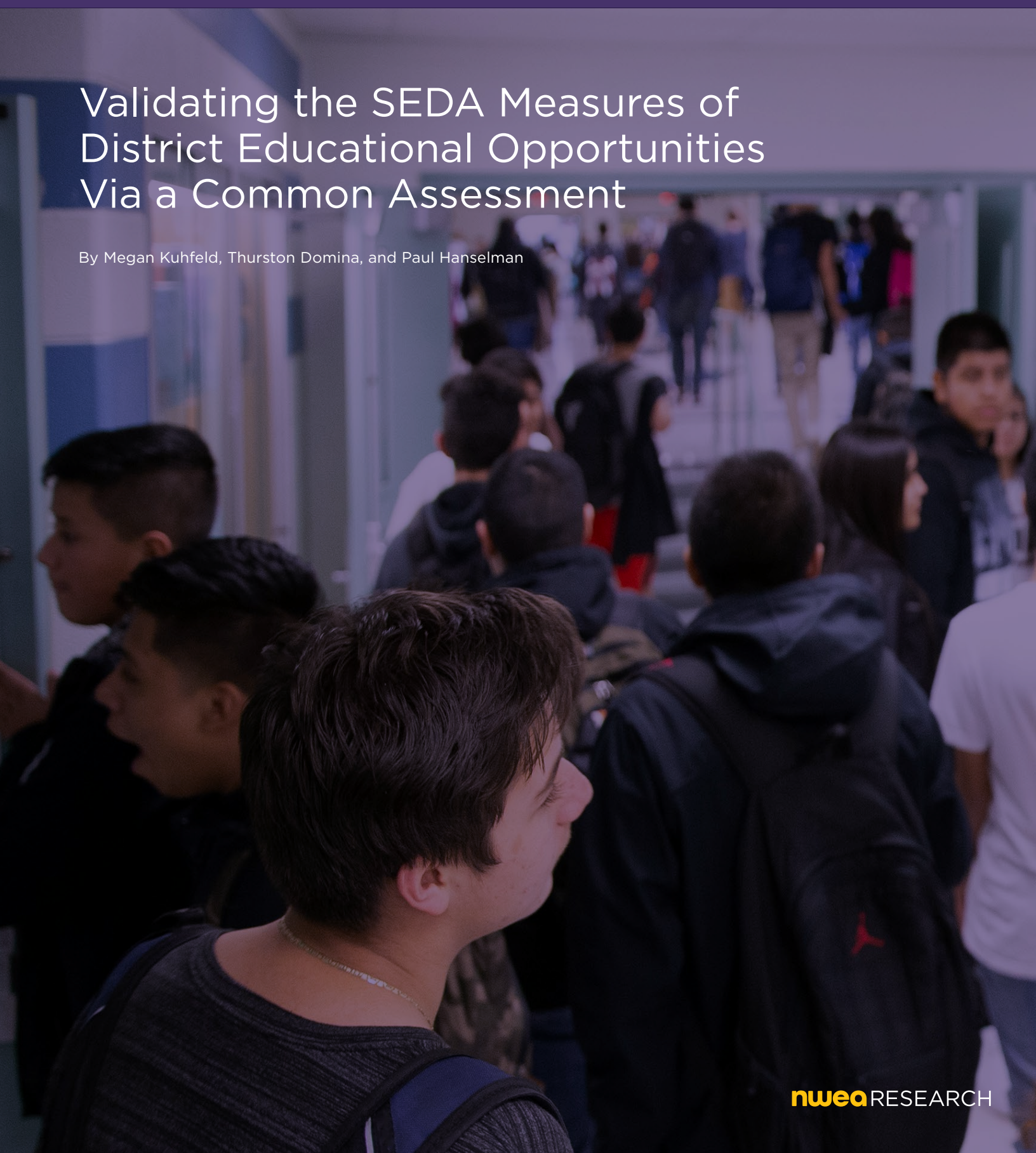
COLLABORATIVE FOR STUDENT GROWTH

BRIEF

Validating the SEDA Measures of District Educational Opportunities Via a Common Assessment

By Megan Kuhfeld, Thurston Domina, and Paul Hanselman



nwea RESEARCH

KEY FINDINGS

- **SEDA reflects the variation in achievement and growth across districts with a high degree of reliability.** Correlations between the SEDA and MAP® Growth™ grade-level estimates of district achievement were high (.85 to .92), supporting previous work validating SEDA achievement estimates and their use in analyzing variation in district-level academic performance across the country. Correlations between growth estimates from SEDA and MAP Growth were also strong (.90 in math and .82 in English Language Arts (ELA).
- **However, small but systematic discrepancies imply that the SEDA growth estimates are less likely to generalize to estimates from MAP Growth in some contexts.** In English Language Arts, districts with higher socioeconomic status tended to have higher scores on MAP Growth than SEDA, raising the possibility that SEDA may provide more optimistic estimates of ELA achievement growth in the most economically disadvantaged districts than would be obtained on other assessments. The alignment of growth estimates was lower in some states than others, implying the discrepancies in the growth estimates are not random and may be related to local context.

