

# Can We Measure Classroom Supports for Social-Emotional Learning?

Robert Meyer  
Libby Pier  
Jordan Mader  
Michal Christian  
Andrew Rice  
Susanna Loeb  
Hans Fricke  
Heather Hough



**T**his brief applies value-added models to student surveys in the CORE Districts to explore whether social-emotional learning (SEL) surveys can be used to measure effective classroom-level supports for SEL. The authors find that classrooms differ in their effect on students' growth in self-reported SEL—even after accounting for school-level effects. Results suggest that classroom-level effects within schools may be larger than school-level effects. However, the low explanatory power of the SEL models means it is unclear that these are causal effects that have appropriately controlled for student-level characteristics. Finally, there are generally low correlations between classroom-level growth in SEL and classroom-level growth in English language arts (ELA) or math, suggesting the SEL measures may capture growth not measured by academic test scores. Although results are preliminary, they indicate there might be measurable student growth in SEL impacted by the environment of classrooms within schools.

**October 2019**

---

## Introduction

There is increasing recognition among educators, researchers, policymakers, and the broader public that students' social-emotional learning (SEL) is a critical component of success for both academic and life outcomes,<sup>1</sup> and that schools can support students' SEL through practices that improve schools' culture and climate.<sup>2</sup> Research also shows that classroom teachers, in particular, can play a critical role in establishing classroom and school environments that contribute to students' social and emotional development.<sup>3,4,5</sup>

The increasing attention on educators' impacts on students' SEL is evident in the 2015 Every Student Succeeds Act (ESSA), which requires that states measure at least one indicator of school quality or student success related to non-cognitive outcomes, such as measures of student engagement or school climate and safety. Similarly, in California, the Local Control Funding Formula (LCFF) and the related Local Control Accountability Plan (LCAP) process require districts to develop and report local measures of school culture and climate, such as surveys of students, parents, and teachers.<sup>6</sup>

The growing interest—both in California and nationwide—in using student surveys to measure student progress and school quality raises an important question about whether such surveys can reliably distinguish the impacts that different educators and schools can have on non-cognitive dimensions of success. Much in the same way that many states and districts have prioritized assessing student growth in academic achievement—rather than merely assessing student proficiency or other measures of attainment—measuring student growth in non-cognitive skills might also be more informative and equitable than relying on attainment alone. Such growth measures could then serve to highlight effective classroom supports that are successfully moving the needle to improve students' social-emotional development.

In this brief, based on a longer working paper,<sup>7</sup> we aim to build upon previous research showing that teachers have the potential to influence students' non-cognitive skills<sup>8</sup> by examining whether student growth in self-reported SEL differs among classrooms within a school. We also extend our own prior work<sup>9,10</sup> examining how much of students' growth in SEL from one year to the next can be attributed to the school a student attends. In this brief, we use survey response data from more than 40,000 fifth-grade students across five large districts in California to estimate value-added models for four SEL constructs. We assess the predictive power of these models, compare the results of the models to value-added models for math and English language arts (ELA), and examine whether classrooms that have large impacts on students' SEL also have large impacts on students' academic growth.

There are five key findings from this work:

1. A greater proportion of the variation in students' self-reported SEL is explained across classrooms within a given school than across different schools, although most of the variability in SEL outcomes is explained at the individual student level
2. Classrooms in our sample serve students with different starting points in SEL within schools, which suggests it is important to control for those differences in order to measure the impact of classrooms on students' SEL over the course of a school year
3. We can estimate classroom-level growth models to control for different starting points in students' SEL, but these models have less predictive power than similar models of academic achievement and, as a result, they may not control for students' starting points as well
4. The variance of classroom-level impacts on students' SEL outcomes extracted from these growth models is similar in magnitude to impacts on students' math and ELA outcomes, but it is a smaller proportion of the total variance to explain compared to math or ELA
5. Classrooms that have a large impact on students' growth in math and ELA are not necessarily the same classrooms that have a large impact on their growth in SEL (or vice versa)

## Measuring SEL in the CORE Districts

We use data from California's CORE Districts, a consortium of eight school districts collectively serving more than one million students attending roughly 1,500 schools. The *CORE Districts* administer a survey of students' SEL each spring to students in grades four through 12. Students are asked to self-report their responses on a five-point Likert scale to items assessing four SEL domains: growth mindset, self-efficacy, self-management, and social awareness. The surveys include between four and nine items for each of the four constructs, for a total of 25 items on the survey.

