Investigation of Reading Development Patterns for Students in Early Grades Using LTA

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Background of the Study

- RTI has been widely implemented as an alternative to the discrepancy model to identify students with reading disabilities (Foorman & Connor, 2010; Francis, et al. 1996).
- With a multi-tiered instruction system, RTI takes a preventative approach, helping struggling young readers before their academic failures (Compton, et al. 2006).
- One of the critical elements of successful RTI implementation is an accurate screening and early identification of students who are at-risk (Compton, et al. 2006; Fuchs, et al. 2003).

Background of the Study

- ORF, a measure of students' fluency skills, has been widely used as a screening tool to identify students who are at-risk for reading difficulties (RD) because of its strong predictive validity (Fuchs, et al, 2001 ; Hasbrouck, & Tindal, 2006; Kim, et al. 2010; Tindal, 2013).
- ORF can identify students at-risk for RD as early as the first couple of years of their formal schooling (Catts, et al. 2012).
- However, some studies suggest that using ORF benchmark scores still yields unreliable classification (Boscardin, et al., 2008; Catts, et al. 2012; Speece, 2005).

Background of the Study

- There have been growing efforts in the field to better understand growth in ORF (Jenkins, et al. 2009; Kim, et al. 2010; Nese, et al 2012; Want, et al. 2008).
- Many of these studies investigated within-year ORF growth with small sample size produced findings that may not be robust enough to model complexity of growth and may not represent growth of all students (Betts, et al. 2009; Fuchs, et al. 1993; Jenkins, et al. 2008; Speece 2005).
- With technological advancements, researchers can not only estimate more precise and robust growth parameters, but also investigate more complex patterns of growth using more sophisticated techniques such as Latent Class Analysis and Growth Mixture Modeling (Boscardin, et al., 2008; Catts, et al. 2012).

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Background of the Study

- Some studies suggest that students exhibit different growth trajectories and differential probabilities of being classified to be at-risk for RD (Boscardin, et al., 2008; Brasseur-Hock , et al. Catts, et al, 2012; Kaplan, et al, 2005).

- Using modeling techniques like LCA and GMM can classify students into latent (unobserved) classes that share the same growth trajectories, which can enhance practices for classification of students at-risk (Boscardin, et al., 2008; Kaplan, et al. 2005).

- As an explorative study, we investigated the transition patterns of students’ fluency growth across 3 years and attempted to identify students who are at greater risk of RD.

Research Questions

- RQ1: What is the average initial performance and growth for students in grades 2 through 4 on the easyCBM Passage Reading Fluency (PRF) assessment?

- RQ2: Do all students have homogenous growth trajectories?

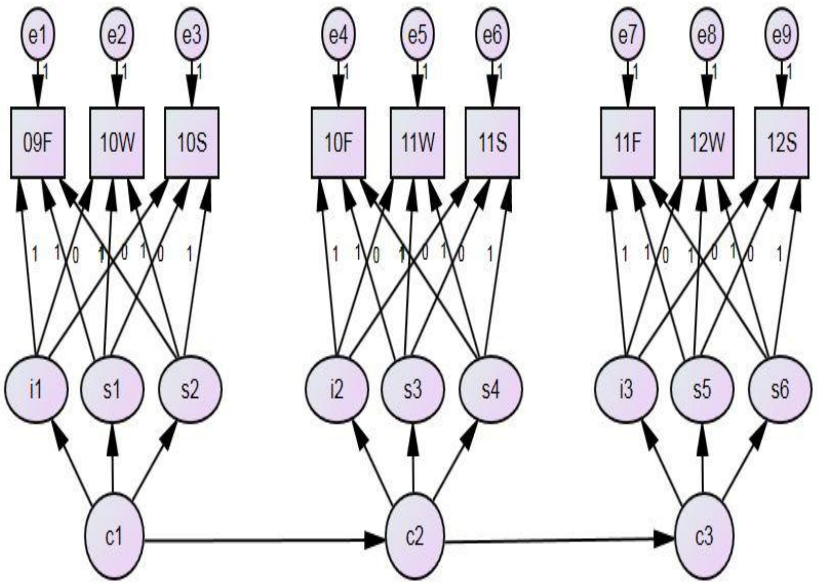
- RQ3: Do students stay in the same latent classes (risk-categories), or do they transition in and out of them over time?

