SCIENCE OF DATA ANALYSIS AT TIERS 1 AND 2
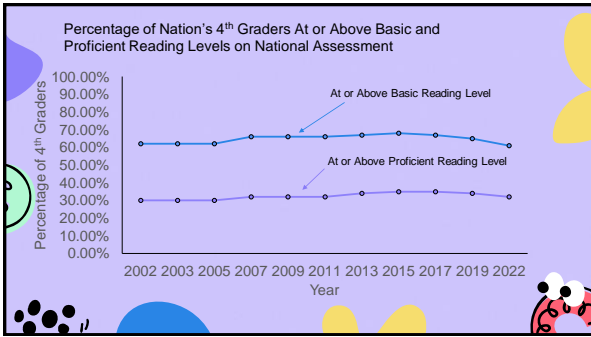
Matthew K. Burns, Ph.D.

University of Florida Literacy Institute

@burnsmk1

1

Percentage of Nation's 4th Graders At or Above Basic and Proficient Reading Levels on National Assessment

At or Above Basic Reading Level

At or Above Proficient Reading Level

Percentage of 4th Graders

100.00%
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%

2002 2003 2005 2007 2009 2011 2013 2015 2017 2019 2022
Year

2

SPECIAL EDUCATION

- President's Commission on Excellence in Special Education
- Reduce paperwork and increase flexibility
- Identify and intervene early
  - Service first and assessment later
- "Those that get counted, count."
- Use special education staff more effectively

3

MTSS AND PROBLEM-SOLVING
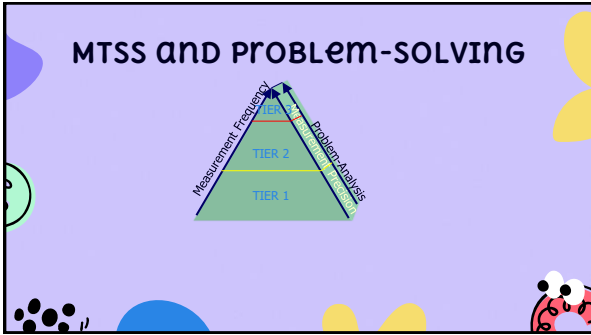
7

PROBLEM SOLVING

Tier I – Identify discrepancy between expectation and performance for class or individual **(Is there a classwide need?)**

Tier II – Identify discrepancy for individual. Identify category of problem. **(What is the category of the problem?)**

Tier III – Identify discrepancy for individual. Identify causal variable. **(What is the causal variable?)**

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TIER 1

CLASSWIDE NEED

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10

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Screener	MAP < 25th %ile	MAP ≥ 25th %ile	Total
Aimsweb CBM-R			
CBM-R < Benchmark Goal	276	145	421
	a	b	
CBM-R ≥ Benchmark Goal	46	501	547
	c	d	
Total	322	646	968
Fountas & Pinnell BAS			
BAS < Benchmark Goal	90	189	279
	a	b	
BAS ≥ Benchmark Goal	200	367	567
	c	d	
Total	290	556	846

Sensitivity = a / (a + c)
.86 for CBM-R
.31 for F&P

Specificity = d / (b + d)
.78 for CBM-R
.66 for F&P

Correct Classification
= (a + d) / N
.80 for CBM-R
.54 for F&P

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Slide 13

PLC Meetings:	Agenda
PLC: 1st weekly meeting of the month (Content Focus)	• Grade level teams and coaches with additional personnel as appropriate • School-site established PLC focus on various topics (e.g., math, STEM, behavior, environment, or other school topical initiatives)
PLC: 2nd weekly meeting of the month MTSS (Core Instruction Literacy Focus)	• Grade level teams and coaches with additional personnel as appropriate • Examine various formal and informal data to drive core instruction • Agenda will include embedded professional development on topics that address opportunities and challenges for core instruction
PLC: 3rd weekly meeting of the month (Content Focus)	• Grade level teams and coaches with additional personnel as appropriate • School-site established PLC focus with schools studying varied topics
PLC: 4th weekly meeting of the month MTSS (Data Analysis)	• Grade level teams and coaches with additional personnel as appropriate (data management team) • Analyze screening/benchmark data • Analyze progress monitoring data • Discuss, monitor and adjust tiered interventions.

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Slide 14

Does This Look Familiar?