The *CORE Districts* describe the four SEL domains as follows:<sup>11</sup>

- Growth mindset is the belief that one's abilities can grow with effort. Students with a growth mindset see effort as necessary for success, embrace challenges, learn from constructive criticism, and persist in the face of setbacks
- Self-efficacy is the belief in one's own ability to succeed in achieving an

outcome or reaching a goal. Self-efficacy reflects confidence in the ability to exert control over one's motivation, behavior, and environment

- Self-management is the ability to effectively regulate one's emotions, thoughts, and behaviors in different situations. This includes managing stress, delaying gratification, motivating oneself, and setting and working toward personal and academic goals
- Social awareness is the ability to take the perspective of and empathize with others from diverse backgrounds and cultures, to understand social and ethical norms for behavior, and to recognize family, school, and community resources

In order to use the SEL survey to measure students' growth in SEL from one year to the next, we transform students' raw responses into scale scores estimated from a generalized partial credit model (GPCM),<sup>12</sup> a step we describe more fully in other work.<sup>13</sup>

## The Development of an SEL Classroom Growth Model

The sample in this brief includes approximately 44,000 fifth-grade students in 3,622 classrooms at 724 schools that are located in five participating CORE districts. We focus on students in fifth grade because these students are frequently in self-contained classrooms, and we limit our analysis dataset to those fifth-grade students who are linked to one and only one teacher for instruction in all observed subjects. Our classroom-level growth models use data from the survey administered to fourth graders in 2015-16 as the pretest measure of students' SEL, and data from the survey administered to those same students as fifth graders in 2016-17 as the posttest measure of students' SEL. In addition to the student SEL survey data, we use data from the Smarter Balanced Assessment Consortium (SBAC) math and ELA assessments from the spring of 2015-16 and of 2016-17, which enables us to compare students' growth in SEL to their growth in math and ELA achievement.

We first examined whether there are differences in students' SEL outcomes (i.e., 2016-17 survey responses), as well as in their prior levels of SEL (i.e., 2015-16 survey responses), and whether those differences are attributable to classrooms specifically, rather than schools more generally. To do so, we decompose the variance explained in the SEL posttest (2016-17) and in the SEL pretest (2015-16) at three levels: across-schools, across-classrooms-within-schools, and within-classrooms. This allows us to estimate the amount of variability in students' SEL due to the school the student attends, the classroom the student is in, and additional unexplained student-level variance, respectively.

We next applied a value-added model framework to construct classroom-level

growth measures of students' SEL in order to assess whether there are differences in students' growth in SEL from 2016 to 2017 that can be attributed to the classroom a student is in. We also estimated these models with outcome measures of ELA and math. To do so, we estimated six separate models that each predicted one outcome (i.e., the student's scale score for math, for ELA, or for one of the four SEL constructs) using measures of all six scale scores in the prior year, along with student demographic characteristics (English language learner status, disability status, economic disadvantage, homelessness, foster care, and race/ethnicity) and a fixed effect for the classroom the student was assigned to. We estimated this regression using an errors-in-variables (EIV) method<sup>14</sup> that accounts for measurement error in the prior-year assessment measures. We used estimates of Cronbach's alpha for lagged SEL constructs, and conditional standard errors of measurement for SBAC scores.

To gauge the magnitude of the estimated classroom-level impacts on students' SEL, we applied the variance decomposition approach to a student-level measure of growth estimated in the value-added regression, so that we could separately investigate the contributions of school and classroom effects to students' growth in SEL. Finally, we computed correlations among the classroom effects estimated from the six value-added models in order to examine whether classrooms where students show high growth in the four SEL constructs also show high growth in academic outcomes.