Method

- Approximately 1,600 students from two school districts were followed for three years, from 2009-2010 to 2011-2012 school years.
- About 51% of students were female, 69% were white, 17% were SPED, and 6% were ELL.
- Students' fluency growth was analyzed using the easyCBM Passage Reading Fluency benchmark measures.

Analytic Procedure

- The piecewise growth model was selected after evaluating functional forms of fluency growth.
- Latent Class Growth Analysis was conducted on the piecewise base model to examine heterogeneity of growth trajectory for each year separately.
- Transition of latent class membership across three years was analyzed.



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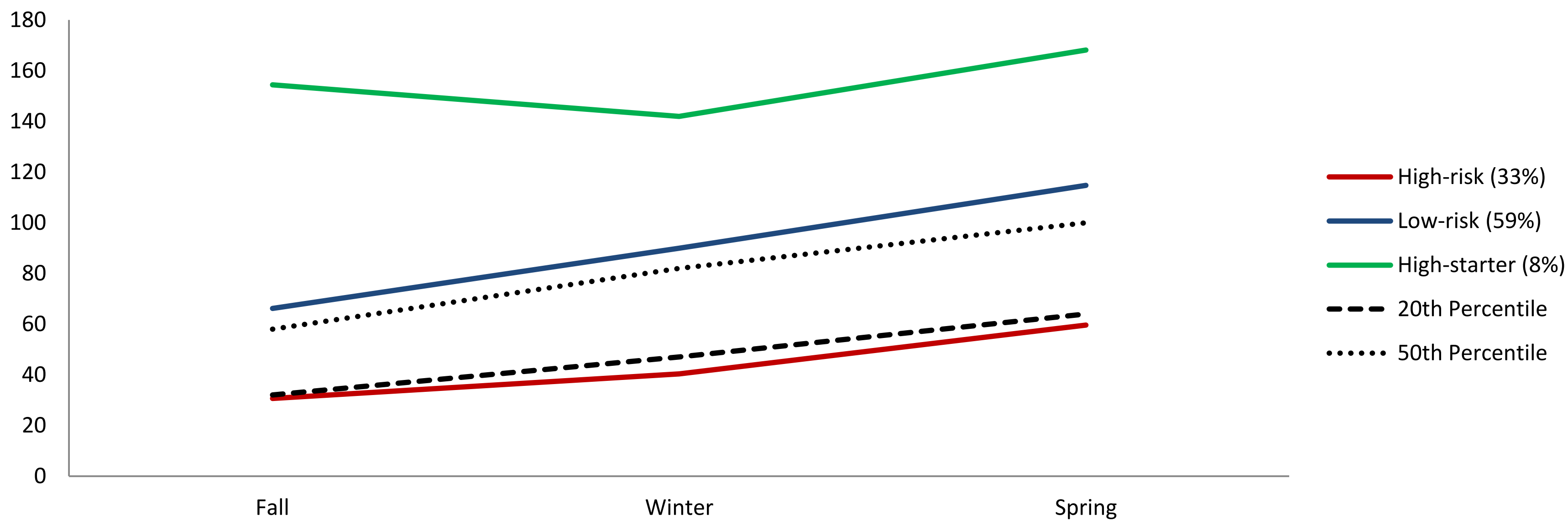
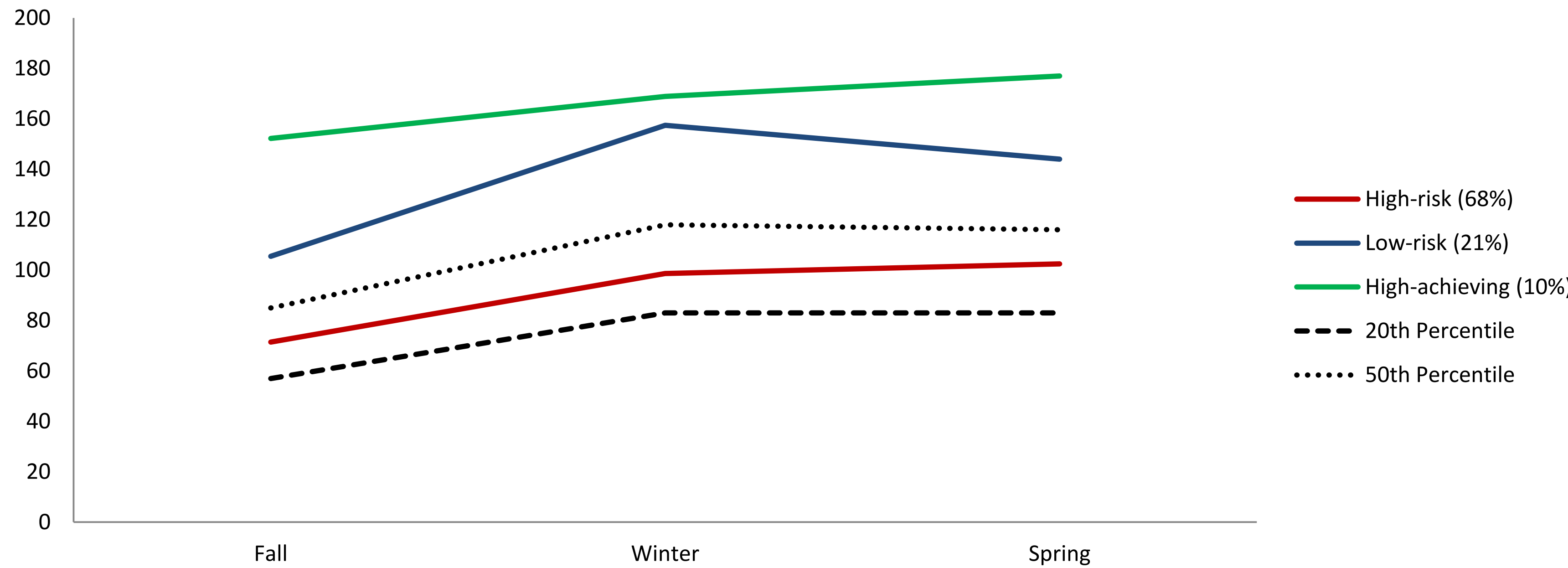
Results

