

Contrasting Approaches to Dyslexia Instruction: What are the "Active Ingredients"?

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Agenda

- Introduction: Learning to Read with Dyslexia
- Effective Instruction for Dyslexia: What Research Says
- Observing Two Instructional Approaches: RR vs. MTA
 - Methods
 - Results
- Implications for Instruction (and Future Research)

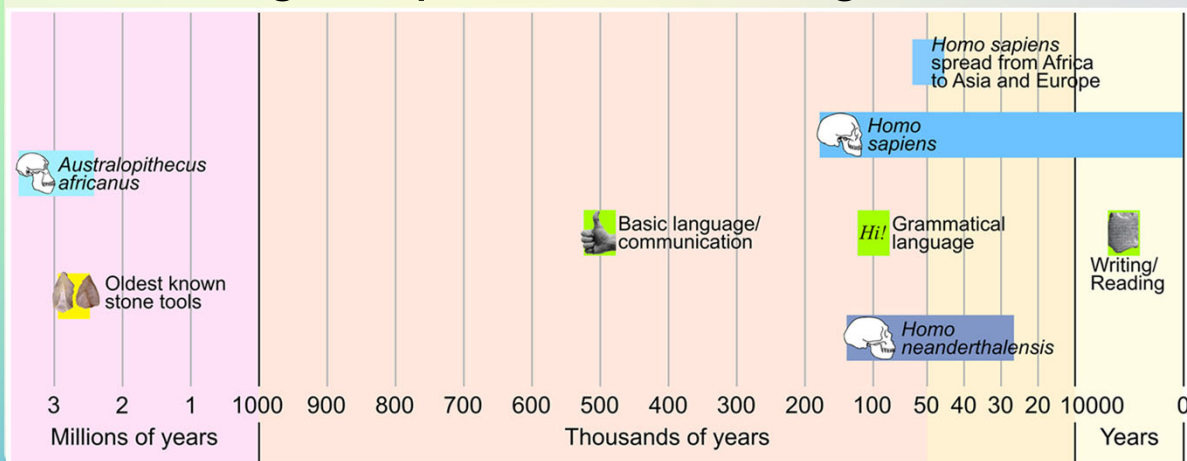


Learning to Read with Dyslexia

Introduction



Learning to Speak vs. Learning to Read



<https://kids.frontiersin.org/article/10.3389/fnym.2015.00005#ref1>



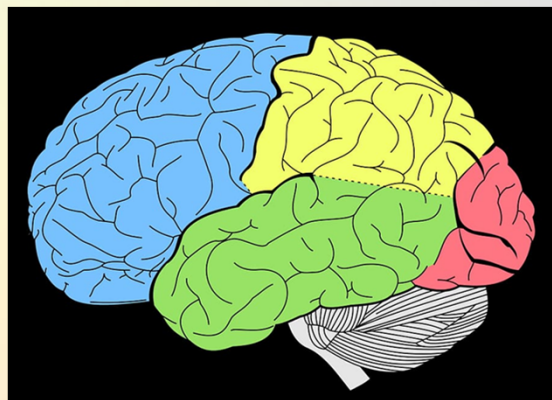
Reading Depends on Phonemic Awareness

Consonant phonemes, with sample words		Vowel phonemes, with sample words	
1. /b/ — bat	13. /s/ — sun	1. /a/ — ant	13. /oi/ — coin
2. /k/ — cat	14. /t/ — tap	2. /e/ — egg	14. /ar/ — farm
3. /d/ — dog	15. /v/ — van	3. /i/ — in	15. /or/ — for
4. /f/ — fan	16. /w/ — wig	4. /o/ — on	16. /ur/ — hurt
5. /g/ — go	17. /y/ — yes	5. /u/ — up	17. /air/ — fair
6. /h/ — hen	18. /z/ — zip	6. /ai/ — rain	18. /ear/ — dear
7. /j/ — jet	19. /sh/ — shop	7. /ee/ — feet	19. /ure/ — sure
8. /l/ — leg	20. /ch/ — chip	8. /igh/ — night	20. /ə/ — data (the 'schwa' — an unstressed vowel sound which is close to /u/ or /i/)
9. /m/ — map	21. /th/ — thin	9. /oa/ — boat	
10. /n/ — net	22. /th/ — then	10. /oo/ — boot	
11. /p/ — pen	23. /ng/ — ring	11. /oo/ — look	
12. /r/ — rat	24. /zh/ — vision	12. /ow/ — cow	



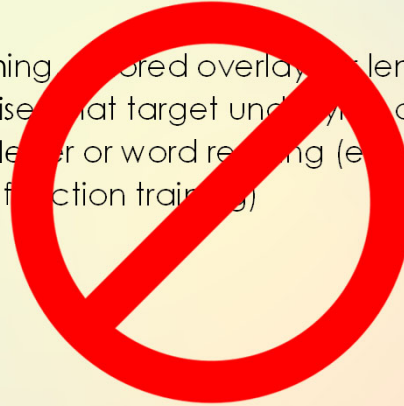
Learning to Read with Dyslexia

There is much cross-sectional, longitudinal, and intervention research that demonstrates that dyslexia is **caused by phonological processing difficulties** (e.g., Adams, 1990; Catts, 1989; Lonigan & Shanahan, 2009; NRP, 2000; Wagner & Torgesen, 1987).



Treatment of Dyslexia: A Checkered History

- Optometric training, colored overlays, or lenses
- Cognitive exercises that target underlying cognitive processes in the absence of letter or word recognition (e.g., working memory or other executive function training)



What do **you** see as the most important thing(s) to teach children with dyslexia?

Instruction should focus on

_____ •

How do you think these things should be taught? What do you see as the most important characteristic(s) of instruction for children with dyslexia?

Instruction should be _____ .



Effective Instruction for Students with Dyslexia

What Research Says



H.L. Swanson (1999)

Effective word-reading interventions for students with learning disabilities:

- Provide **explicit instruction**
- **Orient students to objective** of activities
- **Sequence instruction**; provide scaffolding/support
- **Break down** complex tasks into smaller ones



Scammacca et al. (2007)

Elements of foundational skills instruction in effective reading interventions for students in K-3:

- **Phonological awareness** instruction
- **Decoding / word study** instruction
- **Text reading** (of progressively more difficult texts)
- **Writing** exercises
- Instruction in **reading comprehension strategies**



Gersten et al. (2008):

Reading intervention should:

- Be **explicit** (including teacher explanation, modeling/think-alouds, guided practice)
- Be **systematic**
- Include **cumulative review** to facilitate mastery
- Provide **corrective feedback**
- Provide frequent **opportunities for students to respond**



Vaughn et al. (2012)

Instruction for students with reading difficulties should:

- Be **explicit**
- Be **systematic**
- Provide frequent **opportunities to respond**
- Support **working memory** and **self-regulated learning**
- Engage students in **small groups**
- Provide **increased learning time**



WWC Practice Guide (Foorman et al., 2016)

Reading instruction for students in K-3 should:

- Build **academic language skills**
- Develop **phonological awareness** and knowledge of **grapheme-phoneme correspondences**
- Teach students to **decode** words, **analyze word parts**, **encode words**, and recognize **high-frequency words**
- Ensure that each student **reads connected text every day**



International Dyslexia Association (2020)

Effective instruction for students with dyslexia:

- Builds **phonemic awareness**
- Teaches **associations** between phonemes and graphemes
- Teaches **rules** that govern orthography, including syllable types
- Builds knowledge of **morphology**, including affixes and roots
- Builds knowledge of **syntax**, including parts of speech and conventions of grammar
- Supports **vocabulary** development and **reading comprehension**



