Gaining a Better Understanding of Beginning Reading Skill Development Across Kindergarten Learners: A Growth Mixture Model Approach

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University of Oregon

BRT
behavioral research & teaching

Reading Development Building Blocks & Their Measurement

Text-level skills

Text Fluency

Comprehension

Vocabulary

Word- level skills

Phonemic Awareness

PSF

Alphabetic Principle

LNF

WRF

LSF

Curriculum Based Fluency Measurement

Assessor Copy — Form K-17

Student Name: _____ Date: _____

Letter Names

Procedures
Place the probe marked "Letter Names Student Copy" in front of the student. Read the directions to the student. When you are finished administering the test, enter the student results on the website for scoring and record keeping.

Directions
"**When I say begin, say the name of each letter. I will stop you after 60 seconds. Start at the top of the page and read across each row.**" Demonstrate by sweeping your finger from left to right across the first row. "**Move your marker down after each row.**" Demonstrate. "**Any questions?... Ready?...Begin.**" At 60 seconds, say "**Stop.**" Mark the last letter with a bracket.]

Note: This is a 60 second timed test.

Scoring
If student:
- Self corrects, write S.C. above letter name and count as correct.
- Says incorrect letter name, slash through letter name, and count as incorrect.
- Hesitates more than 3 seconds, supply the letter name and count as incorrect.
- Skips letter, circle the letter and count as incorrect.
- Clearly loses his/her place, point to the next letter.

E	p	x	B	X	Z	A	r	O	s	10
T	m	e	S	L	p	t	a	N	C	20
M	i	k	F	R	P	D	I	f	n	30
h	u	Q	z	c	K	v	W	G	w	40
y	q	J	V	j	b	l	d	U	A	50
r	Z	x	B	s	E	A	p	X	O	60
S	m	p	a	t	L	N	T	C	e	70
P	k	f	R	I	M	n	F	D	i	80
Q	K	w	G	z	h	W	c	v	u	90
V	b	U	q	j	A	y	d	l	J	100

Correct _____

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## Assessor Copy — Form K-11

Student Name: _____ Date: _____

Word Reading

Directions: Place the "Word Reading Student Copy" probe in front of the student and say, "**Please read from this list of words. Read across the page and then on to the next row.**" Demonstrate by sweeping your finger from left to right across the first two rows of words. Start timing when the student begins reading. Mark a bracket] after the last word read. If a student self corrects, write S.C. above the word and count as correct. If they say an incorrect word, mark a slash through the word, and count as incorrect. If they hesitate more than 3 seconds, supply the word and count as incorrect. If a student skips a word, circle the word and count it as incorrect. **Note: This is a 60 second timed test.**

I	top	is	it	4
an	he	fast	did	8
way	had	she	rock	12
day	try	into	great	16
list	bill	fly	before	20
now	are	all	tree	24
good	back	number	that	28
best	wood	left	people	32
open	woman	cover	mark	36
zone	big	new	stick	40
word	yet	pick	maybe	44
important	world	always	every	48
wall	forest	watch	find	52
corner	fell	rich	life	56
question	dark	few	letter	60

Correct _____

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How Well Does CBM Growth inform Beginning Reading Skills Development?

