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Getting Ready to Read: How the Science of Reading Helps Prepare Young Children

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Keynote Presentation
2023 Symposium on Children – Getting Ready to Read
Crane Center’s 10th Symposium on Children
Ohio State University

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Agenda

- What is the science of reading?
- Laying the foundation for word recognition
- Laying the foundation for language comprehension

AGENDA

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WHAT IS THE SCIENCE OF READING?

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The Science of Reading

Hanford (2018); International Literacy Association (2020); Neuman et al. (2023)

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What the science of reading is not...

- A particular program or set of programs
- A phonics-only or phonics-first approach
- Limited to grades K-2
- A fixed or settled body of knowledge

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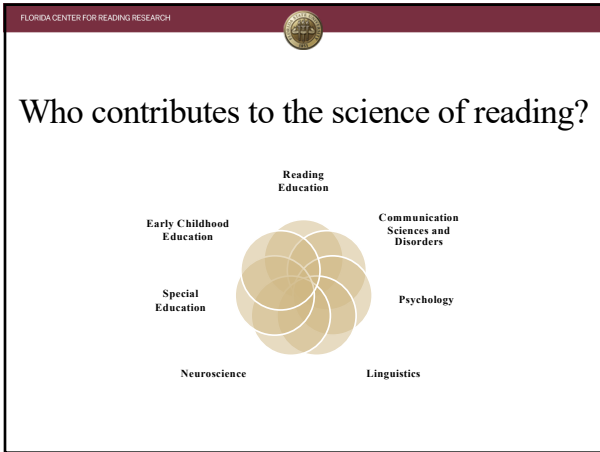
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What the science of reading is...

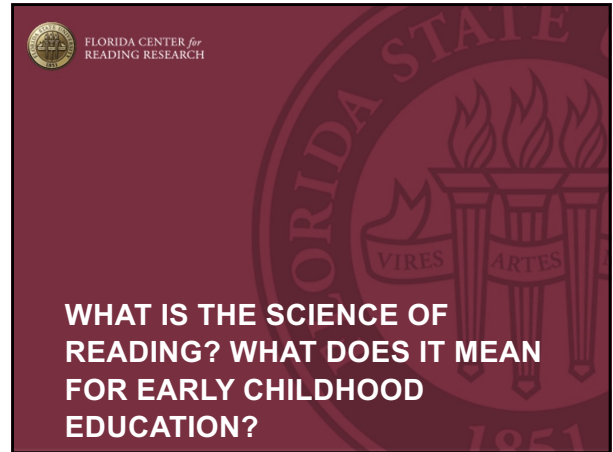
The *science of reading* is an ever-evolving body of research on how children learn to read. It includes well-established frameworks, theories, and empirical studies on what works to build children’s language and literacy skills.

Petscher et al., 2020; Zucker & Cabell, 2023

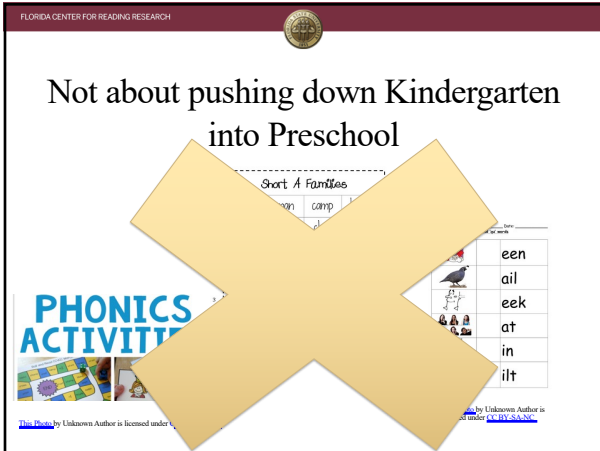
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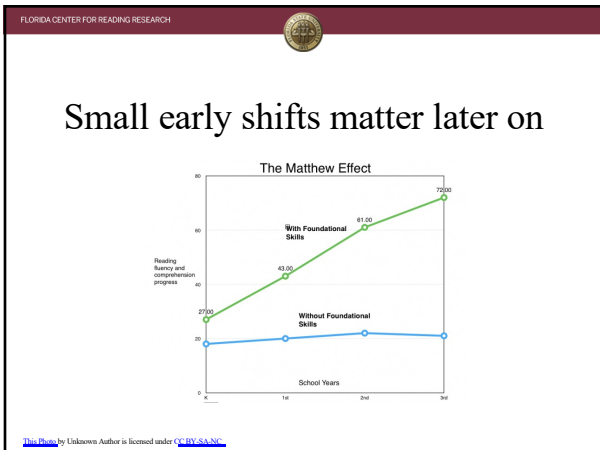
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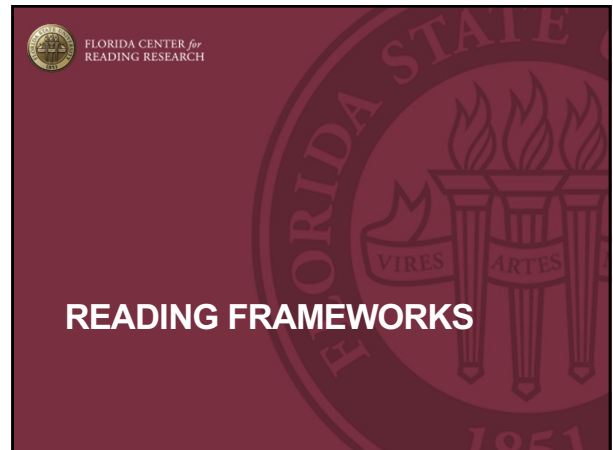
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Simple View of Reading