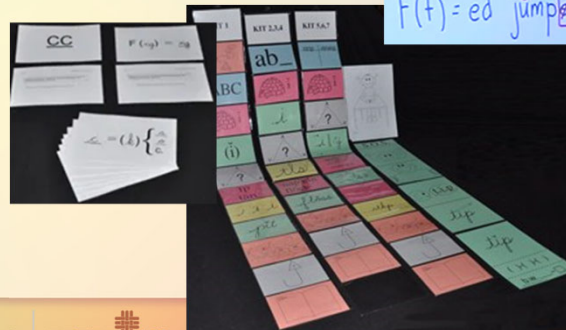
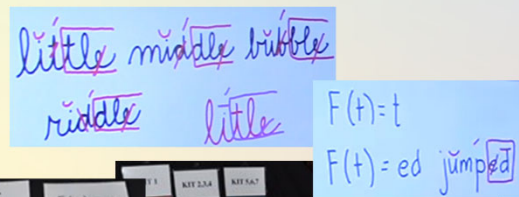
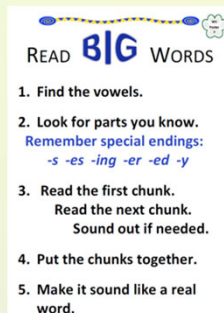
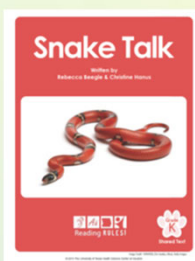
International Dyslexia Association (2020)

Effective instruction for students with dyslexia is:

- **Explicit**
- **Systematic** and **cumulative**
- **Hands-on, engaging,** and **multimodal**
- **Diagnostic** and **responsive**



Different Programs Look So Different:



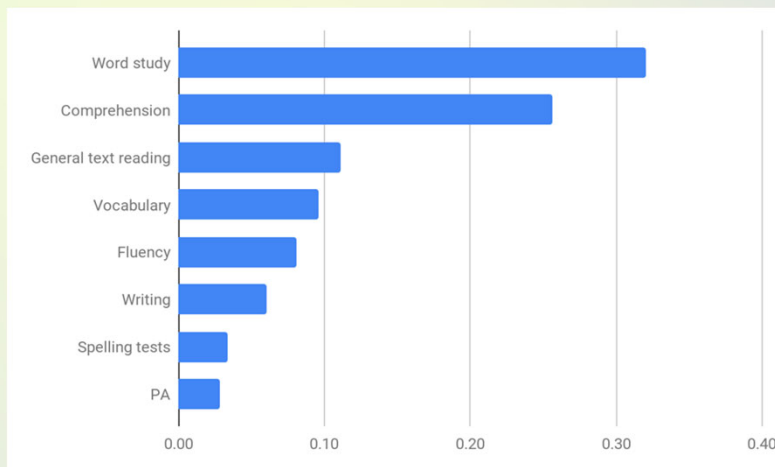
Past Observation Studies

Vaughn et al. (2002):

- Substantial time allocated for reading instruction
- Large proportion devoted to non-reading activities
- Limited time devoted to direct instruction
- Limited time devoted to actual reading
 - 6-10 minutes of silent reading
 - 3-13 minutes of oral reading
- Large amounts of independent seatwork or worksheets
- Little fluency, vocabulary and comprehension instruction (and/or of low quality)



Swanson & Vaughn (2010)



Research Questions

What does typical-practice instruction for students with dyslexia look like?

How is it similar or dissimilar to our researcher-developed reading intervention for students with dyslexia?

Do features of instruction that may impact cognitive resources (e.g., memory load) differ between programs?



Content of Instruction



- Letter names
- **Phonological awareness**
- **GPCs/decoding**
- **Encoding**
- **High-frequency word reading**
- **Text reading**
- Vocabulary knowledge
- Comprehension



Instructional Delivery



How “explicit” is instruction?



“Since 7 of the 11 studies that met WWC standards or that met standards with reservations produced a significant effect on at least one reading outcome, and all seven of these studies used **explicit instruction**, we concluded that **explicit instruction** is an effective approach.” (Gersten et al., 2008)



What is “explicit instruction” anyway?

“...the teacher **explains each concept directly** and clearly, providing **guided practice**.” (IDA, 2020)



Gradual Release of Responsibility

“I Do, We Do, You Do” (Pearson & Gallagher, 1983)

- Explicit explanation/teacher modeling
- Teacher-guided practice
 - Teacher responds alongside of students
 - Teacher assists by heavily scaffolding student responses
- Group practice
- Independent practice

To what degree does instruction focus on grapheme-phoneme associations vs. spelling patterns/rules?



International Dyslexia Association (2020)

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- Supports **vocabulary** development and **reading comprehension**



Rules vs. Associations

Rules

When e is the last letter in a word, and there's only one other vowel in that syllable, the first vowel in that syllable is usually long and the e is silent. This syllable pattern is called "vowel-consonant-e."

Associations

a_e = /ā/

e_e = /ē/

i_e = /ī/

o_e = /ō/

u_e = /ū/



u_e



cute salute

a_e

plane

Image credit: #170594304, nabihanihi, iStock, Getty Images

a_e



Rules vs. Associations

Rules

"C makes a soft c sound before an e, i, or y. It makes a hard c sound before everything else."

Associations

ce = /se/ (as in cent)

ci = /si/ (as in city)

cy = /sy/ (as in cycle)



ce

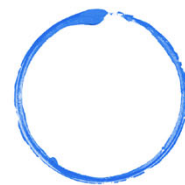
cereal

Image credit: 604383524_etienne voss, iStock

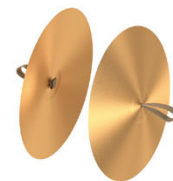
ce



ci



cy



ge 	gi 	gy 
---	---	---




Rules vs. Associations

Rules/Technical Terms

A "digraph" is a fancy word for two letters that represent one sound. In a digraph made of consonants, the two consonants work together to form a new sound. "Ch" is a digraph that makes the sound /ch/. When you see "ch" on this flashcard, I want you to say "digraph ch" and then give the sound this digraph makes (/ch/).

Associations

ch = /ch/ as in chip

Rules vs. Associations

Rules/Technical Terms

A "digraph" is a fancy word for two letters that represent one sound. In a digraph made of vowels, the two vowels work together to make one sound. Often, the first vowel is long and says its name. The second vowel is silent. When you see "oa" on this flashcard, I want you to say "digraph oa" and then give the sound this digraph makes (/ō/).

Associations

oa = /ō/ as in boat

ai = /ā/ as in paint

ea = /ē/ as in beach



Examples of decoding/encoding rules:

- -ck, -tch, and -dge are only used after short vowels.
- Some letters, like v and j, can't occur at the ends of words.
- There are six syllable types: closed, open, vowel-consonant-e, vowel team, r-controlled vowels, consonant-le.
- The letters f, s, z, and l are usually doubled at the end of a one-syllable word immediately following a short vowel.
- I and o may say /ī/ and /ō/ before two consonants (*kind, sold*).
- When adding a suffix beginning with a vowel, drop the final -e before adding the suffix. When adding a suffix beginning with a consonant, keep the final -e.
- When a one-syllable word ends with the /k/ sound immediately following a short vowel, it's usually spelled with ck. When the /k/ sound follows a consonant, long vowel sound, or diphthong, it's usually spelled with k.



Working memory difficulties in students with dyslexia

Impairments in working memory = a defining characteristic of dyslexia.

(Cohen-Mimran & Sapir, 2007; McLoughlin, Fitzgibbon, & Young, 1994; Ransby & Swanson, 2004; Swanson, Ashbaker, & Lee, 1996; Wolff & Lundberg, 2003)

Cognitive load capacity is finite.

Is it important to avoid overburdening working memory during decoding/encoding?



Seidenberg (2017, p. 147):

At this point we only know that what a teacher thinks children are learning from a lesson about sight words, phonics, or vocabulary may differ from how their brains respond to it. Bringing the two into closer alignment could have a powerful impact on learning, but we still need to find out."