## Findings

**Finding 1. A greater proportion of the variation in students' self-reported SEL outcomes is explained across classrooms within a school than across different schools, although most of the variability is explained at the student level.**

Table 1 presents a decomposition of the variance in the posttest, showing the share of variance explained at three different levels: (1) across schools, (2) across classrooms within schools, and (3) within classrooms (i.e., across students within classrooms). We can see in Table 1 that the magnitude of the differences across-classroom-within-school is larger for each outcome (0.37 for math, 0.38 for ELA, 0.14 for growth mindset, 0.04 for self-efficacy, 0.05 for self-management, and 0.05 for social awareness) than the magnitude of differences across-school (respectively, 0.12, 0.09, 0.06, 0.03, 0.02, and 0.03). However, the proportion of the variance that is due to across-classroom-within-school differences is much smaller in SEL than in math or ELA. Conversely, the proportion of the variance that is due to within-classroom (i.e., across-student) differences is larger in SEL than in math or ELA. Among the SEL constructs, growth mindset stands out as having comparatively large across-classroom-within-school differences. Taken together, these results suggest that (1)

a greater proportion of variance is explained at the across-classroom-within-school level than the across-school level for each outcome, (2) we are more likely to see a very wide range of SEL outcomes within classrooms (i.e., across students) in a given school than we are to see a very wide range of math or ELA outcomes, and (3) growth mindset has a higher proportion of variance explained at the across-classroom-within-school level than the other SEL constructs.

**Table 1.** Variance Decomposition of Grade 5 Models: Proportion of Variance of Posttest as Outcome

Outcome	Across-School	Across-Classroom-Within-School	Within-Classroom
Math	0.12	0.37	0.51
ELA	0.09	0.38	0.53
Growth Mindset	0.06	0.14	0.80
Self-Efficacy	0.03	0.04	0.93
Self-Management	0.02	0.05	0.93
Social Awareness	0.03	0.05	0.92

**Finding 2. Classrooms in our sample serve students with different starting points in SEL within schools, which suggests it is important to control for those differences in order to measure the impact of classrooms on students’ SEL over the course of a school year**

We repeated the same variance decomposition analysis for the scale scores of students from the prior year (regardless of their prior school or classroom) in order to quantify differences in students’ “starting points”—in other words, to examine whether students in some classrooms have higher prior SEL than students in other classrooms at the beginning of the school year. If they do, then we would need to take those differing starting points into account in order to assess how much students in a given classroom are growing or improving over the course of the school year.

**Table 2.** Variance Decomposition of Grade 5 Models: Proportion of Variance of Pretest as Outcome

Outcome	Across-School	Across-Classroom- Within-School	Within-Classroom
Math	0.13	0.37	0.51
ELA	0.12	0.35	0.53
Growth Mindset	0.08	0.09	0.83
Self-Efficacy	0.03	0.06	0.91
Self-Management	0.04	0.07	0.89
Social Awareness	0.03	0.03	0.94

As Table 2 shows, there are similar proportions of variance explained at each of the three levels in the pretest as there is in the posttest (see Table 1). This suggests there are differences in students' prior SEL and prior academic achievement at both the school and classroom levels. Prior work (e.g., Fricke et al., 2019; Loeb et al., 2019), which measured the variance of prior academic and SEL outcomes across schools, already established that different schools serve students with different prior math and ELA achievement and, to a lesser degree, with different prior SEL. Table 2 extends this prior work and draws a similar conclusion with regard to across-classroom-within-school variance: classrooms within the schools in our sample are serving students with different starting points in math and ELA achievement and, to a lesser degree, in SEL. This motivates the need to take these differing starting points into account when measuring how much of an impact a student's classroom has on their growth in SEL over the course of a school year.