Grade 2 Fluency Growth: 3-class model



Class	Proportion	Mean Intercept	Growth from Fall to Winter	Growth from Winter to Spring
High starter (Green)	0.08	154.46	-12.44	26.17
Low risk (Blue)	0.59	66.14	23.85	24.76
High risk (Red)	0.33	30.68	9.68	19.21

Grade 3 Fluency Growth: 3-class model



Class	Proportion	Mean Intercept	Growth from Fall to Winter	Growth from Winter to Spring
High starter (Green)	0.10	152.23	16.82	8.10
Low risk (Blue)	0.21	105.49	51.97	13.40
High risk (Red)	0.68	71.46	27.22	3.75

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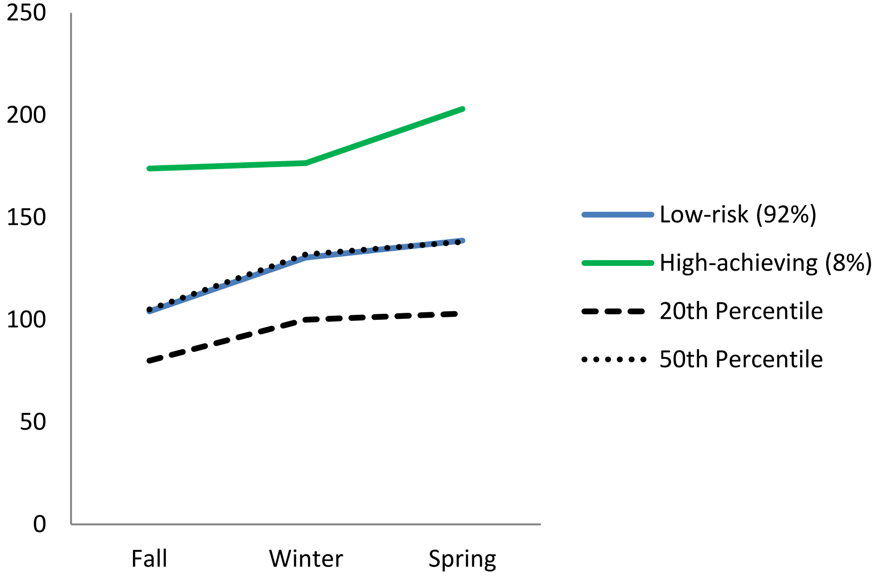
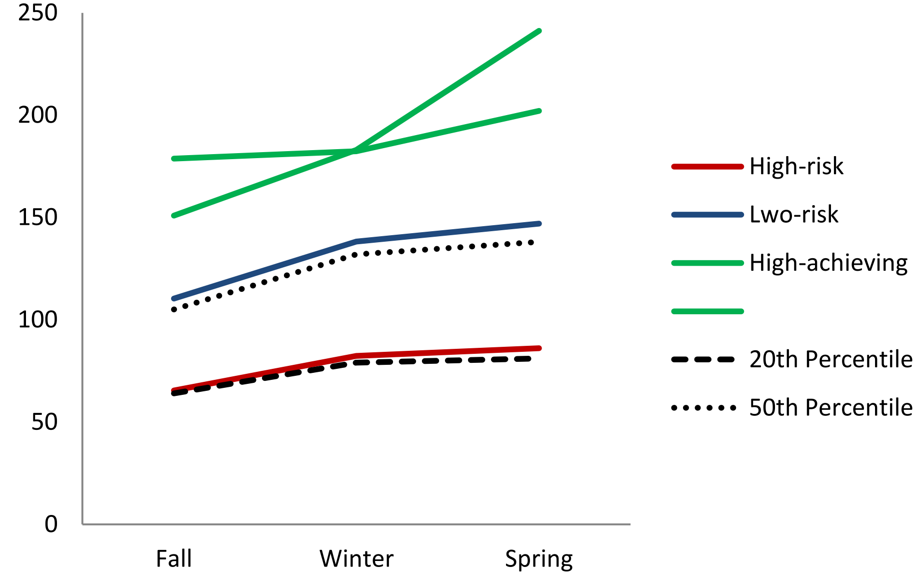
Grade 4 Fluency Growth: 2-class model



Grade 4 Fluency Growth: 4-class model



Class	Proportion	Mean Intercept	Growth from Fall to Winter	Growth from Winter to Spring
High starter (Green)	0.08	173.86	2.69	26.39
Low risk (Blue)	0.92	104.09	26.26	8.27

Class	Proportion	Mean Intercept	F to W	W to S
High achieving (Green)	0.08	178.68	3.62	19.73
High achieving (Green)	0.02	150.87	32.10	58.19
Low-risk (Blue)	0.79	110.29	27.85	8.83
High-risk (Red)	0.11	65.47	16.91	3.63