The Stanford Educational Data Archive (SEDA) is the first dataset to allow district-level comparisons of the academic achievement and growth of students across the United States, shining light on educational opportunities in our country. Recent research using SEDA data draws attention to the remarkable degree of variation in student achievement and academic growth across public schools[i], the magnitude of racial and gender achievement gaps, and other important issues.

SEDA provides estimates of average student achievement and growth, at the district level, in mathematics and English Language Arts (ELA) for students in third through eighth grade. Its data also allow estimation of achievement and growth inequalities within districts, since estimates are computed separately for different student subgroups.

SEDA district estimates are based on a vast amount of data: roughly 300 million state accountability test scores in math and ELA from 2009–2015, from students in over 10,000 districts, representing every public school district in the United States. SEDA data are based on district-level reports of the proportion of students who performed at various proficiency levels on achievement tests that states administer as part of state and federal accountability policy. As such, SEDA's district mean estimates represent a significant interpolation of coarse proficiency counts collected via different tests with different cut scores across states and years.

Third grade district average achievement estimates represent educational opportunities available in a community prior to age 9. Growth rates reflect educational opportunities available to children in middle childhood.

To create a unified data set that can be compared across states, SEDA harmonizes these scores to create achievement and growth estimates on a standardized scale through a series of steps.

1. SEDA estimates district means and standard deviations on a continuous within-state scale from coarsened proficiency count data.
2. SEDA next rescales these state-specific estimates for national comparison. Since state accountability tests differ in content, difficulty, and scale, SEDA uses data from the National Assessment of Educational Progress (NAEP), administered to students in grades 4 and 8 across the U.S, to rescale district means to facilitate cross-state comparison.
3. SEDA then transforms scores from the NAEP scale to more readily interpretable grade-equivalent units and standardized scores.
4. SEDA produces growth estimates using a hierarchical linear modeling approach.

Inevitably, then, SEDA's standardized estimates are based on potentially important assumptions about the cross-state comparability of academic growth.

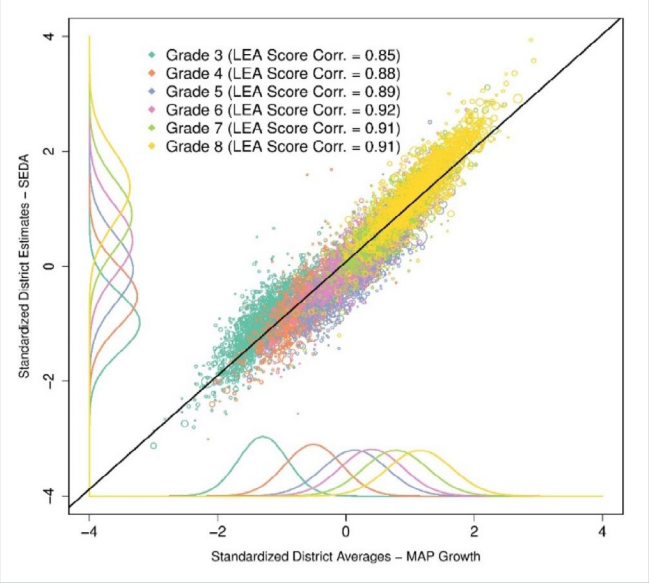
Because the questions that researchers, policymakers, educators, and parents seek to answer about student educational opportunities with these data are so important, it is essential to ensure that SEDA's district estimates accurately reflect variation across districts. This study used an alternative source of national testing data—scores from NWEA® assessment, MAP® Growth™—as a validation check for the SEDA estimates. Because MAP Growth assessments are administered in a consistent format and with a common scale to approximately 20 percent of US public school third- to eighth-graders, it is possible to estimate achievement levels and compare growth estimates between SEDA and MAP Growth participating districts.

By examining data from approximately 1,000 public school districts in which all or nearly all students take both state accountability and MAP Growth assessments, we addressed two questions:

- Do SEDA estimates of achievement growth correspond to those produced using MAP Growth?
- If there are discrepancies, which district characteristics explain the lack of agreement?