**Finding 3. We can estimate classroom-level growth models to control for different starting points in students' SEL, but these models have less predictive power than similar models of academic achievement, and as a result, may not control for starting points as well**

Given that students differ in terms of their prior year SEL within classrooms, we estimated a value-added model using the same specification described in Loeb et al. (2018) and Fricke et al. (2019), except that we have included fixed effects for classrooms, rather than for schools. As Table 3 shows, we found that the goodness-of-fit (as measured by within-classroom  $R^2$ , a version of  $R^2$  computed using only within-classroom variance in the outcome and prediction) is quite low for the SEL models compared to the math and ELA models. This indicates that the SEL models have lower predictive power, which suggests (though does not conclusively determine) that the value-added model may not be controlling for all relevant differences in student characteristics. An alternative possibility is that the errors in measuring SEL are larger than what is implied by the method

used to measure response error (Cronbach’s alpha). This presents a challenge for the interpretation of the classroom effects from the SEL models, and thus warrants general caution against overinterpreting the results from these models.

**Table 3.** Goodness-of-Fit for Grade 5 Classroom Growth Models

Outcome	Within-Classroom $r^2$
Math	0.70
ELA	0.68
Growth Mindset	0.19
Self-Efficacy	0.20
Self-Management	0.24
Social Awareness	0.16

**Finding 4.** The variance of classroom-level impacts on students’ SEL outcomes appears similar in magnitude to impacts on students’ math and ELA outcomes, but it is a smaller proportion of the total variance of student growth compared to math or ELA

In order to assess how much of this impact comes from classrooms specifically, rather than schools more generally, we used the same variance decomposition framework described earlier (see Finding 1 and Finding 2), but this time applied to the student-level residuals extracted from the value-added model—in other words, applied to growth in each outcome rather than to the pretest or the posttest of the outcome. These residuals include both the classroom value-added effect as well as the student-level residual from the value-added regression in order to measure the total part of the outcome that cannot be explained with prior outcomes or demographics. Table 4 displays the results from this analysis; the sum of the variances in each row of the table (shown in the column furthest to the right) is the total variance of the residuals in the growth model. Due to the lower predictive power of the models that have SEL measures as outcomes, the variance of the residuals in the models with SEL outcomes is much higher than the variance of the residuals in the math and ELA models. In other words, outcomes are less consistent from year to year in the SEL measures than in the academic measures, so there is more student level “growth” left over to explain (this is evident in the higher variance estimates for the SEL measures than the academic measures in the “Sum” column of Table 4). As a result, the variance in student growth that is attributable to classrooms is similar in magnitude for all six outcomes as shown by the variance estimates in the third column, “Across-Classroom-Within-School;” however, the classroom-level variance is a smaller proportion of the total variance than in math or ELA, as shown by the percent in parentheses in that column.