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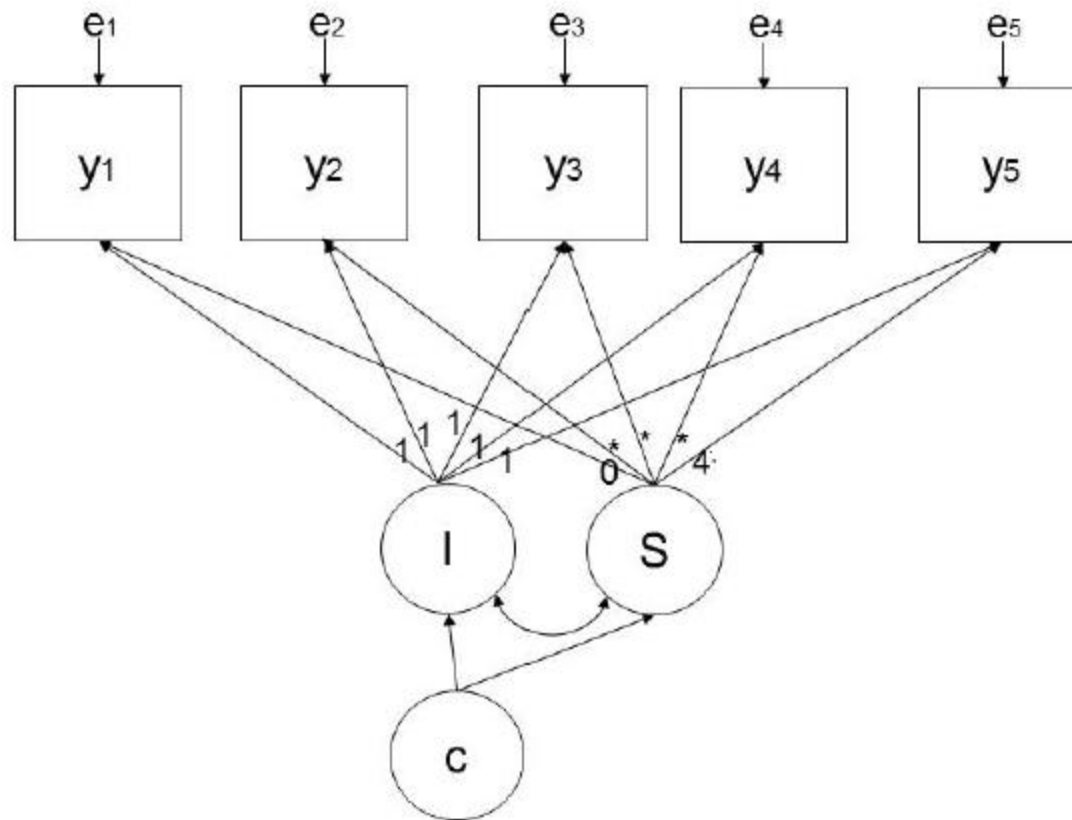