To what degree is instruction multisensory?



Which senses or modalities does reading/spelling instruction in your classroom appeal to?

Visual (Seeing)

Auditory (Hearing)

Tactile/Kinesthetic (Touching/Moving)

Olfactory (Smelling)

Gustatory (Tasting)



What reading or spelling activities in your classroom engage tactile/kinesthetic senses?



Stevens et al. (2020)

State Legislation Mandating the Training and Use of Multisensory Reading Intervention

State	Bill Name	Year	Summary of Legislation
Pennsylvania	A.B. 69	2014	Interventions provided will utilize multisensory structured language programs for students scoring below benchmark that provide timely targeted instruction and strategic reteaching and intensive intervention in identified areas.
South Carolina	H. 3414	2013	A 'dyslexia-specific intervention' means evidence-based, specialized reading, writing, and spelling instruction that is multisensory in nature, equipping students to simultaneously use multiple senses, such as vision, hearing, touch, and movement.
Tennessee	H.B. 1735/ S.B. 2002	2014	A 'dyslexia-specific intervention' means evidence-based, specialized reading, writing, and spelling instruction that is multisensory in nature, equipping students to simultaneously use multiple senses, such as vision, hearing, touch, and movement.
Texas	2009 Amendment	2009	"Multisensory structured language education" will provide instruction in the skills of reading, writing, and spelling that follows the principles of multisensory instruction, including visual-auditory-kinesthetic-tactile instruction.

Note. A.B. = Assembly Bill; H.B. = House Bill; S.B. = Senate Bill; R.S. = Routing Slip; L. B. = Legislative Bill; H. F. = House Files; H. = House;



<i>State Legislation Mandating the Training and Use of Multisensory Reading Intervention</i>			
State	Bill Name	Year	Summary of Legislation
Kentucky	H.B. 187	2018	Teachers need to be able to recognize characteristics of dyslexia and use structured, multisensory approaches to teach and assist students to develop language and reading skills.
Louisiana	R.S. 17:7:11	2013	In accordance with the program adopted by the board, the city, and parish school boards shall provide remediation for children with dyslexia or related disorders in an appropriate multisensory , intensive phonetic, synthetic to analytic phonics, linguistic, meaning based, systematic, language based regular education program.
Minnesota	H.F. 2	2016	A dyslexia specialist shall be highly trained in dyslexia and related disorders and in using interventions and treatments that are evidence-based, multisensory , direct, explicit, structured, and sequential in the areas of phonics, phonemic awareness, vocabulary, fluency, and comprehension.
Mississippi	H.B. 1046	2017	School choice is offered to students with dyslexia in grade 1 through grade 12 to receive a comprehensive, multisensory dyslexia therapy delivered by holders of an appropriate license in dyslexia therapy issued by the department.
Nebraska	L.B. 1052	2016	Students exhibiting dyslexia characteristics will receive structured literacy instruction using a multisensory approach.
Nevada	A.B. 341	2015	The dyslexia therapy provided by a school district or charter school must include multisensory instruction that incorporates the simultaneous use of two or more sensory pathways during teacher presentations and pupil practice.
Ohio	H.B. 157	2011	Children at risk for dyslexia will be enrolled in reading programs staffed by teachers trained in evidence-based reading instruction and multisensory structured language instruction.
Oklahoma	<u>§70-7001</u>	2017	Higher education instruction for teacher candidates enrolled in the elementary, early elementary, and special education programs will be trained in providing multisensory structured reading education for students with dyslexia.

<i>State Legislation Mandating the Training and Use of Multisensory Reading Intervention</i>			
State	Bill Name	Year	Summary of Legislation
Alaska	H.B. 64	2018	Training must be provided to all relevant educational staff in identifying evidence-based, multisensory , direct, explicit, structured, sequential approaches to instructing students affected by dyslexia.
Arkansas	Act 1294	2013	A "dyslexia program" means explicit, direct instruction that is systematic, multisensory , and research based."
California	A.B. 1369	2015	"Educational services" means an evidence-based, multisensory , direct, explicit, structured, and sequential approach to instructing pupils who have dyslexia.
Colorado	Act 14-39	2008	Kindergarten through third sixth-grade teachers who teach reading-related content must earn college credit or in-service points in the use of explicit, systematic, and sequential approaches to reading instruction, developing phonemic awareness, and implementing multisensory intervention strategies.
Florida	H.B. 7069	2017	Work with the Florida Center for Reading Research to identify effective research-based and evidence-based reading instructional and intervention programs that incorporate explicit, systematic, sequential, and multisensory approaches to teaching phonemic awareness, phonics, vocabulary, fluency, and text comprehension and incorporate decodable or phenetic text instructional strategies.
Georgia	S.B. 48 (SUB)	2019	A dyslexia handbook will be utilized that includes information on structured, multisensory approaches to teach language and reading skills
Illinois	H.B. 3700	2018	The State Board is required to establish an advisory group to develop a training module or training modules to provide education and professional development to teachers, school administrators, and other education professionals regarding multisensory , systematic, and sequential instruction in reading.
Indiana	H.B. 1108	2015	If an education service center offers in service training or other teacher training programs, the education service center must offer courses for teachers on dyslexia screening and appropriate interventions, including courses relating to a structured literacy approach that is systematic, explicit, multisensory , and phonetic.

Ritchey and Goeke (2006): Of 12 reviewed studies: 5 reported that OG instruction was more effective than comparison interventions for all measured outcomes; 4 reported that the OG instruction was more effective for at least 1 (but not all) outcomes; 2 reported that OG instruction was less effective than the comparison; 1 reported no significant differences.

Stevens et al. (2020): M ES across 16 meta-analyzed studies suggests that OG instruction was not statistically significantly more effective than BAU instruction.

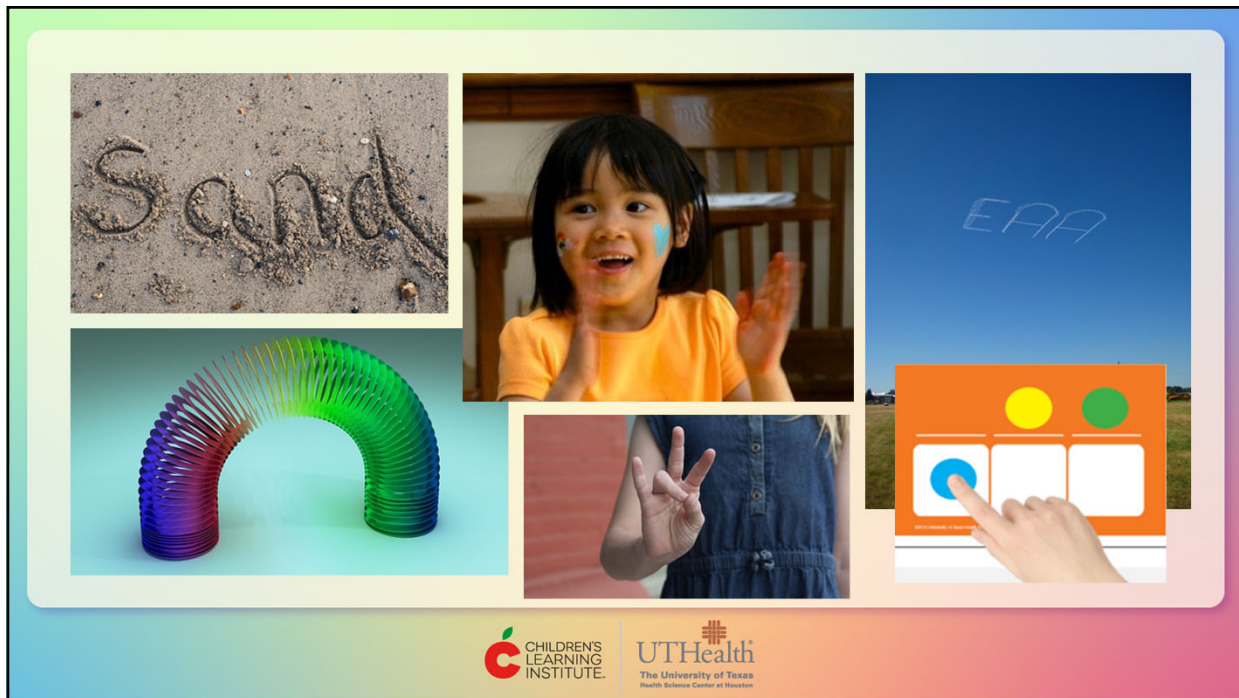
Schlesinger and Gray (2017) directly compared the efficacy of structured language and multisensory approaches. They reported that both approaches showed important treatment effects over baseline; however, there were no significant effects favoring multisensory instruction over a structured literacy approach that was not multisensory on letter naming, letter sound production, word reading, or word spelling outcomes.