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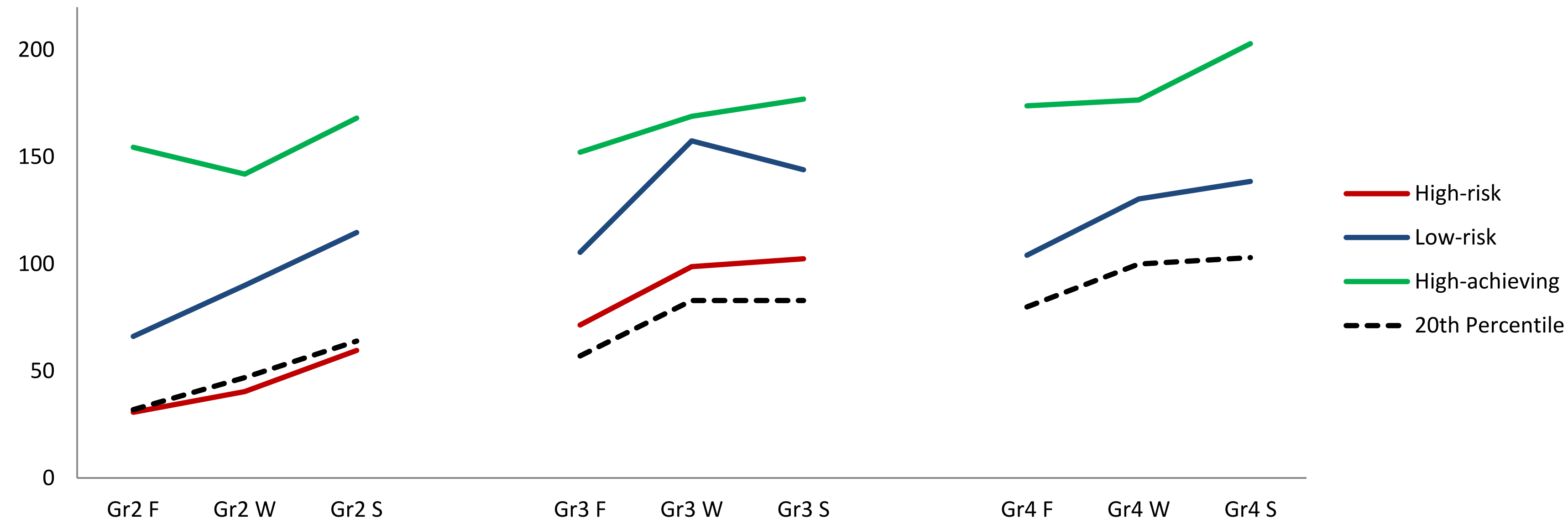
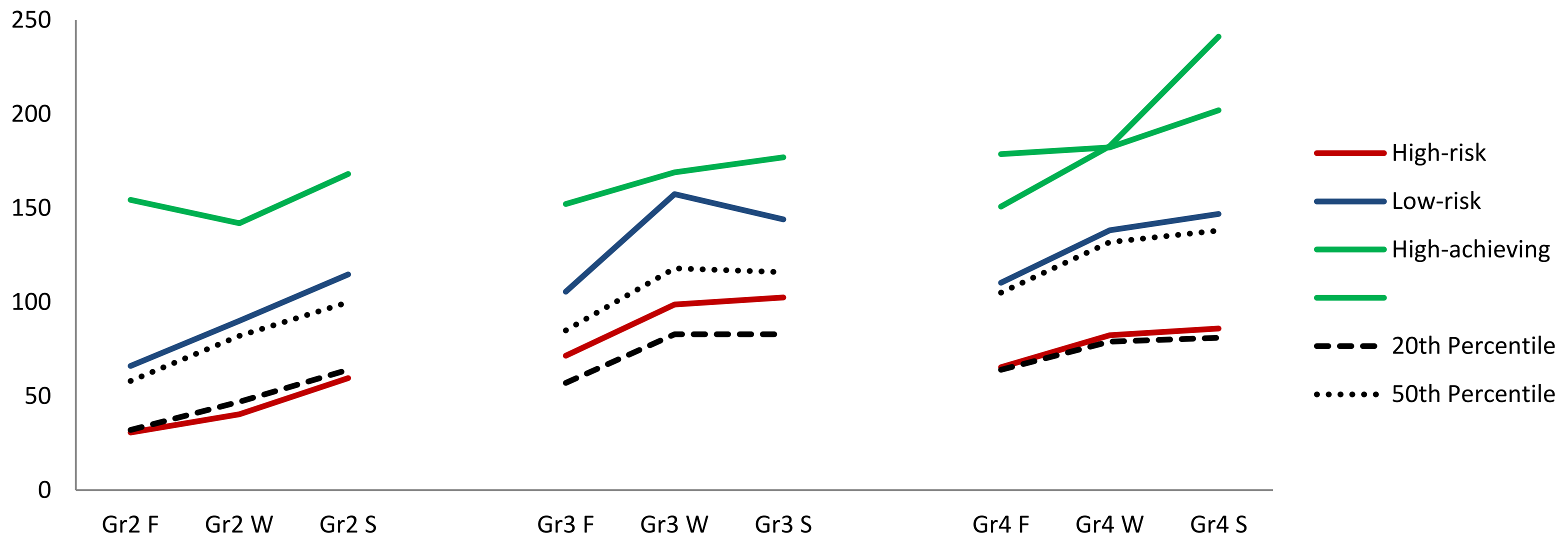
Fluency Growths Grades 2 to 4