Word Reading

Spring

Winter

Fall
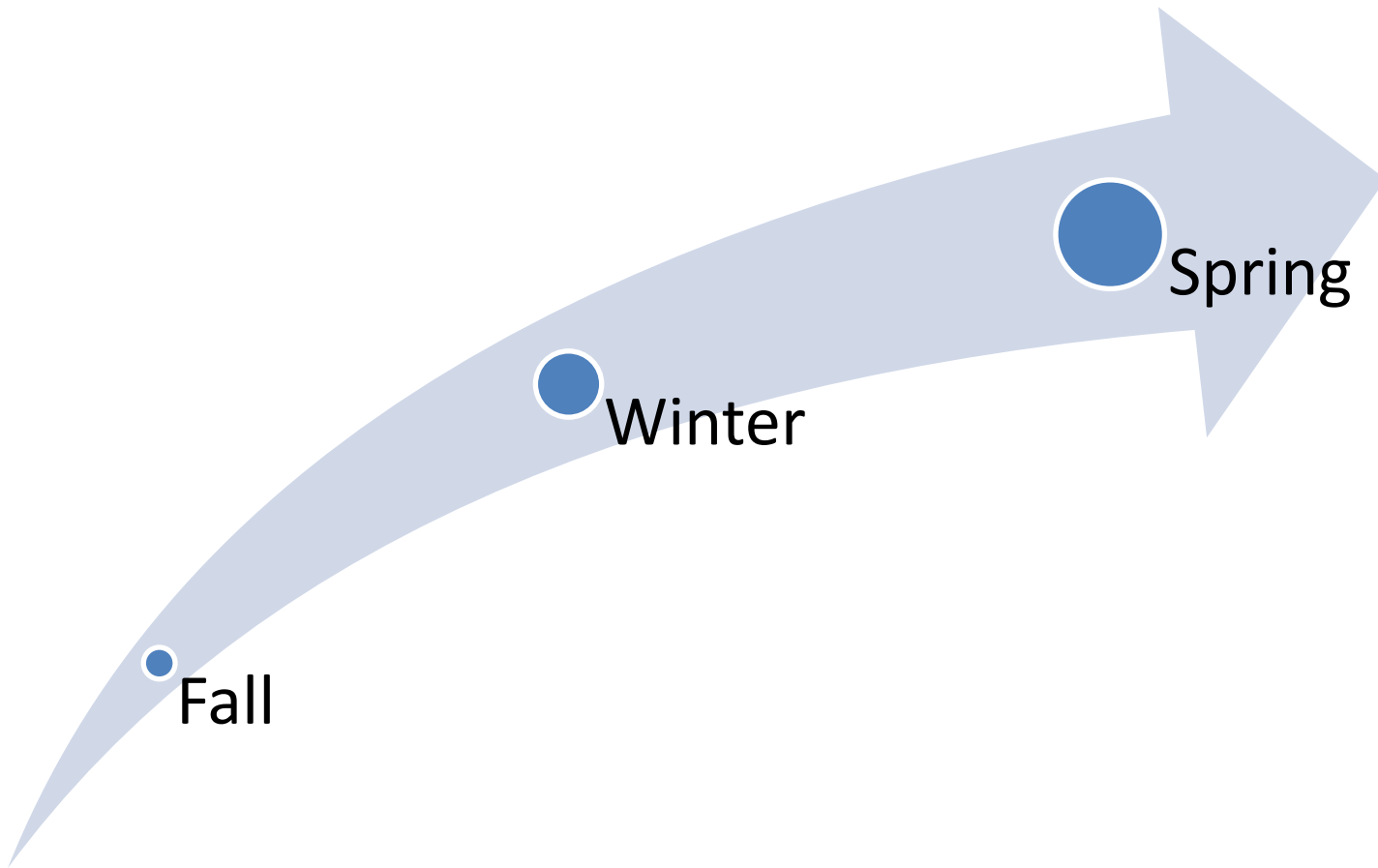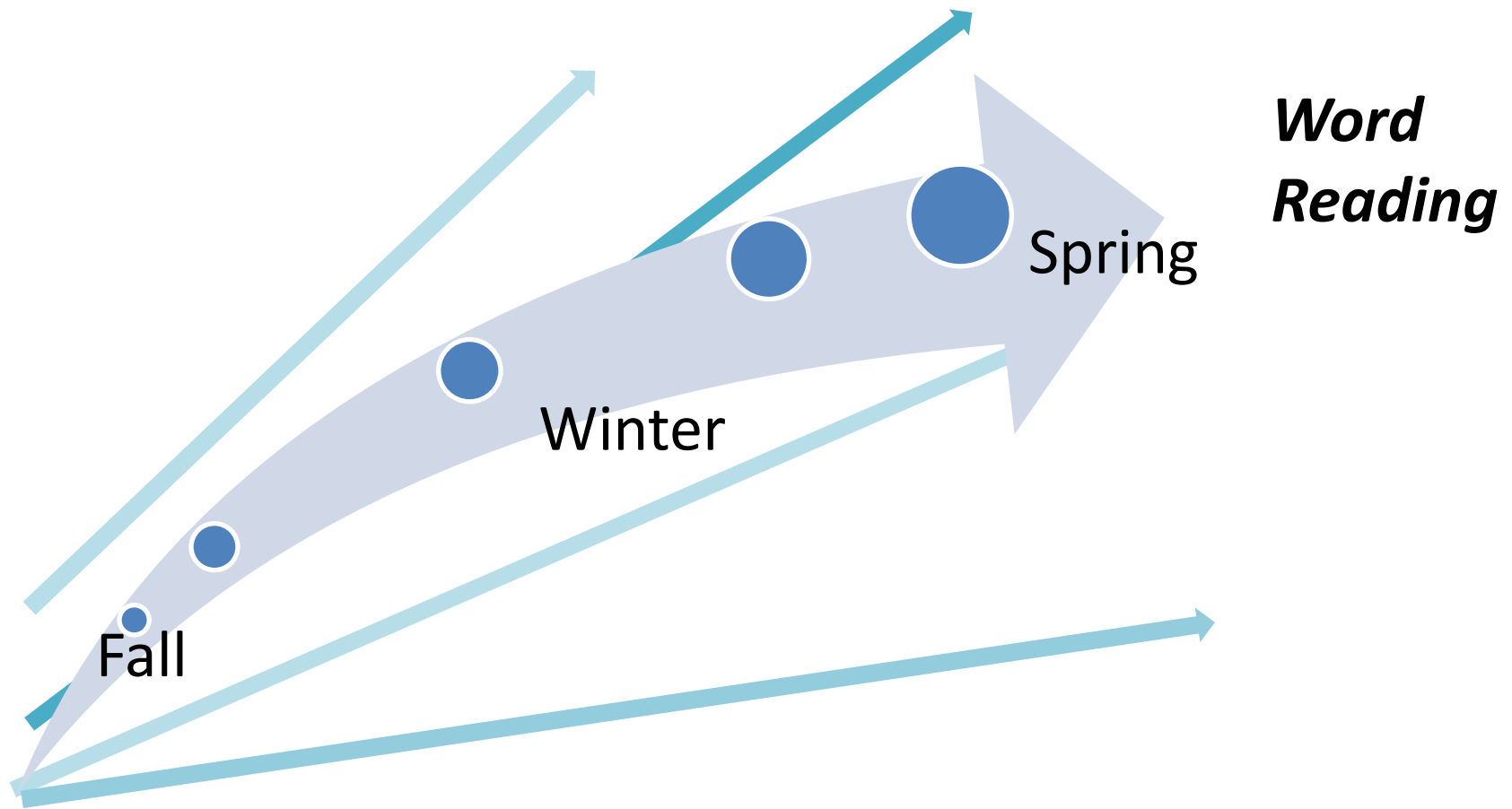
Figure 1. Theoretical estimated time score growth mixture model (GMM). * indicates that the time score is estimated.