To what degree do students learn tactile/kinesthetic procedures to support reading or spelling?

(And what other procedures are students taught to use when decoding and/or encoding words?)





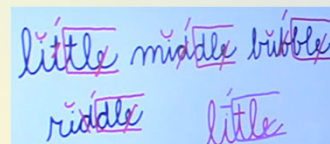
Non-tactile/kinesthetic procedures used to decode/encode words:

- Written
- Oral
- Cognitive



READ **BIG** WORDS

1. Find the vowels.
2. Look for parts you know.
Remember special endings:
-s -es -ing -er -ed -y
3. Read the first chunk.
Read the next chunk.
Sound out if needed.
4. Put the chunks together.
5. Make it sound like a real word.

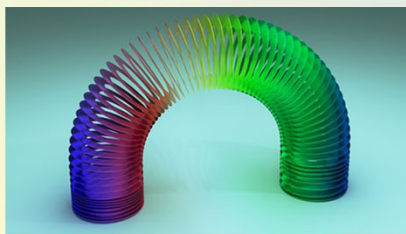


content



Does instruction use manipulatives?

(And what other materials do
different programs use?)



Vaughn et al. (2012): “more concrete learning opportunities with the use of pictures, graphics, **manipulatives**, or think-alouds” is one characteristic of explicit and/or systematic for students with reading difficulties.



Manipulatives to Facilitate Learning: A Long History

Froebel (1837): designed and promoted educational play materials/manipulatives (blocks, tiles, etc.) to facilitate learning.

Montessori (1917), Piaget (1970), and Bruner (1966): Describe theories of learning positing benefits of interaction with physical objects.



Research on instruction using manipulatives:

Pullen and Lane (2014): Students who used manipulative letters scored significantly better on measures of phonological awareness, decoding, and word recognition than those who did not.

D'Agostino et al. (2016): Students using an iPad application to learn letter names and sounds had significantly higher scores on the three measures of letter name and sound knowledge than students who used magnetic letters. Teachers maintained strong beliefs in the value of using concrete manipulatives.



Figure 1. LetterWorks iPad application.



Methods

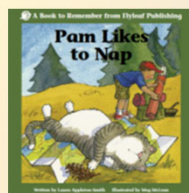
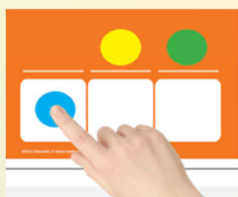
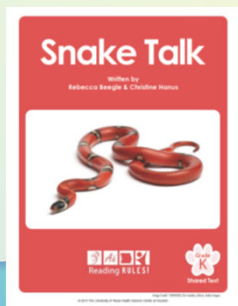
Observing Two Instructional Approaches: RR vs. MTA



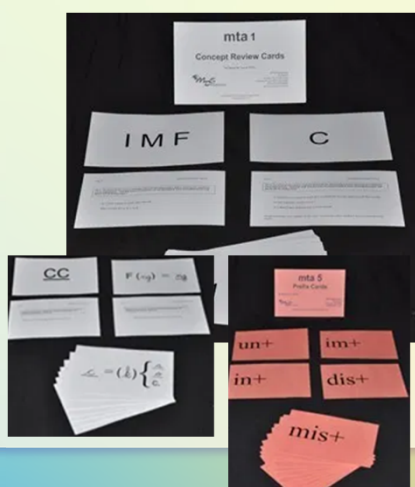
Researcher-Developed Reading RULES!



Sound Box Spelling				
2				
3				
4				
5				



District Program Multisensory Teaching Approach



Research Questions

What does typical-practice instruction for students with dyslexia look like?

How is it similar or dissimilar to our researcher-developed reading intervention for students with dyslexia?

Do features of instruction that may impact cognitive resources (e.g., memory load) differ between programs?



2018-2019 District Demographics

- Student ethnicity:
 - African-American: 7.5%
 - Asian: 1.1%
 - Hispanic: 21.8%
 - White: 64.5%
 - Two or more races: 4.6%
- 22.7% of students were economically disadvantaged
- 3.7% of students were designated Limited English Proficient
- 10.6% of students received special education services
- 5.6% of students received dyslexia services



Participants

4 teachers:

- 2 RR teachers / 2 MTA teachers
- Each was experienced teaching their dyslexia program
- Each taught a small group of students in **Grades 2-4**



Participants

All white; all female; all with B.A. degrees and certifications in Elementary Education.

RR teachers:

- Teaching in SpEd resource room
- Each had 2 yrs of experience using RR
- 11 and 23 years of teaching experience total

MTA teachers:

- Teaching students with dyslexia
- Both had 4 yrs of experience using MTA
- 33 and 41 years of teaching experience total
- 1 teacher also had an M.A. degree in Elementary Reading



Procedures

- Three observations per teacher (12 observations total): fall, winter, spring
- Groups scheduled for 45 minutes daily
- Observations were video-recorded
- All observations were independently coded by the first and second author; consensus reached by discussion



Observation Tool:

Snapshot of Instruction for Students with Dyslexia (SISD)

Coding Guide

Objective: Evaluate content and quality of instruction in two reading instruction programs (i.e., Multisensory Teaching Approach [MTA] and Reading RULES [RR]) for students with dyslexia.

Start Time	Program Emphasis (circle one in each, if applicable)				Materials (circle all)	Notes: Brief summary of activity; describe terms, T/K activities, manipulatives, rules
	Domain	Instruction	Memory	Procedure		
0:00	LN_PA Dec Enc Hfw TR Comp Voc OthD Nli	Mod/Exp Tch-Guid Grp Ind	Rules... Assoc	Wrt T/K Oral/Cog	FC_WK WL SB BK MN	
1:00	LN_PA Dec Enc Hfw TR Comp Voc OthD Nli	Mod/Exp Tch-Guid Grp Ind	Rules... Assoc	Wrt T/K Oral/Cog	FC_WK WL SB BK MN	
2:00	LN_PA Dec Enc Hfw TR Comp Voc OthD Nli	Mod/Exp Tch-Guid Grp Ind	Rules... Assoc	Wrt T/K Oral/Cog	FC_WK WL SB BK MN	



Overall, I consider this lesson's pacing and use of instructional time to be:	Highest Quality			Average			Less than Adequate	
	7	6	5	4	3	2	1	
Comments:								

Overall, I consider this lesson's preparation & organization to be:	Highest Quality			Average			Less than Adequate	
	7	6	5	4	3	2	1	
Comments:								

Overall, I consider this lesson's scaffolding and feedback to be:	Highest Quality			Average			Less than Adequate	
	7	6	5	4	3	2	1	
Comments:								

Overall, I consider this lesson's behavior management to be:	Highest Quality			Average			Less than Adequate	
	7	6	5	4	3	2	1	
Comments:								




Results

Observing Two Instructional Approaches: RR vs. MTA




Curriculum Materials Comparison

RR	MTA
• 9 books with 78 units completed over 1-2 years • One new decodable text in every unit with one or more target letter-sounds and high-frequency words for each book • Place new students at appropriate level	• 7 “kits” completed over 3-6 years • 100 “multisensory letter introductions” • 136 additional “concepts” (e.g., I.M.F., syllable types, affixes, irregular words...) • Place all new students at the beginning
Scripted programs Feature explicit instruction Highly systematic and sequential Frequent progress-monitoring assessments	



Observation Coding Reliability

Interrater agreement for all observations: 83%

- Instructional domain: 86%
- Type of instruction: 75%
- Rules vs. associations: 83%
- Procedures for decoding/spelling: 84%
- Materials: 86%

ALL observations were independently coded by two coders and disagreements were resolved through discussion.