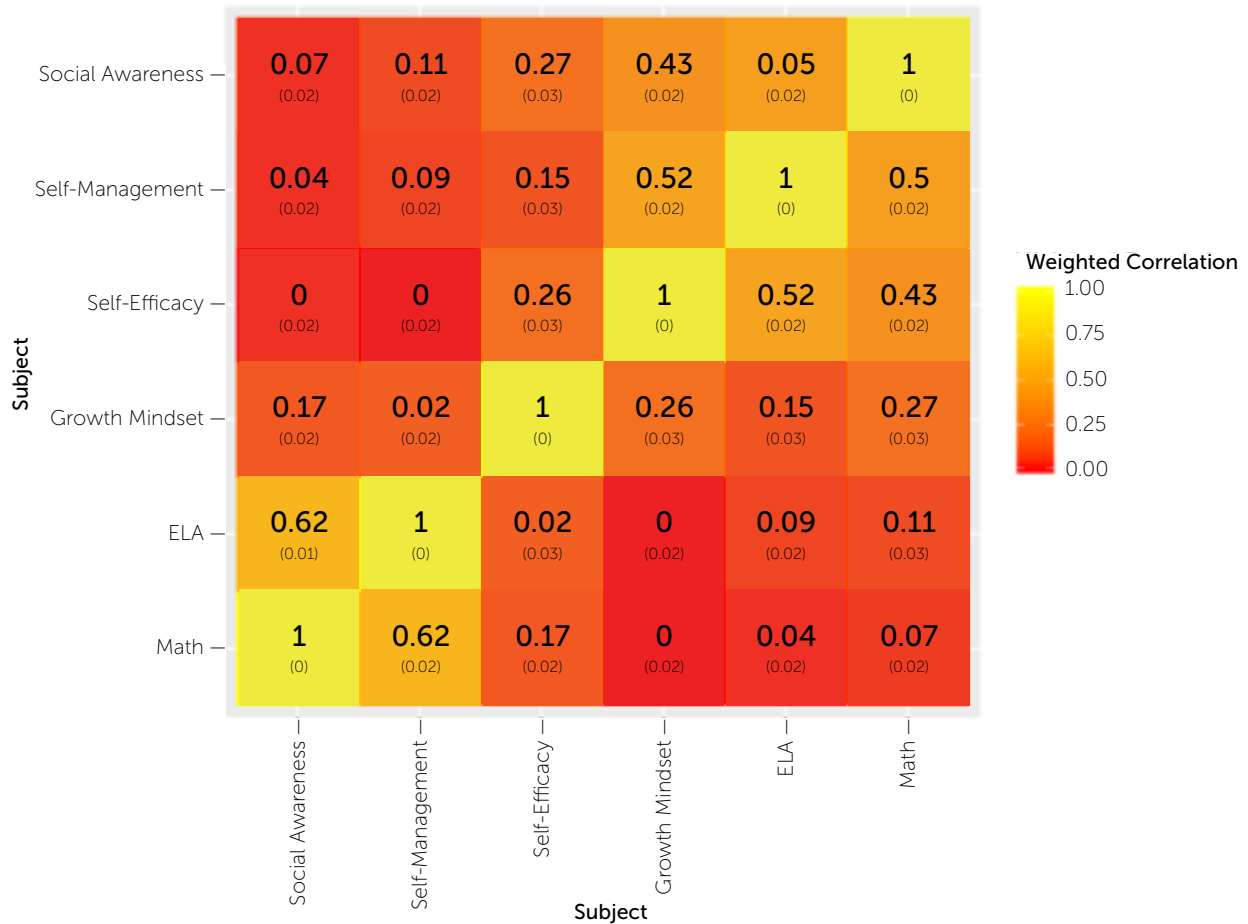
**Table 4.** Variance Decomposition of Grade 5 Classroom Growth Models: Variance (and Percent) of Growth as Outcome

Outcome	Across-School	Across-Classroom-Within-School	Within-Classroom	Sum
Math	0.02 (7%)	0.05 (17%)	0.21 (77%)	0.28 (100%)
ELA	0.01 (4%)	0.03 (10%)	0.24 (86%)	0.28 (100%)
Growth Mindset	0.02 (3%)	0.07 (9%)	0.69 (88%)	0.78 (100%)
Self-Efficacy	0.02 (2%)	0.05 (6%)	0.77 (92%)	0.84 (100%)
Self-Management	0.01 (1%)	0.04 (5%)	0.74 (94%)	0.79 (100%)
Social Awareness	0.02 (2%)	0.05 (5%)	0.82 (93%)	0.89 (100%)

**Finding 5. Classrooms that have a large impact on students' growth in math and ELA are not necessarily the same classrooms that have a large impact on their growth in SEL (or vice versa)**

We examined the associations between classroom effects on the six different outcomes to see if classrooms with impacts in some domains tend to have similar impacts on other domains. Figure 1 shows the correlation between the classroom effects for each pair of outcomes; for example, the top left box shows the correlation between classroom effects on social awareness and classroom effects on math ( $r = 0.07$ , with a standard error of 0.02). Boxes that are darker red show little to no correlation, whereas boxes that are light orange or yellow show stronger correlations. The strongest relationship is between growth in the two academic subjects, math and ELA ( $r = 0.62$ ). Growth in social awareness, self-management, and self-efficacy are all strongly related to one another as well ( $0.43 \leq r \leq 0.52$ ). Growth mindset stands apart from other SEL constructs, because it is the SEL construct most strongly correlated with math and ELA, and is the most weakly correlated with the other three SEL constructs. These results indicate that classrooms having a large impact on students' growth in math and ELA are not necessarily the same classrooms that have a large impact on their growth in SEL (or vice versa). In addition, there are some classrooms that have a large impact on students' growth mindset that also have an impact on students' academic achievement; however, as we discuss in the longer working paper, this may be an artifact of the poorer psychometric properties of the growth mindset construct compared to the other SEL constructs.