Year 1	Year 2 (Grade 3)			Year 3 (Grade 4)		Year 2	Year 3 (Grade 4)	
	Low-risk	High-risk	High-achieving	Low-risk	High-starter		Low-risk	High-starter
Low-risk (930)	**280 (0.30)**	556 (0.60)	94 (0.10)	**864 (0.93)**	66 (0.07)	Low-risk (341)	**294 (0.86)**	47 (0.14)
High-risk (528)	13 (0.02)	**515 (0.98)**	0	527 (0.99)	1 (0.01)	High-risk (1084)	1070 (0.99)	14 (0.01)
High-starters (131)	48 (0.37)	13 (0.10)	**70 (0.53)**	69 (0.53)	**62 (0.47)**	High-achieving (164)	96 (0.59)	**68 (0.41)**

Fluency Growth Grades 2 to 4: 4-clss model



Year 1	Year 2 (Grade 3)			Year 3 (Grade 4)			Year 2	Year 3 (Grade 4)		
	Low-risk	High-risk	High-achieving	Low-risk	High-risk	High-achieving		Low-risk	High-risk	High-achieving
Low-risk (930)	**280 (0.30)**	556 (0.60)	94 (0.10)	844 (**0.91**)	3 (0.003)	83 (0.09)	Low-risk (341)	280 (**0.82**)	0	61 (0.18)
High-risk (528)	13 (0.02)	**515 (0.98)**	0	357 (0.68)	169 (**0.32**)	2 (0.04)	High-risk (1084)	895 (0.83)	172 (**0.16**)	17 (0.02)
High-starters (131)	48 (0.37)	13 (0.10)	**70 (0.53)**	55 (0.42)	0	76 (**0.58**)	High-starters (164)	81 (0.49)	0	83 (**0.51**)
	Stayers (54%) Movers (46%)			Stayers (69%) Movers (31%)				Stayers (34%) Movers (66%)		

Discussion

- The 2-class model represented the grade 4 data the best (low-risk and high-risk), however, it did not capture the students at-risk for RD.
- Although the 4-class model for grade 4 was not statistically significant, it captured the students at-risk for RD.
- Results from this study, especially regarding to the grade 4 results, and an over-identification of the students at-risk in grade 3 (68%) may be an empirical artifact.
- Nonetheless, this may suggest that differentiating typically developing readers from struggling readers using ORF becomes more challenging in upper elementary grades (Boscardin et al., 2008; Catts et al., 2012).

Limitations and Future Directions

- More investigations of long-term fluency development are necessary based on more representative samples to better understand ORF growth and to enhance identification of students at-risk (Speece, 2005).
- Although findings from this study are limited for generalization, students' ORF growth patterns are heterogeneous, which supports the use of LTA and/or GMM.
- More replications employing similar modeling techniques using other ORF measures should be conducted.
- Future studies should explore the effects of student backgrounds (e.g. ELL, SPED) on students' long-term ORF growth.
- Lastly, using other CBM reading measures such as vocabulary and/or comprehension in addition to ORF should be considered when conducting LCA or GMM for identification.

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For More Information

http://brt.uoregon.edu

http://easyCBM.com

Note: Funds for this data set used to generate this report come from a federal grant awarded to the UO from the U.S. Department of Education, Institute for Education Sciences: Reliability and Validity Evidence for Progress Measures in Reading. U.S. Depart

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