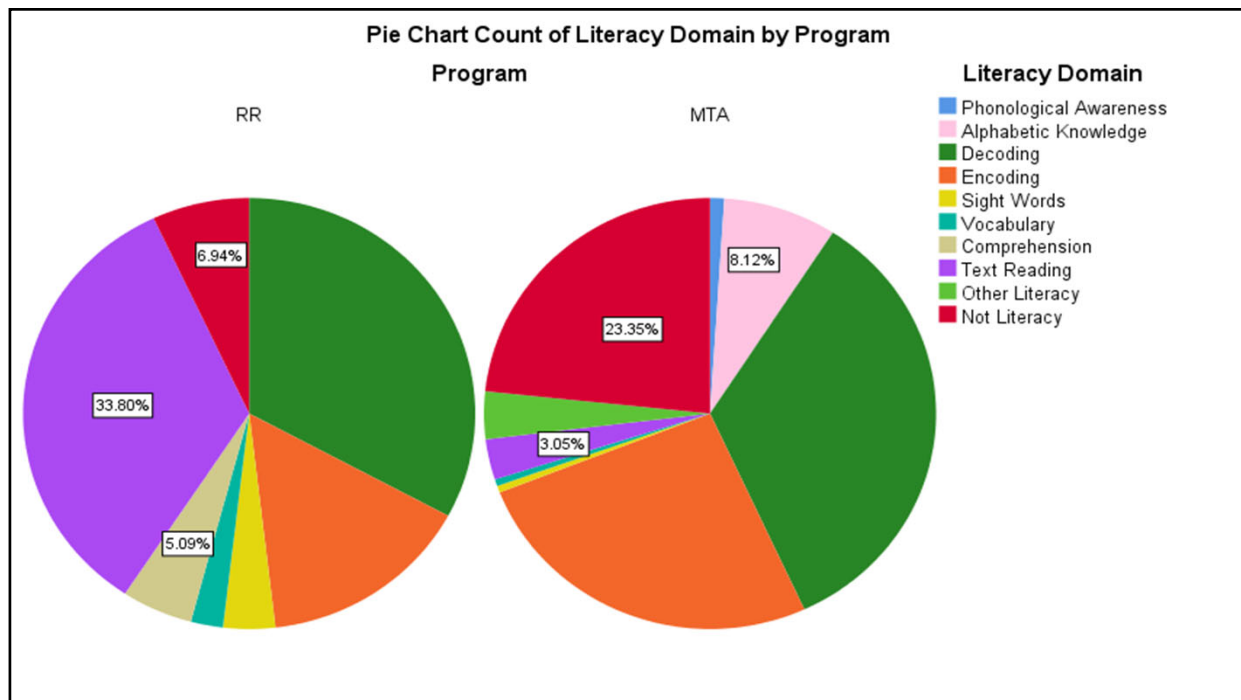


Results

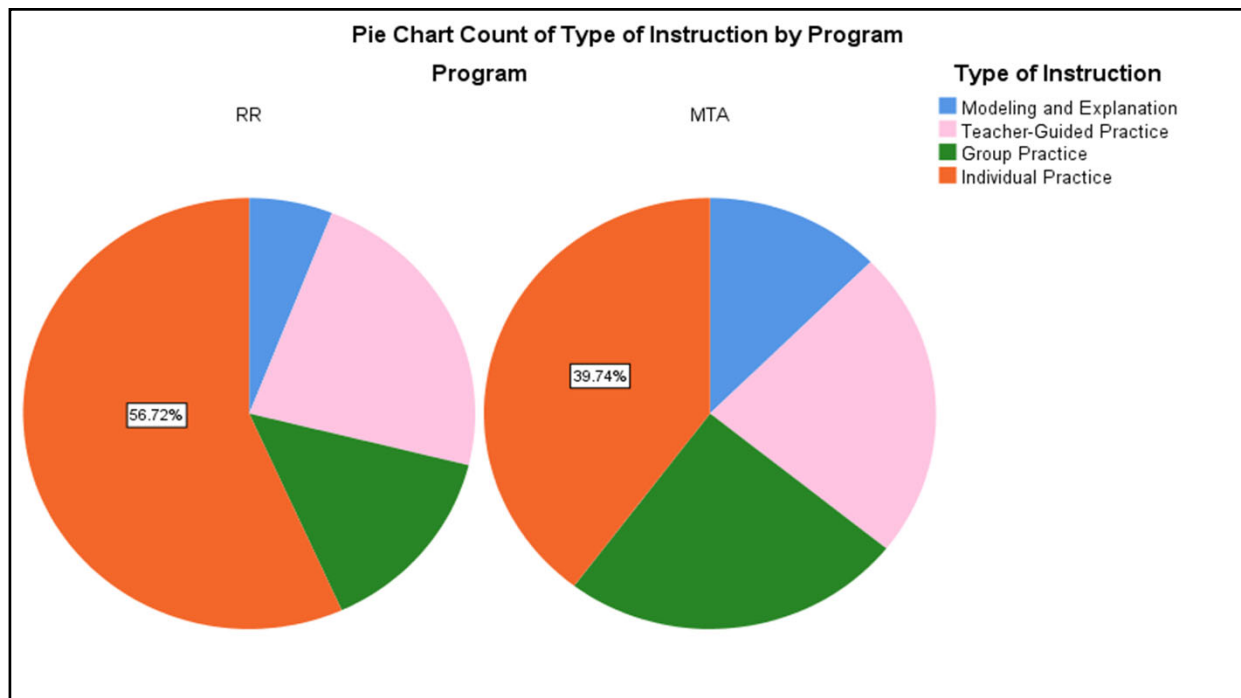
By lesson:	Reading RULES! <i>n</i> = 6		Multisensory Teaching Approach <i>n</i> = 6	
Observation	Average	[Range]	Average	[Range]
Number of students	3.7	[1, 6]	1.8	[1, 2]
Length of lesson in minutes	36	[23, 50]	33	[29, 37]
Quality (7-point Likert scale)	5.7	[5, 6.2]	3.9	[3.0, 4.6]



	Reading RULES! <i>n</i> = 216		Multisensory Teaching Approach <i>n</i> = 197			
Domain	Count [Range per lesson]	Percent	Count [Range per lesson]	Percent	Chi-Square	p-value
<i>PA</i>	0	--	2 [0, 1]	1%	2.204	0.227
<i>LNK</i>	0	--	16 [0, 9]	8%	18.250	0.000
<i>Decoding</i>	71 [4, 22]	33%	67 [4, 17]	34%	0.060	0.835
<i>Encoding</i>	33 [2, 8]	15%	51 [4, 12]	26%	7.159	0.010
<i>Sight Words</i>	8 [0, 2]	4%	1 [0, 1]	1%	4.937	0.039
<i>Text Reading</i>	73 [7, 20]	34%	6 [0, 6]	3%	62.980	0.000
<i>Vocabulary</i>	5 [0, 3]	2%	1 [0, 1]	1%	2.350	0.218
<i>Comp.</i>	11 [0, 4]	5%	0	--	10.307	0.001
<i>Other</i>	0	--	7 [0, 6]	4%	7.807	0.005
<i>Not Literacy</i>	15 [0, 6]	7%	46 [3, 13]	23%	22.029	0.000

