process** (requiring skills & strategies) and a **social practice** (attending to interests, purposes, and funds of knowledge), yet the needs of students related to these vary.

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Where can I find evidence-based instructional practices?

Bookworms ELA Open Source Curriculum

https://openupresources.org/ela-curriculum/bookworms-k-5-reading-writing-curriculum/

What Works Clearinghouse

https://ies.ed.gov/ncee/wwc/FWW/Results?filters=,Literacy

Institute of Education Sciences Foundational Skills Videos

https://ies.ed.gov/ncee/rel/products/resource/100715

Literacy Essentials
https://www.gomaisa.org/literacy-essentials/the-essentials/

The Reading Forum
https://thereadingforum.com/

Text Project
https://textproject.org/

Shanahan On Literacy
https://www.shanahanonliteracy.com/

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How will you bring the science of reading back to your schools?

rdana@vt.edu

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