Reading Comprehension
Automatic Word Recognition
Language Comprehension

Reading = Decoding X Comprehension

Gough & Tunmer (1986)

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Preschool Language and Literacy Skills Lay a Foundation

Reading = Decoding X Comprehension

Gough & Tunmer (1986); Storch & Whitehurst (2002); Whitehurst & Lonigan (1998)

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The Reading Rope

THE MANY STRANDS THAT ARE WOVEN INTO SKILLED READING

LANGUAGE COMPREHENSION

BACKGROUND KNOWLEDGE (facts, concepts, etc.)

VOCABULARY (breadth, precision, links, etc.)

LANGUAGE STRUCTURES (syntax, semantics, etc.)

VERBAL REASONING (inference, metaphor, etc.)

LITERACY KNOWLEDGE (print concepts, genres, etc.)

WORD RECOGNITION

PHONOLOGICAL AWARENESS (syllables, phonemes, etc.)

DECODING (alphabetic principle; spelling-sound correspondences)

SIGHT RECOGNITION (of familiar words)

SKILLED READING: Fluent execution and coordination of word recognition and text comprehension.

Scarborough, 2001

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LAYING A FOUNDATION FOR THE D AND THE C

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Overview

Laying the Foundation for Decoding

- Print Navigators
- Sound-Letter Linkers
- Resourceful Writers

Laying the Foundation for Language Comprehension

- Clever Communicators
- Text Comprehenders

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PRINT NAVIGATORS: PRINT CONCEPTS

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What Do You Notice First?

Elmer's Friends by David McKee, Ahmed Al-Hamdi



مرحباً يا حمار الوحش.

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مرحباً يا حمار الوحش.

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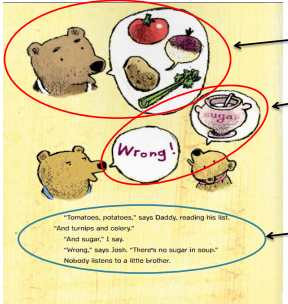
مرحباً

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Where Do Children Look?

Surprise Soup by Mary Rodman & Brain Karas



Children look here...
And sometimes here...
But not here!

*"Tomatoes, potatoes," says Daddy, reading his list.
"And turnips and celery."
"And sugar," I say.
"Honey," says Leah. "There's no sugar in soup."
Nobody listens to a little brother.*


Justice, Pullen, & Pence (2008)

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Print Concepts include...

- Print represents language.
- Print is organized in a specific way and is made of symbols that represent the parts of language.



Justice & Sofka (2010)

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RESEARCH NOTE

The Impact of Print Referencing

Research with 4-year-olds shows that print referencing during read alouds can improve children's understandings about print in preschool and can have lasting effects on children's reading development (Justice et al. 2010; Piasta et al. 2012).

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Print Meaning

Let's Play in the Forest While the Wolf is Not Around
By Claudia Rueda

The words in this speech bubble tell us what the character is saying.

Justice & Sofka (2010)

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Book and Print Organization

Spot is happy. He and his daddy are spending the day together.