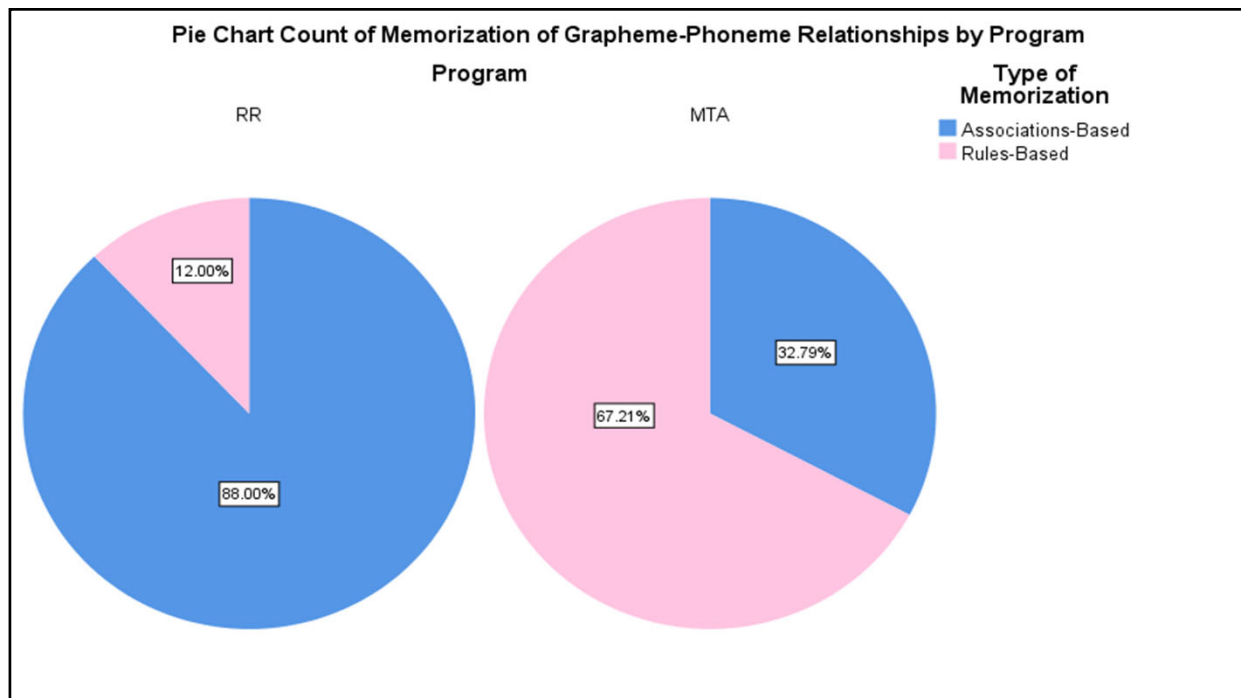


	<i>Reading RULES!</i>		<i>Multisensory Teaching Approach</i>			
Gradual Release Instruction	Count [Range]	Percent	Count [Range]	Percent	Chi-Square	p-value
<i>Modeling and Explanation</i>	12 [1, 3]	6	19 [0, 8]	10	2.481	0.136
<i>Teacher-Guided Practice</i>	46 [1, 14]	21	35 [1, 14]	18	0.814	0.387
<i>Group Practice</i>	29 [0, 11]	13	37 [0, 11]	19	2.201	0.142
<i>Individual Practice</i>	114 [11, 26]	53	60 [1, 18]	30	21.055	0.000



	<i>Reading RULES!</i>		<i>Multisensory Teaching Approach</i>			
Memorization of Phoneme-Grapheme Correspondences	Count [Range]	Percent	Count [Range]	Percent	Chi-Square	p-value
<i>Associations</i>	110 [9, 30]	51	40 [0, 13]	20	41.771	0.000
<i>Rules</i>	15 [0, 9]	7	82 [1, 27]	42	68.955	0.000



<i>Minutes of:</i>	<i>Reading RULES!</i>		<i>Multisensory Teaching Approach</i>			
Procedures for Decoding and Encoding	Count [Range]	Percent	Count [Range]	Percent	Chi-Square	p-value
<i>Oral or Cognitive</i>	51 [6, 13]	24	0	--	53.067	0.000
<i>Tactile or Kinesthetic</i>	16 [0, 6]	7	1 [0, 1]	1	12.428	0.000
<i>Written</i>	44 [0, 17]	20	78 [3, 27]	40	18.293	0.000

- **Oral/Cognitive** examples: stretching the word orally, self-monitoring for accuracy ("does it make sense?")
- **Tactile/Kinesthetic** examples: using letter tiles to encode words, tapping out sounds, covering part of the word
- **Written** examples: underlining sounds, applying macron/breve

RR

READ BIG WORDS

1. Find the vowels.
2. Look for parts you know.
Remember special endings:
-s -es -ing -er -ed -y
3. Read the first chunk.
Read the next chunk.
Sound out if needed.
4. Put the chunks together.
5. Make it sound like a real word.