Spring Benchmark		90	
Student	Grade	ORF	Errors
A	2	64	5
B	2	22	5
C	2	77	0
D	2	68	4
E	2	21	1
F	2	18	2
G	2	60	0
H	2	70	2
I	2	84	0
J	2	77	0
K	2	26	4
L	2	89	1
M	2	54	0
N	2	46	8
O	2	70	3
P	2	75	0
Q	2	32	6
R	2	35	2
S	2	51	1
T	2	71	1

14

Slide 15

Does This Look Familiar?

MAP Criterion = 212

CBM-ORF Criterion = 141

Student	MAP	CBM-ORF
601	225	209
602	210	113
603	210	135
604	196	138
605	219	145
606	211	75
607	220	128
608	206	132
609	204	126
610	221	214
611	183	88
612	209	137
613	211	158
615	210	122
616	222	133
617	224	158
618	211	85
619	208	140
620	210	137
621	214	125
622	204	101
623	215	122
624	227	172
Median	211	133

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WHAT IS THE CLASS MEDIAN?

- Median: the middle value in a list of numbers when the values are arranged from lowest to highest.

- Finding the class median:
  - Order student scores from the lowest to highest value.
  - The score in the middle of the list is the median.
  - If there is an even number of scores, take the average of the middle two scores.

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	WRC
Student 1	48
Student 2	122
Student 3	126
Student 4	82
Student 5	102
Student 6	77
Student 7	51
Student 8	84
Student 9	80
Student 10	102
Student 11	83
Student 12	38
Student 13	104
Student 14	152
Student 15	143
Student 16	115
Student 17	142
Student 18	114
Student 19	13
Student 20	75
Student 21	141
Student 22	87
Student 23	49
Median	87

Fall	70
Winter	91
Spring	109

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What is the Class Median?

Winter Benchmark		101	
Student	**Grade**	**ORF WRC**	**Errors**
A	3	21	8
B	3	18	6
C	3	87	1
D	3	110	0
E	3	46	6
F	3	92	1
G	3	89	3
H	3	98	1
I	3	119	2
J	3	96	2
K	3	50	8
L	3	122	2
M	3	97	1
N	3	49	6
O	3	105	0
P	3	86	6
Q	3	89	2
R	3	76	3
S	3	112	3
T	3	141	1
U	3	94	2
Class Median			

Winter Benchmark		101	
Student	**Grade**	**ORF WRC**	**Errors**
B	3	18	6
A	3	21	8
E	3	46	6
N	3	49	6
K	3	50	8
R	3	76	3
P	3	86	6
C	3	87	1
G	3	89	3
Q	3	89	2
F	3	92	1
U	3	94	2
J	3	96	2
M	3	97	1
H	3	98	1
O	3	105	0
D	3	110	0
S	3	112	3
I	3	119	2
L	3	122	2
T	3	141	1
Class Median		92	

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What is the Class Median?

Student	Grade	ORF WRC	Errors
A	2	64	5
B	2	22	5
C	2	77	0
D	2	68	4
E	2	21	1
F	2	18	2
G	2	60	0
H	2	70	2
I	2	84	0
J	2	77	0
K	2	26	4
L	2	89	1
M	2	54	0
N	2	46	8
O	2	70	3
P	2	75	0
Q	2	32	6
R	2	35	2
S	2	51	1
T	2	71	1
Class Median			

Spring Benchmark 73

Student	Grade	ORF WRC	Errors
F	2	18	2
E	2	21	1
B	2	22	5
K	2	26	4
Q	2	32	6
R	2	35	2
N	2	46	8
S	2	51	1
M	2	54	0
G	2	60	0
A	2	64	5
D	2	68	4
H	2	70	2
O	2	70	3
T	2	71	1
P	2	75	0
C	2	77	0
J	2	77	0
I	2	84	0
L	2	89	1
Class Median		62	

Spring Benchmark 73

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Kindergarten Winter* LSF

Criterion = 20 Sounds per minute

Name	Fall
KA	25
BA	29
SW	20
RA	15
TV	12
JP	18
PJ	25
YD	14
CA	29
GA	0
OG	19
SM	4
TJ	12
AD	1
GM	17
QL	4
TE	29
CJ	3
VR	3
LD	2
RL	4
Median	14