When I read, I start here and move this way. Max, can you show me where I start reading?

Justice & Sofka (2010)

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Letters

There are a lot of letters on this page. Here is the letter S. S for Sonia! Who else has an S in their name?

Justice & Sofka (2010)

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Words

Look at this word. It's long with lots of letters. It's longer than this other word. Let's say all of the letters that make up this word: M-I-T-T-E-N.

Justice & Sofka (2010)

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How Often Should I Do This?

- Choose two print targets for the week: one general and one specific (e.g., print meaning and words).
- Say something about print four times per book reading.
- Do this about three or four times per week.

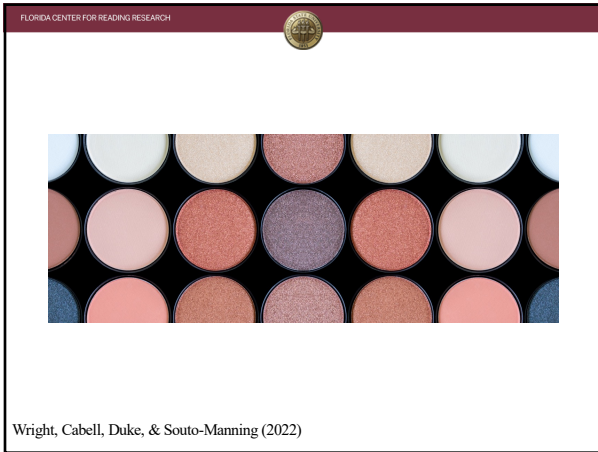
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SOUND-LETTER LINKERS: PHONOLOGICAL AWARENESS & ALPHABET KNOWLEDGE

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Wright, Cabell, Duke, & Souto-Manning (2022)

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Phonological Awareness

The understanding that words are made up of individual sounds

/B/ /Ā/ /K/

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Alphabet Knowledge

- Teacher lowercase and uppercase letters together.
- Teach letter names and letter sounds together.
- Teach children about letters in their own names.

Wright, Cabell, Duke, & Souto-Manning (2022)

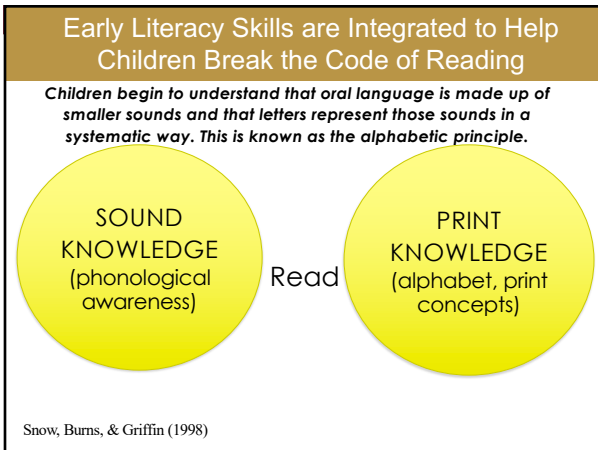
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The Alphabet Plus Card

Figure 3.2. An alphabet chart can be used to promote children's learning about sounds and letters. It is helpful to show children how to use these materials and then make them available to children during self-directed play.
Reprinted with permission, The Great First Eight Curriculum (GreatFirstEight.org), 2022, Regents of the University of Michigan.

Wright, Cabell, Duke, & Souto-Manning (2022)

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Snow, Burns, & Griffin (1998)

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Games with movement

Say It and Move It

/s/ /a/ /t/

→

Blachman et al. (2000)

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How do children develop a store of "sight words?"

Connections for Regular Words

STOP
/s/-/t/-/p/

G I G G L E
/g/-/l/-/l/

CH E C K
/t/-/e/-/k/

B I R D
/b/-/i/-/d/

FIGURE 2 Connections between graphemes (capital letter groups) in spellings and phonemes (phonetic symbols between hyphens) in pronunciations to retain regularly spelled words in memory.

Connections for Irregular Words

I S* L A N D
/ay/-/l/-/a/-/n/-/d/

L I S T* E N
/l/-/i/-/s/-/t/-/e/-/n/

S W* O R D
/s/-/w/-/o/-/r/-/d/

S I G* N
/s/-/i/-/n/

FIGURE 3 Connections between graphemes in spellings and phonemes in pronunciations to retain irregularly spelled words in memory.