SEDA reliably reflects the variation in student achievement in districts across the country

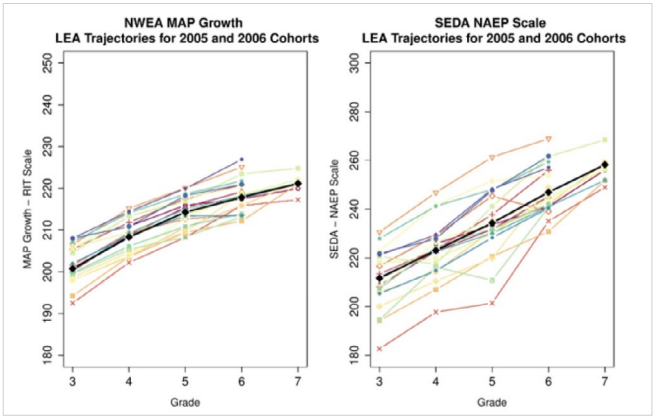
The results showed that correlations between the SEDA and MAP Growth grade-level estimates of mean district achievement were high, ranging from .85 to .92. This supports previous work[ii] validating SEDA's achievement estimates and their use in analyzing variation in district-level academic performance across the country.



Comparison of SEDA and MAP Growth district mean score distributions in mathematics by grade shows a strong correlation between estimates using the two assessments. See paper for similar plot of ELA.

Differences in patterns of score distributions reflect different assumptions about student growth trajectories

Analyses revealed some differences in the patterns of score distributions by grade, both in mean score distributions and in terms of individual district's score trajectories.



Comparison of district ELA score trajectories for MAP Growth (left) and SEDA (right) for a randomly selected set of 20 districts. The black line represents the average trajectory of the cohorts, while colored lines represent individual district trajectories. Note that scales differ for the two (RIT scale for MAP Growth; NAEP scale for SEDA).

District score trajectories showed linear growth for SEDA achievement estimates from grades 3 to 8, but showed growth leveling off by the end of elementary school on the MAP Growth scale. Because SEDA uses a linear interpolation to scale student scores in grades for which NAEP data are not available, its estimates suggest that, on average, students make similarly-sized achievement gains each year between grades 3 and 8. In contrast, MAP Growth has a vertical scale that spans these grades, so grade-to-grade differences are directly observed rather than interpolated. Analyses using MAP Growth and other vertically-scaled assessments suggest that, on average, student growth rates slow in upper elementary and middle school.

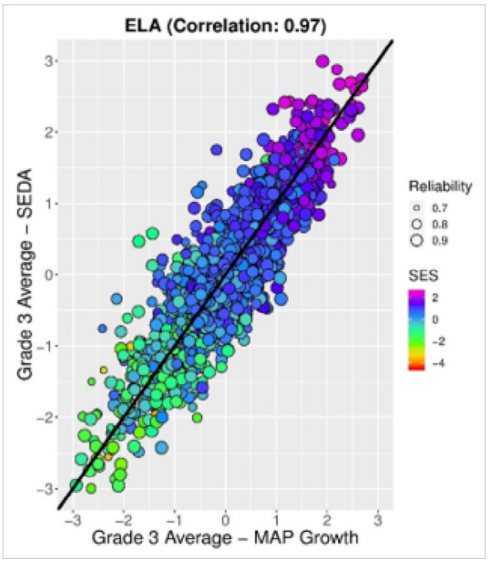
Comparison of the score trajectories using the two assessments also showed other noteworthy differences. Some districts showed gains followed by losses or temporary flattening on the SEDA scale, but moderate but consistent gains on MAP Growth scale for the same districts. It was not clear if these fluctuations in year-to-year growth reflected true variability in growth on state assessments in these districts, or if they were, at least in part, an artifact of the linear cross-grade scale interpolation.

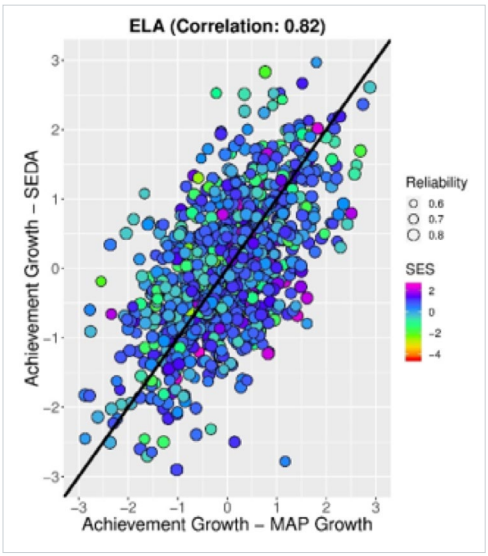
SEDA generally shows variation in growth across districts with a high degree of reliability, but reflects small, systematic discrepancies

The results showed a very high degree of alignment between SEDA and MAP Growth in third grade achievement estimates (0.98 in math; 0.97 in ELA). As previous research[iii] demonstrates, achievement estimates in third grade and socioeconomic status (SES) are strongly related: more affluent districts mostly clustered at the upper end of the grade 3 score distribution for both SEDA and MAP Growth.