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Teacher Roles

- Activator

Drill & practice	d = 0.99
Feedback	d = 0.72
Meta-cognition	d = 0.67
Direct Instruction	d = 0.59
Mastery Learning	d = 0.57
Formative Assessment	d = 0.46
Total	**d = 0.60**

- Facilitator

Simulation/game	d = 0.32
Inquiry-based	d = 0.31
Class size	d = 0.21
Problem-based	d = 0.15
Inductive teach	d = 0.06
Total	**d = 0.17**

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CLASSWIDE INTERVENTION

http://kc.vanderbilt.edu/pals/

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Spring Benchmark		90	
Student	Grade	ORF WRC	Errors
A	2	31	6
B	2	47	5
C	2	47	4
D	2	48	4
E	2	51	2
F	2	54	3
G	2	55	4
H	2	58	7
I	2	61	7
J	2	61	1
K	2	65	0
L	2	71	1
M	2	78	2
N	2	82	6
O	2	84	0
P	2	86	0
Q	2	95	0
R	2	98	2
S	2	108	1
T	2	121	2
U	2	141	3
Class Median			

Partner Reading Partnerships

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PROCEDURE

Partner Reading	Paragraph Shrinking
1. Stronger reader reads aloud for 5 minutes	1. For 5 minutes the stronger read continues reading new text in the story, stopping after each paragraph to summarize
2. The weaker reader reads aloud the SAME text for 5 minutes	2. For 5 minutes the weaker reader continues with the new text, stopping after each paragraph to summarize

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Paragraph Shrinking

- 👤 Name the most important **who** or **what.**

- 💬 Tell the **most important thing** about the who or what.

- ❝❞ Say the main idea in **10** words or less.

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Timeline

1	2	3	4	5
Collect Data: Pre-test (fluency and comprehension)	**Day 1:** Train Students on Set Up Procedures and Partner Reading, Practice Reading for 10 minutes, Error Correction	**Day 2:** Train Students on Paragraph Shrinking, Practice Reading for 10 minutes	**Day 3-10:** Partner Reading, Paragraph Shrinking 15 minutes every day	Collect Data: Post-test (fluency and comp.)

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What We Found: 3rd Grade Partner Reading Data

Third Grade			
Third Grade Benchmark	**91 Words Read Correctly (WRC)**		
	Pre Intervention Class Median (WRC)	**Post Intervention Class Median (WRC)**	**Slope (WRC)**
Class 1	81	104	11.5
Class 2	87	115	14

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WHAT WE FOUND: 3RD GRADE PARTNER READING DATA

	Students Below Benchmark Pre Intervention	Students Below Benchmark Post Intervention	Total Students in Class
Third Grade Class 1	10	**5**	20
Third Grade Class 2	13	**5**	23

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	WRC	WRC after PALS
Student 1	48	92
Student 2	122	142
Student 3	126	147
Student 4	82	113
Student 5	102	117
Student 6	77	97
Student 7	51	70
Student 8	84	95
Student 9	80	82
Student 10	102	127
Student 11	83	106
Student 12	38	47
Student 13	104	115
Student 14	152	161
Student 15	143	158
Student 16	115	125
Student 17	142	160
Student 18	114	127
Student 19	13	40
Student 20	75	92
Student 21	141	136
Student 22	87	105
Student 23	49	47
Median	87	113

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Maki et al. (2020)
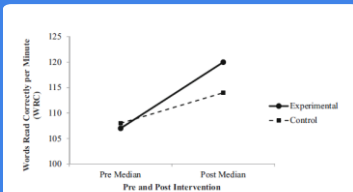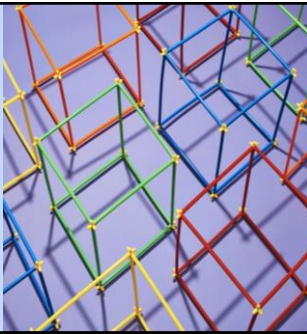
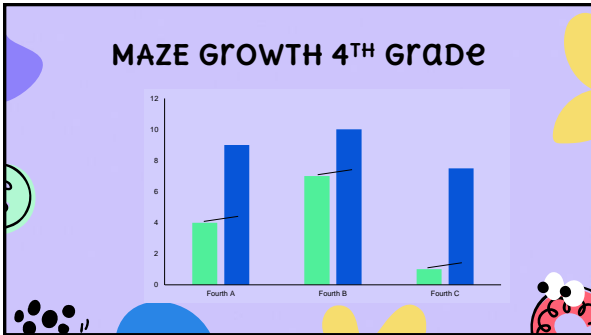Fig. 1 Curriculum-based measure for reading median scores for treatment and control classrooms