Table 2. *Model Fit Indices*

Measure	Class	AIC	BIC	ABIC	Entropy	LMR (p value)	Adjusted LMR (p value)	BLR (p value)
Letter Name	1	7133.89	7176.77	7135.58	-	-	-	-
	2	**7126.87**	**7179.64**	**7128.95**	**0.69**	**0.07**	**0.08**	**0.02**
	3	7124.80	7187.47	7127.27	0.60	0.60	0.62	0.38
Letter Sound	1	6756.13	6799.01	6757.82	-	-	-	-
	2	**6729.63**	**6782.41**	**6731.72**	**0.80**	**0.01**	**0.01**	**0.00**
	3	6717.71	6780.38	6720.19	0.83	0.18	0.20	0.00
Phoneme Segmenting	1	7033.16	7075.78	7034.60				
	2	**7016.20**	**7068.65**	**7017.96**	**0.83**	**0.00**	**0.00**	**0.00**
	3†	-	-	-	-	-	-	-

Note. LMR = Lo-Mendel-Rubin ratio test. BLR = Bootstrapped likelihood ratio test. **Bold** indicates best model fit. † Parameters were not estimated due to convergence issues.

Table 3. *Summary of Model Parameter Estimates for the Final Models*

		Letter Name	Letter Sounds	Phoneme Segmenting
	Best Model fit	2-class	2-class	2-class
	n	200	200	196
		Normative	*Normative*	*Normative*
Class 1	Fixed Effect			
	Intercept (I)	25.80	8.16	23.87
	Slope (S)	3.96	6.89	6.11
	Class Proportion (*n*)	0.83 (165)	0.75 (151)	0.88 (174)
		Accelerated	*Above Average*	*Below Average*
Class 2	Fixed Effect			
	Intercept (I)	19.59	28.86	6.71
	Slope (S)	9.93	4.60	4.39
	Class Proportion (*n*)	0.18 (35)	0.25 (48)	0.12 (22)