However, SEDA and MAP Growth estimates of achievement growth during the elementary and middle school years did not align quite as neatly. The correlations between grade 3 to 8 growth estimates of the two scales were still strong (.90 in math and .82 in ELA), but there were also some discrepancies. Approximately three percent of districts were within one standard deviation of the mean on one scale but more than two standard deviations above or below the mean on the other scale.

Additional analyses showed that these differences were not random. Rather, discrepancies between the SEDA and MAP Growth estimates of grade 3 to 8 growth were more problematic in some types of districts and some states. In ELA, SEDA data appeared to modestly under-estimate the amount of achievement growth in high-SES districts and over-estimate the degree of achievement growth in low-SES districts. The correspondence between the growth estimates was lower in some states than others, implying the errors in the growth estimates were not random.





The relationship between the SEDA and MAP Growth estimates of grade 3 ELA achievement (top) and SEDA and MAP Growth estimates of ELA achievement growth between third and eighth grades. Estimates shown are reported in a standardized metric. Bubble size corresponds to the reliability of the estimates and the color coding shows the district socioeconomic status level.

i Fahle, E. & Reardon, S.F. (2018). *How much do test scores vary among school districts? New estimates using population data, 2009–2015.* Educational Researcher, 47(4), 221–234, https://doi.org/10.3102/0013189X18759524.

ii Reardon, S.F., Kalogrides, D., & Ho, A. (2018). *Validation methods for aggregate-level test scale linking: A case study mapping school district test score distributions to a common scale.* (CEPA Working Paper No.16-09). Retrieved from Stanford Center for Education Policy Analysis: https://cepa.stanford.edu/sites/default/files/wp16-09-v201807.pdf.

iii Reardon, S.F. (2018). *Educational opportunity in early and middle childhood: Variation by place and age.* Retrieved from Stanford Center for Education Policy Analysis: https://cepa.stanford.edu/content/educational-opportunity-early-and-middle-childhood-variation-place-and-age.

RECOMMENDATIONS

SEDA provides a unique measure of educational opportunity. Consider including additional data from a vertically-scaled assessments when studying questions about grade-specific growth patterns.

The findings of this study, together with previous research, suggest that researchers should have strong confidence in the validity of the SEDA estimates of third grade achievement levels in US public school districts.

The results also show that SEDA scores effectively distinguish between high- and low-achieving districts in subsequent grades, but that the linear growth interpolation it uses may lead to different conclusions about typical patterns of grade-to-grade achievement growth than those drawn from vertically-scaled assessments. This limitation is likely not consequential for most SEDA users, though it may limit the data's potential to address issues around middle school transition or other grade-specific achievement trajectories. In such cases, additional data from vertically-scaled assessments, like MAP Growth, may be useful, since these assessments are specifically designed to measure academic growth on a consistent scale across grades and settings, and require fewer assumptions than SEDA.

Be aware that, in some cases, using SEDA growth estimates may lead to different conclusions about growth in a district than would be made using another assessment.

While SEDA's growth estimates show similar patterns of grade 3 to 8 growth as in MAP Growth, a small percentage of low-growth districts in SEDA would be identified as high-growth based on the MAP Growth assessment, and vice versa. These discrepancies are related to observable district characteristics, particularly in ELA, where the SEDA data appear to modestly under-estimate the amount of achievement growth in high-SES districts and over-estimate the degree of achievement growth in low-SES districts. While these discrepancies do not appear to be large enough to invalidate the SEDA for most purposes, they do raise cautions about the generalizability of the SEDA growth estimates for inferences about learning opportunities in middle childhood in some settings.

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ABOUT THE
COLLABORATIVE FOR STUDENT GROWTH

The Collaborative for Student Growth at NWEA® is devoted to transforming education research through advancements in assessment, growth measurement, and the availability of longitudinal data. The work of our researchers spans a range of educational measurement and policy issues including achievement gaps, assessment engagement, social-emotional learning, and innovations in how we measure student learning. Core to our mission is partnering with researchers from universities, think tanks, grant-funding agencies, and other stakeholders to expand the insights drawn from our student growth database—one of the most extensive in the world.

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