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Science Project

- Approximately 140 4th and 5th graders
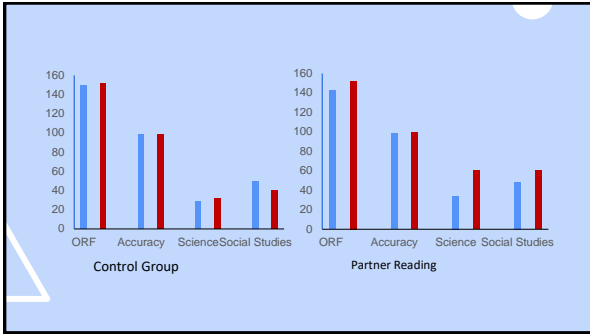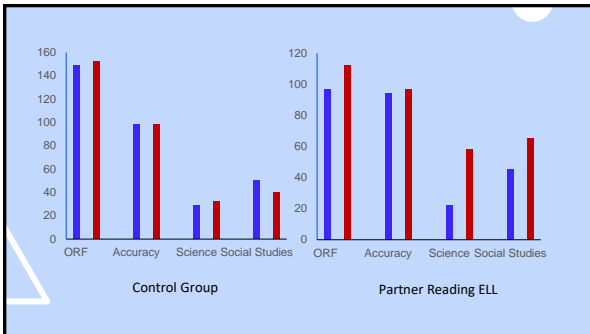- Science content
- Readworks.org
- Science MAZE
- 2 weeks

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MAZE GROWTH 4TH GRADE

35

MAZE GROWTH 5TH GRADE

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Control Group / Partner Reading

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Control Group / Partner Reading ELL

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Tweet

Lindsay Kennny
@LindsayKennny

Two weeks ago our class median for words correct per minute was 50 (2nd grade) . -Now our class median is 66! This is thanks to a class wide intervention I implemented after learning from @burnsmk1. I love doing mini-research in my classroom!

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TIER 2

CATEGORY OF THE PROBLEM

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INTERVENTIONS FOR CHILDREN WITH LD

Reading comprehension	1.13
Direct instruction	0.84
Psycholinguistic training	0.39
Modality instruction	0.15
Diet	0.12
Perceptual training	0.08

Kavale & Forness, 2000

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NATIONAL READING PANEL

- Is phonemic awareness instruction effective in helping children learn to read?
- Reviewed 52 studies of PA instruction.
- Three general outcomes were explored
  - PA tasks such as phoneme manipulation,
  - spelling,
  - and reading tasks such as word reading, pseudoword reading, reading comprehension, oral text reading, reading speed, time to reach a criterion of learning, and miscues

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National Reading Panel Results

- PA instruction demonstrated better efficacy over alternative instruction models or no instruction
- Improved PA measures (strong), reading (d = .53) and spelling skills
- Teaching one or two PA skills was preferable to teaching three or more
- PA instruction benefited reading comprehension (Ehri et al.).

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Means and ranges of effect sizes by reading outcome measure

	N	Mean ES	SD	Minimum	Maximum
Pseudowords	24	0.84	0.80	-0.19	3.60
Words in Isolation	48	0.92	0.89	-0.05	4.33
Contextual Reading	24	0.37	0.38	-0.37	1.18

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Tier II Interventions

- PALS
- Road to the Code
- Read Naturally
- Rewards
- LLI
- Etc., etc., etc.

Phonemic Awareness
Phonics
Fluency
Vocabulary and Comprehension

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Leveled Literacy Intervention

- Effect Sizes
- Kindergarten =   0.26
- First Grade =   0.36
- Second Grade =   **-0.09**

Ransford-Kaldon, C. R., Flynt, E. S., Ross, C. L., Franceschini, L. A., Zoblotsky, T. A., Huang, Y., & Gallagher, B. (2010). Implementation of effective intervention: An empirical study to evaluate the efficacy of Fountas & Pinnell's Leveled Literacy Intervention Program (LLI) for 2009-2010. Memphis, TN: The University of Memphis, Center for Research in Educational Policy.