Letter Names Fluency
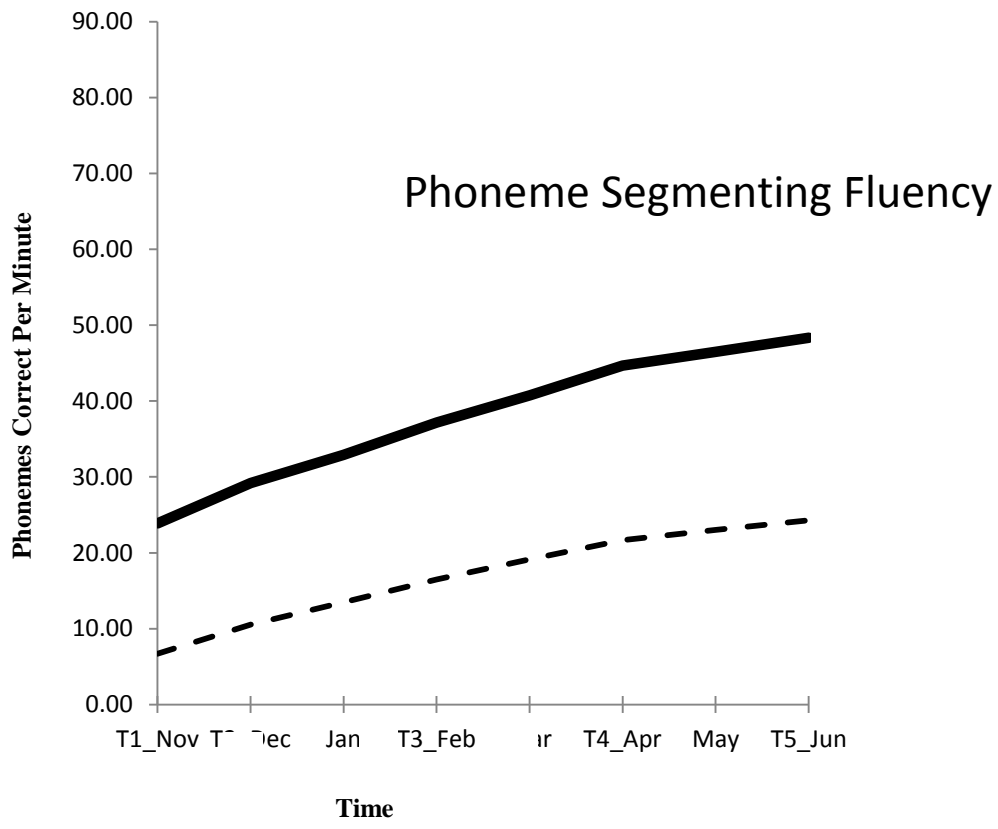
Letter Sounds Fluency