MTA

little middle bubble
riddle little

$F(t)=t$
 $F(t)=ed$ jumped

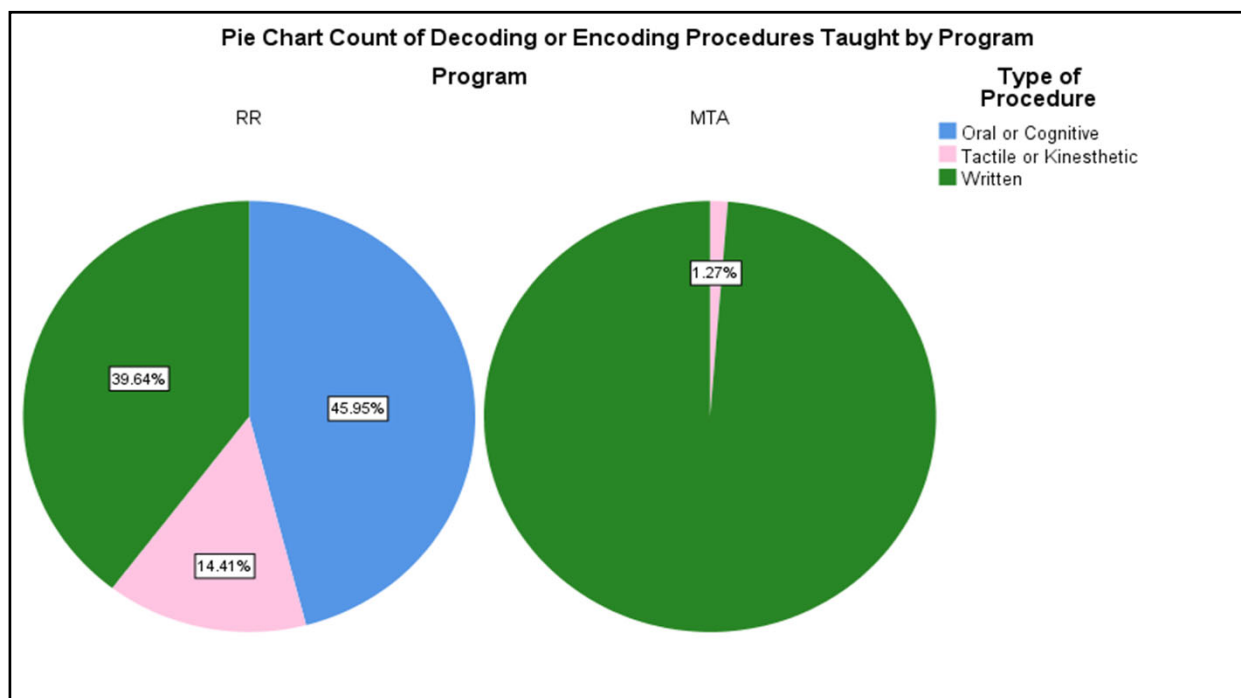
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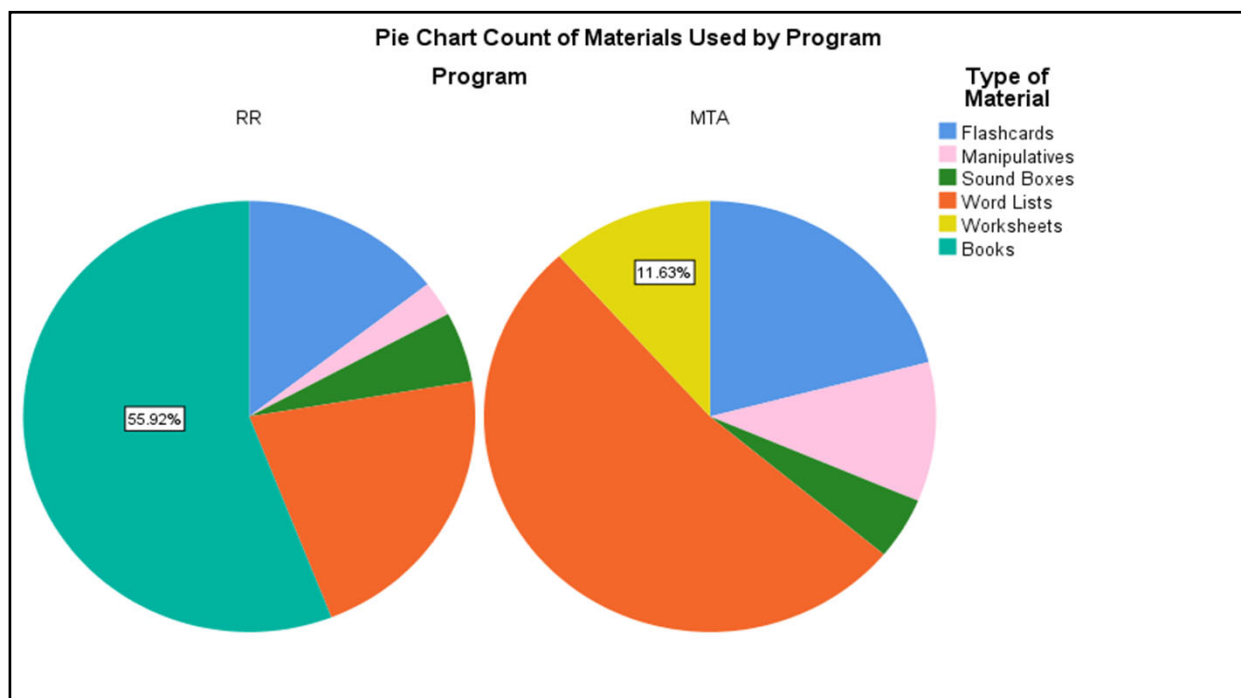
CHILDREN'S
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The University of Texas
Health Science Center at Houston



<i>Minutes of:</i>	<i>Reading RULES!</i>		<i>Multisensory Teaching Approach</i>			
Materials Used	Count [Range]	Percent	Count [Range]	Percent	Chi-Square	p-value
<i>Flashcards</i>	22 [2, 6]	10	18 [0, 7]	9	0.129	0.742
<i>Sound Boxes</i>	8 [0, 4]	4	4 [0, 4]	2	1.023	0.387
<i>Manipulatives</i>	4 [0, 4]	2	9 [0, 9]	5	2.494	0.159
<i>Word Lists</i>	33 [0, 11]	15	45 [0, 14]	23	3.849	0.059
<i>Worksheets</i>	0	--	10 [0, 6]	5	11.237	0.001
<i>Books</i>	85 [10, 21]	39	0	--	97.613	0.000



Discussion: Implications for Instruction

...and Future Research



Was instruction in these programs aligned with research-based recommendations?



Content

Significant instructional time was devoted to phonics, decoding and encoding instruction.

Some discrepancies in terms of:

- **connected-text reading** -- a research-based recommendation supported by a moderate level of research evidence
- **letter-name instruction** -- the effectiveness of which in terms of improving word reading/spelling for students in Grades 2-4 is less well established.
- **vocabulary and comprehension instruction** -- less research evidence for the association between vocabulary and comprehension instruction and improved distal vocabulary/comprehension outcomes for this profile of student.



Instructional Delivery

In both programs:

- instruction was highly **systematic** and carefully **sequenced**.
- there were approximately equal proportions of **teacher explanation/modeling**, teacher **guided practice**, and **group/independent practice** in each program.



Instructional Delivery

- One program was much more **associations**-based, while the other emphasized the articulation and application of **rules**.
- As part of this focus on rules, one program heavily emphasized **written coding** as a procedure to decode words; the other emphasized **cognitive procedures** (“look for the parts you know” that emphasized associations).



Future Research

Might one type of instruction work better for some students, while the other works better for other students?

Might students' working memory capacity predict which type of instruction is more effective?

There is a need for more research to determine whether multi-sensory (i.e., tactile/kinesthetic) activities and manipulatives are “active ingredients” of instruction for students with dyslexia.



References

- Adams, M.J. (1990). *Beginning to read: Thinking and learning about print*. Cambridge, MA: MIT Press.
- Al Otaiba, S., Rouse, A., & Baker, K. (2018). Elementary grade intervention approaches to treat specific learning disabilities, including dyslexia. *Language, Speech, and Hearing Services in Schools (Online)*, 49(4), 829–842. https://doi.org/10.1044/2018_LSHSS-DYSLC-18-0022
- Bruner, J. S. (1966). *Toward a theory of instruction*. Harvard University Press.
- Catts, H. (1989). Defining dyslexia as a developmental language disorder. *Annals of Dyslexia*, 39(1), 50–64. <https://doi.org/10.1007/BF02656900>
- D'Agostino, J. V., Rodgers, E., Harmey, S., & Brownfield, K. (2016). Introducing an iPad app into literacy instruction for struggling readers: Teacher perceptions and student outcomes. *Journal of Early Childhood Literacy*, 16(4), 522–548. <https://doi.org/10.1177/1468798415616853>
- Ehri, L., Nunes, S., Stahl, S., & Willows, D. (2001). Systematic phonics instruction helps students learn to read: Evidence from the National Reading Panel's meta-analysis. *Review of Educational Research*, 71(3), 393–447. <https://doi.org/10.3102/00346543071003393>
- Fernald, G., & Keller, H. (1921). The effect of kinaesthetic factors in the development of word recognition in the case of non-readers. *The Journal of Educational Research*, 4(5), 355–377. <https://doi.org/10.1080/00220671.1921.10879216>
- Foorman, B. R. & Torgesen, J. (2001). Critical elements of classroom and small-group instruction promote reading success in all children. *Learning Disabilities Research & Practice*, 16(4), 203–212.