Ehri, 2005

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RESOURCEFUL WRITERS: EARLY WRITING

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A Variety of Writers in Classrooms

How do I write *sun*?

What should I say?

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Early Writing First Reflects Print Knowledge and Later Reflects Both Print and Sound Knowledge

SOUND KNOWLEDGE

PRINT KNOWLEDGE

WRITING

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How Writing Relates to Other Literacy Skills

- Writing serves as a window into children's literacy knowledge

As children learn more about print and sound, their knowledge is reflected in their writings
- Writing helps children's literacy grow

As children engage in writing, they grow in their knowledge of print and sound

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The Early Writing Framework

Level 1: Drawing & Scribbling	Level 2: Letters & Letter-Like Forms	Level 3: Salient & Beginning Sounds	Level 4: Beginning & Ending Sounds
No understanding of the alphabetic principle		"I love Pennsylvania"	"hop"

Cabell et al., 2013; Copp, Cabell, et al., 2023

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Goals

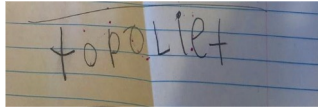
Drawing & Scribbling

- To consistently distinguish writing as separate from drawing
- To use individual units or letters while writing

Cabell et al., 2013; Copp, Cabell, et al., 2023

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Goals

Letters & Letter-Like Forms

- To write letters with more consistency and variety
- To write the salient sound in a word

Cabell et al., 2013; Copp, Cabell, et al., 2023

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Goals


Salient & Beginning Sounds

- To continue writing more salient sounds heard in longer words
- To write with beginning and ending sounds in a simple word

Cabell et al., 2013; Copp, Cabell, et al., 2023

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Goals

Beginning & Ending Sounds

- To solidify beginning and ending sounds of words and syllables
- To listen for and include a middle vowel sound in a word

Cabell et al., 2013; Copp, Cabell, et al., 2023

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**CLEVER COMMUNICATORS:
ORAL LANGUAGE**

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Oral Language

- Vocabulary
- Language Structures: Syntax & Grammar

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How Do We Learn Language?

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All talk is not necessarily conversation...

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The Importance of Teacher Talk

Proportion of complex sentences produced by teacher	Change in percent of correct responses on comprehension test
0.15	30.0%
0.20	15.0%
0.25	10.0%
0.30	5.0%
0.10	-5.0%
0.15	-10.0%
0.20	-15.0%
0.25	-20.0%
0.30	-25.0%
0.12	10.0%
0.18	5.0%
0.22	0.0%
0.28	10.0%
0.32	20.0%
0.15	5.0%
0.20	10.0%
0.25	15.0%
0.30	20.0%
0.10	0.0%
0.15	5.0%
0.20	10.0%
0.25	15.0%
0.30	20.0%

Huttenlocher, Vasilyeva, Cymerman, & Levine (2002)

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This clock tells us the time and we can move the hands.

Children are likely to follow a teacher complex utterance with a complex utterance of their own.

Justice, Zucker, McGinty, Cabell, & Piasta (2013)

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This clock tells us the time and we can move the hands.

Can I move the hands on the clock and change the time?

Children are likely to follow a teacher complex utterance with a complex utterance of their own.

Justice, Zucker, McGinty, Cabell, & Piasta (2013)

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Power of Conversations to Build Language Comprehension

Conversational interactions


where students are active participants and where teachers are responsive partners

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What are the Features of High Quality Conversations?

- Maintaining a conversation on one topic over multiple turns. (T-C-T-C-T)
- Teachers **elicit** student participation (e.g., asking open-ended question)
- Teacher **expands** what students are saying.



Cabell, Justice, McGinty, DeCoster, & Forston (2015)

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TEACHING TIP

Ask Open-Ended Questions

Extend and expand conversations with children by asking open-ended questions.

Instead of asking . . .	Ask . . .
Are you reading a book?	What are you doing?
What color is the playdough?	What are you doing with the playdough?
Is your hot chocolate hot or cold?	How does your hot chocolate feel when you drink it?
Does Charlie feel mad?	Why does Charlie feel mad?

Wright, Cabell, Duke, & Souto-Manning (2022)


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Recasting Children's Comments

Child: Glue sticky.

Teacher: Yes, glue is sticky, isn't it?



