
Testing the importance of individual growth curves in predicting performance on a high-stakes reading comprehension test in Florida

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Key findings

To what extent does individual student change (growth) over the academic year statistically explain why students differ in end-of-year performance after accounting for performance on interim assessments? The four growth estimates examined in this report (simple difference, average difference, ordinary least squares, and empirical Bayes) all contributed significantly to predicting performance on the end-of-year criterion-referenced reading test when performance on the initial (fall) interim assessment was used as a covariate. The simple difference growth estimate was the best predictor when controlling for mid-year (winter) status, and all but the simple difference estimate contributed significantly when controlling for final (spring) status. Quantile regression suggested that the relations between growth and the outcome were conditional on the outcome, implying that traditional linear regression analyses could mask the predictive relations.

REL 2014–006

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January 2014

This report was prepared for the Institute of Education Sciences (IES) under Contract ED-IES-12-C-0011 by Regional Educational Laboratory Southeast administered by Florida Center for Reading Research, Florida State University. The content of the publication does not necessarily reflect the views or policies of IES or the U.S. Department of Education nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government.

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Petscher, Y., Kershaw, S., Koon, S., & Foorman, B. R. (2014). *Testing the importance of individual growth curves in predicting performance on a high-stakes reading comprehension test in Florida* (REL 2014–006). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Southeast. Retrieved from <http://ies.ed.gov/ncee/edlabs>.

This report is available on the Regional Educational Laboratory website at <http://ies.ed.gov/ncee/edlabs>.

Summary

Districts and schools use progress monitoring to assess student progress, to identify students who fail to respond to intervention, and to further adapt instruction to student needs. Researchers and practitioners often use progress monitoring data to estimate student achievement growth (slope) and evaluate changes in performance over time for individual students and groups of students.

The literature reports mixed findings on whether measuring individual student change over time on an interim progress monitoring assessment adds value to understanding student differences in future performance on an assessment. Specifically, to what extent does change over the academic year statistically explain why students differ in end-of-year performance after accounting for performance at the fall, winter, or spring assessment period (status variable). Some studies suggest that individual growth during the year does statistically predict variable differences in future performance on an assessment (Kim, Petscher, Schatschneider, & Foorman, 2010). Others find no contribution beyond that predicted by performance on an interim assessment (Schatschneider, Wagner, & Crawford, 2008; Yeo, Farrington, & Christ, 2012).

Monitoring student progress is central to accountability systems in general and is useful for measuring how well students respond to instruction or intervention. Progress monitoring entails tracking individual growth across the academic year. Thus, it is important to understand why individual students differ on an outcome beyond what can be known by accounting for performance on a status assessment.

This study examines the relations among descriptive measures of growth (simple difference and average difference) and inferential measures (ordinary least squares and empirical Bayes) for students in grades 3–10 and considers how well such measures statistically explain differences in end-of-year reading comprehension after controlling for student performance on a mid-year status assessment. The study also looks at how the results change when controlling for initial (fall) and final (spring) status and when the relations among individual growth curves, status, and end-of-year reading comprehension performance depend on end-of-year reading comprehension performance.

Using archival data for 2009/10, the study analyzes a stratified random sample of 800,000 Florida students in grades 3–10: their fall, winter, and spring reading comprehension scores on the Florida Assessments for Instruction in Reading (FAIR) and their reading comprehension scores on the 2010 end-of-year state accountability assessment, the Florida Comprehensive Assessment Test (FCAT). Student differences in reading comprehension performance were explained by the four growth estimates (measured by the coefficient of determination, R^2) and differed by status variable used (performance on the fall, winter, or spring FAIR reading comprehension screen).

All four growth estimates significantly contributed to the prediction of FCAT performance when controlling for fall status, as did all but the simple difference estimate when controlling for spring status. But only the simple difference score was a good predictor when controlling for winter status. Quantile regression suggested that the relations between growth estimates and FCAT performance were conditional on the FCAT, implying that traditional linear regression analyses could mask the predictive relations.

References

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