Phoneme Segmenting Fluency
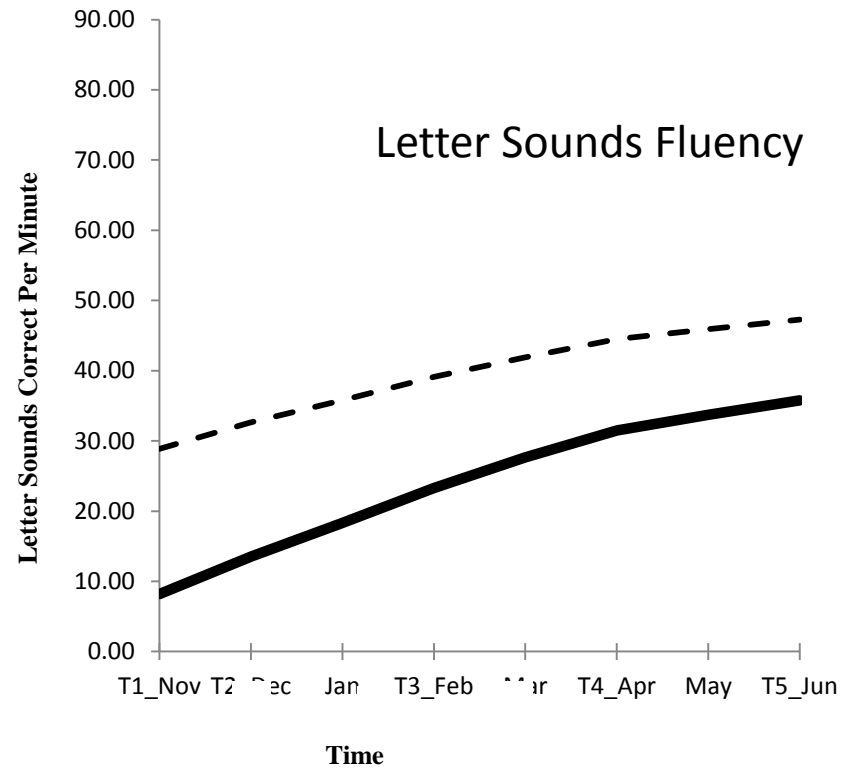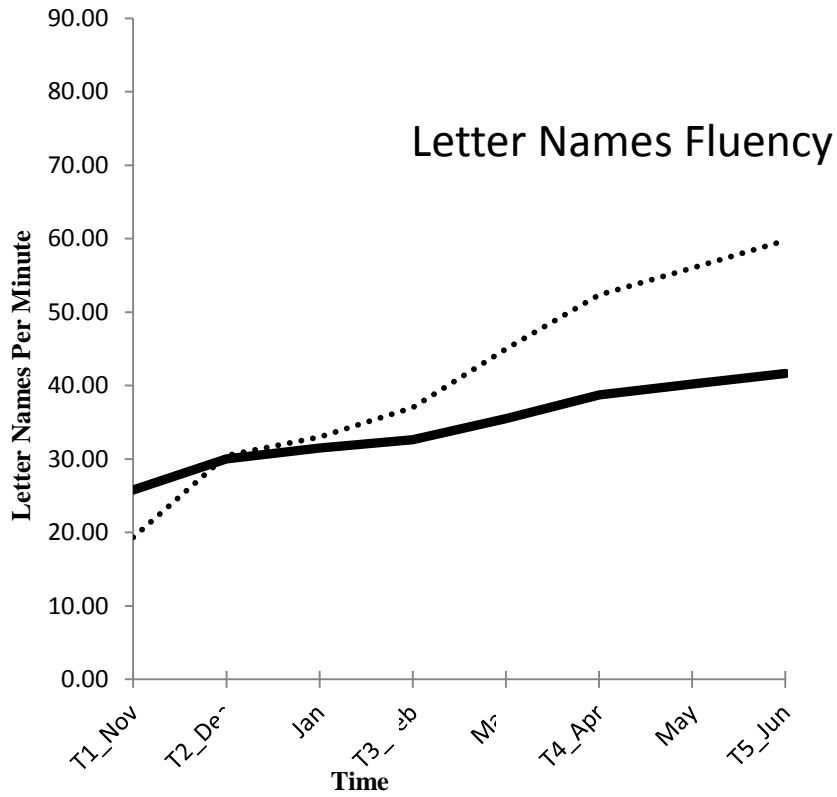
Table 4. *Mean Estimated Probability for the 25th, 50th, and 75th Percentile Membership*

Categories.

Skill	Significant Predictors	Latent Class	Percentile		
			25th	50th	75th
Letter Name	Intercept	Accelerated	0.417	0.288	0.295
		Normative	0.299	0.284	0.418
Letter Sounds	Intercept & Slope	Above average	0.040	0.151	0.810
		Normative	0.410	0.277	0.313
Phoneme Segmenting	Intercept	Below Average	0.680	0.235	0.084
		Normative	0.318	0.300	0.383

Study Significance

- Modeling beginning reading skills using more than one class provided enhanced information about differential skill development among kindergarteners, which may be missed by conventional single class "average" modeling methods.

- Unlike intercepts, growth slopes were inconsistent predictors of WRF, which raises the question of how well fluency growth reflects skill progress for kindergarten beginning reading skills development.

For More Information

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http://www.brtprojects.org

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