MAKE CHILD'S STATEMENT MORE COMPLETE

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ADD VOCABULARY AND AN IDEA

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To help children's language grow, consider the following strategies:

1. Repeat and reword what children say to expose them to advanced language models.
 - Infant:** Blue. (*Eats blueberries.*)
 - Adult:** Blueberries.
 - Toddler:** Sticky.
 - Adult:** That glue is sticky.
 - Preschooler:** I wonned the game.
 - Adult:** Yes, you won the game!
2. Expand and extend what children say by adding an idea.
 - Infant:** Ka. (*Touches a cat.*)
 - Adult:** That's a soft cat.
 - Toddler:** Truck! (*Plays with a toy truck.*)
 - Adult:** Your truck is driving up the hill and down the hill.
 - Preschooler:** It's sunny today.
 - Adult:** It's sunny and the temperature is high; it's going to be very hot today.

Wright, Cabell, Duke, & Souto-Manning (2022)

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Strive-for-Five Conversations






Image from Strive-for-Five Conversations (Zucker & Cabell, 2023)

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Formal Language

The language of written texts used in school that is academic, with more complex language structures.

Strive-for-Five Conversations (Zucker & Cabell, 2023)

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Informal vs. Formal Language


Mother: What side do you want?

Trey: French fries!

Mother: No, we need something healthier than that. How about a vegetable?

Trey: French fries?

Mother: No, choose between broccoli and carrots.



Strive-for-Five Conversations (Zucker & Cabell, 2023)

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Informal vs. Formal Language


Teacher: What vegetables do you have on your plate?

Trey: Apples!

Teacher: An apple is a fruit. I wonder what kind of vegetables you have.

Trey: Broccoli.

Teacher: I see broccoli and green beans on your plate. Both are vegetables and both are healthy for you because they help your body have the nutrients it needs to grow strong.



Strive-for-Five Conversations (Zucker & Cabell, 2023)

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Formal Language

Teacher: What are some things we learned about Asia from reading this book?

Trey: Three out of every five people on earth lives there!

Teacher: Yes, about 60 percent of the world's population lives on the continent of Asia.

Trey: Yeah, and it's big. Russia is the biggest!

Teacher: Russia is the largest country in Asia and in the whole world, in terms of land area. Part of Russia is also in Europe.

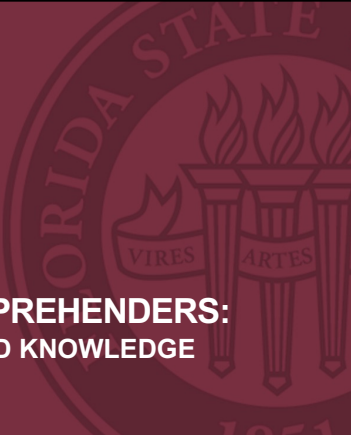


Strive-for-Five Conversations (Zucker & Cabell, 2023)

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TEXT COMPREHENDERS: BACKGROUND KNOWLEDGE



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Customarily six to eight ushers create the arch. The ushers may be commissioned officers from different branches of service and, thus, in different uniforms. If that many ushers are not needed, other military guests may be asked in advance to assist the ushers in performing the service.


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The Arch of Sabers


Customarily six to eight ushers create the arch. The ushers may be commissioned officers from different branches of service and, thus, in different uniforms. If that many ushers are not needed, other military guests may be asked in advance to assist the ushers in performing the service.

-The Army Wife Handbook (p.258; Crossley & Keller, 1996)



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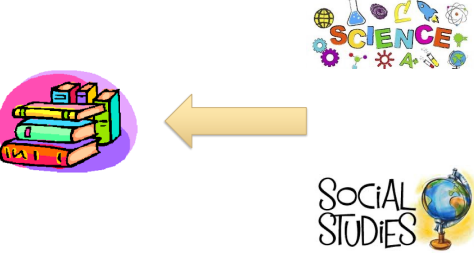
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Anderson & Freebody (1981)

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Meta-Analysis on Approaches that Integrate Literacy and Content Knowledge

- Approximately 35 studies in K-5
- Experiments or quasi-experiments
- Moderate-to-large effects on vocabulary and comprehension
 - significant effect on standardized comprehension
- Large effects on content knowledge