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How Effective is the Leveled Literacy Intervention for K-2 Students?

Fountas & Pinnell:
- BAS – Diagnostic accuracy of 54% for identifying struggling readers (Parker et al., 2015)
- 58% of Struggling readers could not read the book that was at their level according to F&P (Burns et al., 2015)

Sources:
LLI - https://ies.ed.gov/ncee/wwc/Docs/InterventionReports/wwc_leveledliteracy_091917.pdf
Sound Partners - https://charts.intensiveintervention.org/aintervention

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Assess 4 NRP Areas

📚	Vocabulary/Comprehension	Star Reading
📖	Fluency	Oral reading fluency
✏️	Phonics	NWF Decodable Words Spelling
✓	Phonemic Awareness	Word Blending Word Segmenting

48
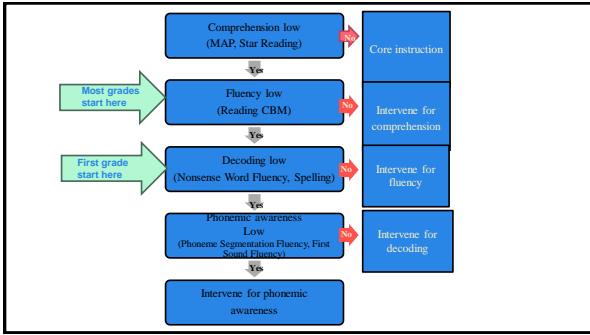
49

Grade	Phonemic Awareness	Phonics	Fluency	Comprehension
Kindergarten	Road to the Code	Sound Partners	NA	NA
First Grade	Road to the Code	Sound Partners	NA	NA
Second Grade	Intervention for All: Phonological Awareness	Sound Partners	Read Naturally	Learning Strategies Curriculum: Inferencing (LSC:I)
Third Grade	NA	Phonics for Reading	Read Naturally	LSC:I
Fourth Grade	NA	REWARDS	Read Naturally	LSC:I
Fifth through Eighth Grades	NA	REWARDS	Read Naturally	LSC:I

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Grade	Phonemic Awareness	Phonics	Fluency	Comprehension
Kindergarten				
First Grade				
Second Grade				
Third Grade				
Fourth Grade				
Fifth Through Eighth Grades				

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Category of Problem MN HS

- 9-12 with approximately 1600 students
- 69.2% pass reading
- 9th-10th grade
- 28% low on MAP (~225)
- 45% Low on TOSCRF (~100)
  - 64% low on phonics (~65)
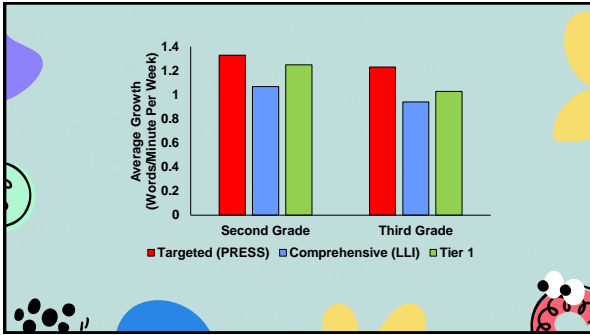 - 36% acceptable phonics (~36)

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Groups

- Randomly assigned to two groups
  - Read 180
  - Targeted (phonics – REWARDS, fluency – Read Naturally, comprehension – Read 180

- Wait list control group

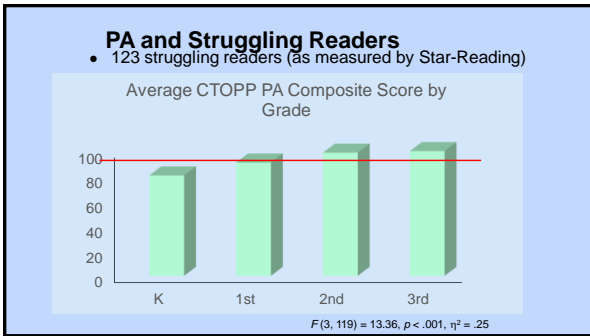- 20 minutes each day for 13 weeks in addition to reading and study skills

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Targeting Intervention at Tier 2 - HS

ANCOVA for fluency $F(1, 42) = 4.98$, $p < .025$, $d = 0.50$
ANCOVA for MAP $F(2, 74) = 5.84$, $p < .025$, $\eta^2 = .14$.