- Foorman, B., Beyler, N., Borradaile, K., Coyne, M., Denton, C. A., Dimino, J., Furgeson, J., Hayes, L., Henke, J., Justice, L., Keating, B., Lewis, W., Sattar, S., Streke, A., Wagner, R., & Wissel, S. (2016). *Foundational skills to support reading for understanding in kindergarten through 3rd grade (NCEE 2016-4008)*. Washington, DC: National Center for Education Evaluation and Regional Assistance (NCEE), Institute of Education Sciences, U.S. Department of Education. <https://ies.ed.gov/ncee/wwc/>
- Gersten, R., Compton, D., Connor, C.M., Dimino, J., Santoro, L., Linan-Thompson, S., and Tilly, W.D. (2008). Assisting students struggling with reading: Response to Intervention and multi-tier intervention for reading in the primary grades. A practice guide. (NCEE 2009-4045). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education. <https://ies.ed.gov/ncee/wwc/>
- Glenberg, A. M., Brown, M., & Levin, J. R. (2007). Enhancing comprehension in small reading groups using a manipulation strategy. *Contemporary Educational Psychology*, 32(3), 389–399. <https://doi.org/10.1016/j.cedpsych.2006.03.001>
- Glenberg, A. M., Gutierrez, T., Levin, J. R., Japuntich, S., & Kaschak, M. P. (2004). Activity and imagined activity can enhance young children's reading comprehension. *Journal of Educational Psychology*, 96(3), 424–436. <https://doi.org/10.1037/0022-0663.96.3.424>
- IDA [International Dyslexia Association]. (2020). Structured literacy: Effective instruction for students with dyslexia and related reading difficulties. <https://dyslexiaida.org/fact-sheets/>
- Lonigan, C., Shanahan, T., & National Institute for Literacy. (2009). *Developing Early Literacy: Report of the National Early Literacy Panel. Executive Summary. A Scientific Synthesis of Early Literacy Development and Implications for Intervention*. National Institute for Literacy.
- Manning, J. P. (2005). Rediscovering Froebel: A call to re-examine his life & gifts. *Early Childhood Education Journal*, 32(6), 371–376. <https://doi.org/10.1007/s10643-005-0004-8>



- Manset-Williamson, G., & Nelson, J. (2005). Balanced, Strategic Reading Instruction for Upper-Elementary and Middle School Students with Reading Disabilities: A Comparative Study of Two Approaches. *Learning Disability Quarterly*, 28(1), 59–74. <https://doi.org/10.2307/4126973>
- Marley, S. C., & Carbonneau, K. J. (2015). How psychological research with instructional manipulatives can inform classroom learning. *Scholarship of Teaching and Learning in Psychology*, 1(4), 412–424. <https://doi.org/10.1037/stl0000047>
- Marley, S. C., Levin, J. R., & Glenberg, A. M. (2007). Improving Native American children's listening comprehension through concrete representations. *Contemporary Educational Psychology*, 32(3), 537–550. <https://doi.org/10.1016/j.cedpsych.2007.03.003>
- Monroe, M. (1932). *Children who cannot read; the analysis of reading disabilities and the use of diagnostic tests in the instruction of retarded readers*. Univ. of Chicago Press.
- Montessori, M. (1917). *The advanced Montessori method*. Frederick A. Stokes.
- NRP [National Reading Panel]. (2000). *Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction: Reports of the subgroups (NIH Publication number 00-4769)*. Washington, DC: National Institute of Child Health and Human Development.
- Orton, S. T. (1937). *Reading, writing and speech problems in children*. W W Norton & Co.
- Pearson, P. D., & Gallagher, M. C. (1983). The instruction of reading comprehension. *Contemporary Educational Psychology*, 8(3), 317–344. [https://doi.org/10.1016/0361-476X\(83\)90019-X](https://doi.org/10.1016/0361-476X(83)90019-X)
- Piaget, J. (1970). *Science of education and the psychology of the child*. Orion Press
- Piasta, S. B., Purpura, D. J., & Wagner, R. K. (2010). Fostering alphabet knowledge development: A comparison of two instructional approaches. *Reading and Writing*, 23(6), 607–626. <https://doi.org/10.1007/s11145-009-9174-x>



- Pullen, P. C., & Lane, H. B. (2014). Teacher directed decoding practice with manipulative letters and decoding skills of struggling first grade students. *Exceptionality*, 22, 1-16. <https://doi.org/10.1080/09362835.2014.865952>
- Ritchey, K., & Goeke, J. (2006). Orton-Gillingham and Orton-Gillingham—Based Reading Instruction: A Review of the Literature. *The Journal of Special Education*, 40(3), 171–183. <https://doi.org/10.1177/00224669060400030501>
- Scanlon, D. M., & Vellutino, F. R. (1996). Prerequisite skills, early instruction, and success in first grade reading: Selected results from a longitudinal study. *Mental Retardation and Developmental Disabilities Research Reviews*, 2, 54–63.
- Schatschneider, C., Fletcher, J. M., Francis, D. J., Carlson, C. D., & Foorman, B. R. (2004). Kindergarten prediction of reading skills: A longitudinal comparative analysis. *Journal of Educational Psychology*, 96(2), 265–282. <https://doi.org/10.1037/0022-0663.96.2.265>
- Schlesinger, N., & Gray, S. (2017). The impact of multisensory instruction on learning letter names and sounds, word reading, and spelling. *Annals of Dyslexia*, 67(3), 219–258. <https://doi.org/10.1007/s11881-017-0140-z>
- Stevens, E., Austin, C., Moore, C., Scammaca-Lewis, N., Boucher, A., & Vaughn, S. (2020). Current state of the evidence: Examining the effects of Orton-Gillingham-based reading interventions for students with or at-risk for word reading difficulties. Presentation at the CEC 2020 Convention and Expo.
- Scammaca, N., Vaughn, S., Roberts, G., Wanzek, J., & Torgesen, J. K. (2007). *Extensive reading interventions in grades K–3: From research to practice*. Portsmouth: RMC Research Corporation, Center on Instruction.
- Seidenberg, M. S. (2017). *Language at the speed of sight: How we read, why so many can't, and what can be done about it*. New York: Basic Books.
- Swanson, E. A. (2008). Observing Reading Instruction for Students with Learning Disabilities: A Synthesis. *Learning Disability Quarterly*, 31(3), 115–133. <https://doi.org/10.2307/25474643>



- Swanson, H. L. (1999). Reading research for students with LD: A meta-analysis of intervention outcomes. *Journal of learning disabilities*, 32(6), 504-532.
- Swanson, H. L., & O'Connor, R. (2009). The Role of Working Memory and Fluency Practice on the Reading Comprehension of Students Who Are Dysfluent Readers. *Journal of Learning Disabilities*, 42(6), 548–575. <https://doi.org/10.1177/0022219409338742>
- Torgesen, J. K. (2004). Lessons learned from research on interventions for students who have difficulty Learning to Read. In P. McCardle & V. Chhabra (Eds.), *The Voice of Evidence in Reading Research* (p. 355–382). Paul H Brookes Publishing Co.
- Vaughn, S., Levy, S., Coleman, M., & Bos, C. S. (2002). Reading Instruction for Students with LD and EBD: A Synthesis of Observation Studies. *The Journal of Special Education*, 36(1), 2–13. <https://doi.org/10.1177/00224669020360010101>
- Vaughn, S., Wanzek, J., Murray, C. S., & Roberts, G. (2012). *Intensive interventions for students struggling in reading and mathematics: A practice guide*. Portsmouth, NH: RMC Research Corporation, Center on Instruction. <https://www.centeroninstruction.org/files/Intensive%20Interventions%20for%20Students%20Struggling%20in%20Reading%20&%20Math.pdf>
- Wagner, R. K., & Torgesen, J. K. (1987). The nature of phonological processing and its causal role in the acquisition of reading skills. *Psychological Bulletin*, 101(2), 192–212. <https://doi.org/10.1037/0033-2909.101.2.192>
- Walker, M. A., & Stevens, E. A. (2017). Reading instruction for students with learning disabilities: An observation study synthesis (1980–2014). *Learning Disability Quarterly*, 40(1), 17-28.
- Wanzek, J., & Vaughn, S. (2007). Research-Based Implications from Extensive Early Reading Interventions. *School Psychology Review*, 36(4), 541–561.
- Wanzek, J., Wexler, J., Vaughn, S., & Ciullo, S. (2010). Reading interventions for struggling readers in the upper elementary grades: a synthesis of 20 years of research. *Reading and Writing*, 23(8), 889–912. <https://doi.org/10.1007/s11145-009-9179-5>