Hwang, Cabell, & Joyner, 2022 in *Scientific Studies of Reading*

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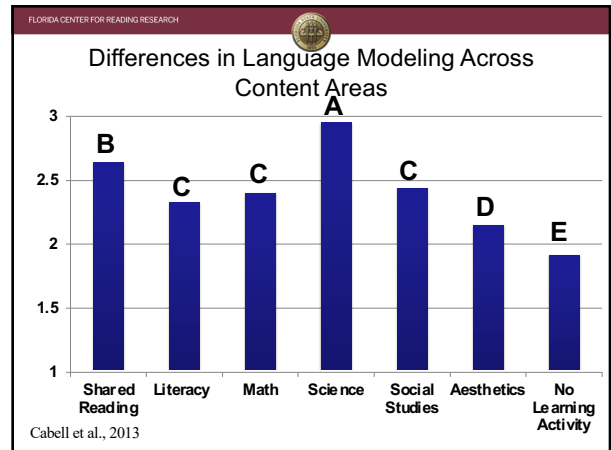
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Research on CKLA: Knowledge

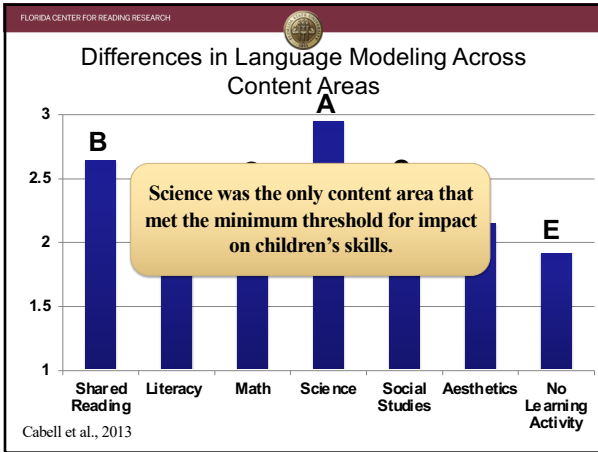
- Two randomized controlled trials in kindergarten in large urban districts
- Vehicle of instruction: Content-rich interactive read-alouds
- Impact on vocabulary and knowledge
 - On both researcher-created and standardized outcomes
 - This is one of the few early childhood studies to find generalized impact on vocabulary learning

[Cabell & Hwang \(2020\)](#); Cabell, White, Kim, Hwang, & Gale (2019)
 Funded by Institute of Education Sciences, US DOE, under award number R305A170635 to FSU (PI Sonia Cabell)

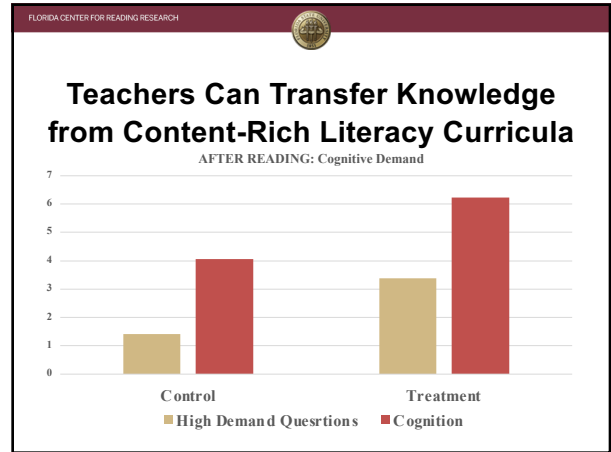
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Content-Rich Conversations during Interactive Read-Alouds

- Extra-textual talk during read-alouds is related to improved language learning
- Elicit students' contributions by asking open-ended questions
 - Inferential questions elicit inferential language from children (Zucker et al., 2010)
 - Discussion after book reading is related to expressive vocabulary (Gonzalez et al., 2014)
- Extend what students say by building on their ideas

Zucker, Cabell, Justice, Pentimonti, & Kaderavek (2013)

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"Our Earth" Text Sets for Read-Alouds

Pre-K

- *Happy Birthday Moon* by Frank Asch (narrative, discuss objects in the sky)
- *Rainy, Sunny, Blowy, Snowy* by Jane Brocket (informational, discuss the earth's weather patterns)
- *Water Little Water* by Jorge Argueta (informational, discuss the earth's elements)
- *The Earth Book* by Todd Parr (informational, discuss taking care of our environment)