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PA and Struggling Readers
- 123 struggling readers (as measured by Star-Reading)

Average CTOPP PA Composite Score by Grade
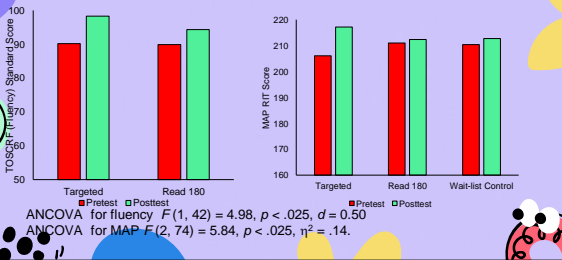
$F_{(3, 119)} = 13.36$, $p < .001$, $\eta^2 = .25$

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Relationship Between DIBELS Composite and CTOPP Score			
Grade	N	Correlation	Number of Students Low PA
Kindergarten	28	.35*	20 (70%)
First Grade	26	.19	10 (38%)
Second Grade	32	.27	7 (21%)
Third Grade	37	.02	5 (14%)

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Regression of Oral Reading Fluency on Phonemic Awareness (as Measured by Comprehensive Test of Phonological Processing Second Edition) and Reading Decoding (as Measured by Nonsense Word Fluency) with Decoding in Model 2 with Students in Second and Third Grades (n = 69).

Variable	Model 1				Model 2				Model 3			
	B	SE	Beta	T	B	SE	Beta	t	B	SE	Beta	t
Constant	-0.16	0.71		-0.23	-0.42	0.47		-0.89	-0.31	0.54		-0.57
Phoneme Blending	0.04	0.05	.11	0.85	0.01	0.03	.02	0.29	0.01	0.04	.03	0.36
Phoneme Isolation	-0.04	0.06	-.08	-0.67	0.04	0.04	.08	0.93	0.04	0.04	.08	0.99
Reading Decoding					0.77	0.08	.77	9.27	0.79	0.10	.78	8.33*
Phoneme Elision									-0.02	0.04	-.04	-0.47

p < .05 R^2 = .02, Δ = .02, F = 0.51 R^2 = .58, Δ = .56, F = 85.85 R^2 = .58, Δ < .01, F = 0.22

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Student	MAP RIT	RIT %ile	ORF	Accuracy
2	144	1	2	20%
36	146	1	7	41%
33	148	1	11	52%
34	160	6	22	82%
10	158	3	23	77%
27	158	3	27	87%
7	154	1	30	77%
11	160	6	31	82%
6	160	6	36	86%
5	152	1	38	91%
4	169	24	42	91%
32	166	17	44	90%
37	161	8	50	96%
17	174	37	54	95%
9	162	9	57	88%
30	155	1	57	93%
26	166	17	58	92%
3	177	45	68	96%
19	180	53	68	94%
22	190	78	72	99%
13	172	32	74	96%
1	175	39	75	95%
8	187	71	76	96%
14	182	58	78	99%
35	181	56	140	100%

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Second Grade Practice Data

❖ What is the class median?

❖ Does this class need a class-wide intervention?

❖ Why?

❖ Use the Intervention Flowchart to decide what is appropriate for this class.

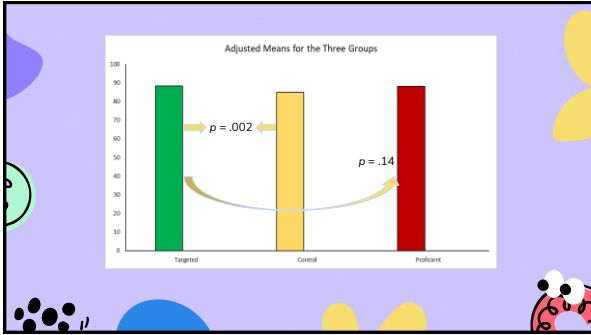❖ Assign student partnerships, if appropriate.

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Meta-Analysis

- 24 studies of K-8 small-group reading interventions
- 27 effects
- Median g = 0.54
- Targeted (comprehension, fluency, vocabulary, decoding, phonemic awareness)
- 14 effects, g = 0.65
- Comprehensive
- 13 effects g = 0.33

• Hall & Burns (2018)

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