Grade K

- *Seeds! Seeds! Seeds!* by Nancy Elizabeth Wallace (narrative, discuss how seeds grow)
- *Seed, Soil, Sun* by Chris Peterson (informational, discuss how the food we eat germinates and grows)
- *Amazing Plant Powers* by Loren Leedy (informational, discuss plant parts and functions)
- *It's Our Garden: From Seeds to Harvest in a School Garden* by George Acona (informational, discuss the plants in a school garden)

continued on next page

From *Strive-for-Five Conversations* (Zucker & Cabell, 2023)

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Strive-for-Five Conversations

- 1 TEACHER QUESTION**
Mr. Fazal: How does a plant change as it grows?
- 2 STUDENT RESPONSE**
Kenny: It gets bigger
- 3 TEACHER SCAFFOLD**
Mr. Fazal: Yes, a plant does grow bigger. Tell me more about that.
- 4 STUDENT RESPONSE**
Kenny: It starts as a tiny seed. And then it grows.
- 5 TEACHER EXPANDS**
Mr. Fazal: Yes, the seed germinates.

From *Strive-for-Five Conversations* (Zucker & Cabell, 2023)

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Strive-for-Five Conversation

- 1 TEACHER QUESTION**
MR. FAZAL: The seed germinates. Then how does the plant change after that? (concrete question)
- 2 CHILD RESPONDS**
KENNY: There's roots going down.
- 3 TEACHER CHALLENGES**
MR. FAZAL: Why do you think the roots grow under the soil? (abstract question)
- 4 CHILD RESPONDS**
KENNY: So we can see the baby plant!
- 5 TEACHER EXPANDS**
MR. FAZAL: Yes, the seedling can grow when the roots get the water, minerals, and oxygen it needs from the soil.

Image from *Strive-for-Five Conversations* (Zucker & Cabell, 2023)

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Review

- The science of reading helps us lay a foundation for children’s later literacy growth in decoding and language comprehension.
 - Print Navigators
 - Draw children’s attention to print.
 - Sound-Letter Linkers
 - Help children understand how sounds and letters work together.
 - Resourceful Writers
 - Support children’s writing attempts.
 - Clever Communicators
 - Be a conversationally responsive partner with children.
 - Text Comprehenders
 - Have conversations during content-rich interactive read-alouds.

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Take-Aways for Researchers

- Create partnerships to translate the science effectively to educators and those who lead them.
- Consider how implementation science can elucidate how teachers uptake effective instructional practices.
- Partner with policy-makers and leaders of non-profit organizations to combine your expertise and knowledge.

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Take-Aways for Policymakers

- The science of reading is not a fixed set of knowledge but is ever-evolving.
- A recent review showed that some but not all of the current science of reading has impacted legislation.
- Be mindful of how kindergarten can serve as a “sturdy bridge” between preschool and elementary school.

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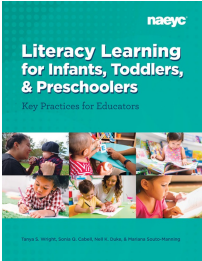
Take-Aways for Leaders of Non-Profit Organizations

- Beware of publishers who are calling their products “aligned with the science of reading.” Carefully examine them for yourselves against the evidence.
- Cull existing resources for teachers and reduce barriers to access and implementation.

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Resources



[Literacy Learning for Infants, Toddlers, & Preschoolers](#)

- Wright, Cabell, Duke, & Souto-Manning
- Published by NAEYC

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Resources

- [Strive-For-Five Conversations](#)
 - Tricia Zucker & Sonia Cabell
- [Handbook on the Science of Early Literacy](#)
 - Sonia Cabell, Susan Neuman, & Nicole Patton Terry

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THANK YOU!

 SCABELL@FSU.EDU

 @SoniaCabell

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Resources

- Florida Center for Reading Research
 - <https://www.fcr.org>
- Science of Reading: The Podcast—Season 3, Episode 8- Deconstructing the Rope: Language Comprehension with Sonia Cabell
 - <https://amplify.com/science-of-reading-the-podcast/>
- Reading Research Quarterly articles in the Science of Reading Special Issue
 - [Cabell & Hwang \(2020\)](#) Building Content Knowledge to Boost Comprehension in the Primary grades
 - [Peterscher, Cabell, et al. \(2020\)](#) How the Science of Reading Informs 21st-Century Education; open access preprint: <https://psyarxiv.com/yvp54/>

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Resources

Early Writing

Cabell, S. Q. (2019). *Writing into literacy: Why early writing matters (Selected Speaker)*. TEDx FSU Conference, Florida State University. <https://www.youtube.com/watch?v=bNiwxyzCE0>

Cabell, S. Q., *Tortorelli, L. S., & Gerde, H. K. (2013). How do I write...? Scaffolding preschoolers' early writing skills. *The Reading Teacher*, 66, 650-659. <https://www.readingrockets.org/topics/preschool-and-child-care/articles/how-do-i-write-scaffolding-preschoolers-early-writing>

Copp, S. B., **Cabell, S. Q.**, Gabas, C., *Slik, D., & *Todd, J. (2023). The Rising Star scaffolding guide: Supporting young children's early writing skills. *The Reading Teacher*, 76(4), 380-389. (special issue) <https://ils.onlinelibrary.wiley.com/doi/full/10.1002/trr.2156>

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Resources

- Hwang, Lupo, Cabell, & Wang (2021) (open access)
 - <https://heyzine.com/flip-book/cf84416713.html#page/38>
- Science of Reading: The Podcast—Season 2, Episode 7- Research, Comprehension, and Content-Rich Literacy Instruction: Sonia Cabell <https://amplify.com/science-of-reading-the-podcast/>
- Filling the Pail Podcast (Australia)—Sonia Cabell <https://gregashman.wordpress.com/2021/03/12/sonia-cabell/>

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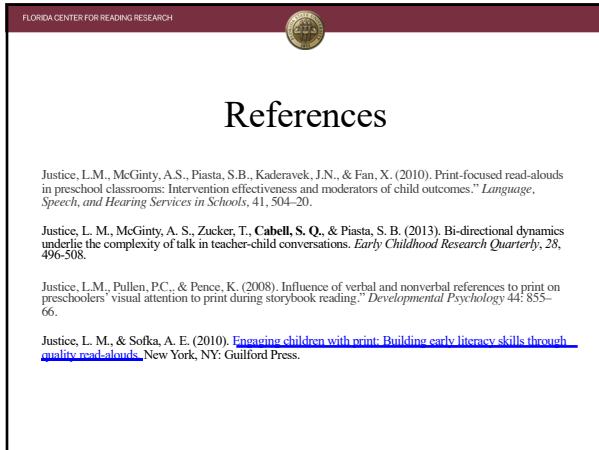
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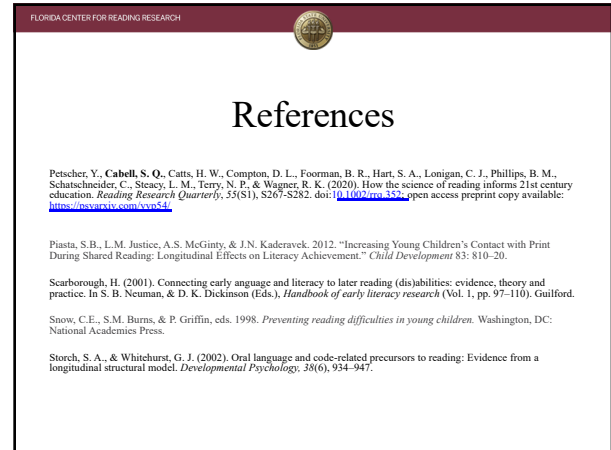
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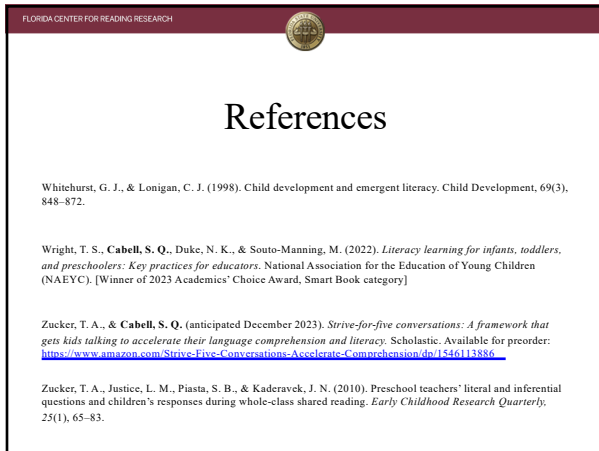
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