**Figure 1.** Weighted Correlations Among Classroom Effects on Each Outcome)



## Conclusion and Implications

This brief summarizes five key findings emerging from our preliminary analysis of whether classroom-level value-added models can measure classroom impacts on students’ self-reported SEL. Using the same approach that has been used to estimate school-level impacts on SEL (Fricke et al., 2019; Loeb et al., 2019), we find that classrooms differ with respect to their end-of-year self-reported SEL, their prior-year self-reported SEL, and their growth in SEL—even after accounting for school-level impacts. Although classroom effects are similar in magnitude among the four SEL outcomes measured (growth mindset, self-efficacy, self-management, and social awareness) and the academic outcomes (math and ELA), the classroom effects for SEL are proportionally smaller relative to the classroom effects for academics. In addition, the lower explanatory power ( $R^2$ ) of the SEL models relative to the academic models means it is less clear that these are causal effects that have appropriately controlled for student-level characteristics. Although we recommend interpreting the results presented here with caution given the lower  $R^2$  of the SEL models, these results nonetheless indicate there might be measurable student growth in SEL that is impacted in some way by the environment of the classroom and the school.

As conversations around appropriate and valid uses of measures of students' SEL continue, this brief aims to provide some preliminary evidence as to whether we can reliably measure classroom-level impact on students' SEL using the CORE self-report SEL surveys. In doing so, we aim to contribute to the growing body of knowledge about appropriate and innovative uses of measures of students' non-cognitive and social-emotional learning.<sup>15</sup> In addition, these results set the stage for additional research investigating how and whether classroom-level interventions and support might causally produce measurable impacts on students' SEL, which further informs how schools and districts think about programs, policies, and initiatives to improve students' SEL.

## Author Biographies

**Robert Meyer** is the CEO and President at Education Analytics.

**Libby Pier** is the Research Manager at Education Analytics.

**Jordan Mader** is the Director of Analytics Engineering at Education Analytics.

**Michal Christian** is a Research Scientist at Education Analytics.

**Andrew Rice** is the Chief Operating Officer at Education Analytics.

**Susanna Loeb** is director of the Annenberg Institute and a professor at Brown University.

**Hans Fricke** was the Director of Quantitative Research for PACE when producing this report; he is now an economist at Amazon.com, Inc.

**Heather Hough** is the Executive Director of PACE.

## Endnotes

- <sup>1</sup> Nagaoka, J., Farrington, C. A., Ehrlich, S. B., & Heath, R. D. (2015). *Foundations for young adult success: A developmental framework*. Chicago, IL: The University of Chicago Consortium on Chicago School Research. Retrieved from: <https://consortium.uchicago.edu/publications/foundations-young-adult-success-developmental-framework>
- <sup>2</sup> McCormick, M. P., Cappella, E., O'Connor, E. E., & McClowry, S. G. (2015). Context matters for social-emotional learning: Examining variation in program impact by dimensions of school climate. *American Journal of Community Psychology*, 56(1-2), 101-119. doi: 10.1007/s10464-015-9733-z.
- <sup>3</sup> Blazar, D., & Kraft, M. A. (2017). Teacher and teaching effects on students' attitudes and behaviors. *Educational Evaluation and Policy Analysis*, 39(1), 146-170. doi: 10.3102/0162373716670260
- <sup>4</sup> Kraft, M. A. (2017). Teacher effects on complex cognitive skills and social-emotional competencies. *Journal of Human Resources*, 54(1), 1-36. doi: 10.3368/jhr.54.1.0916.8265R3
- <sup>5</sup> Jackson, K. (2018). What do test scores miss? The importance of teacher effects on non-test-score outcomes. *Journal of Political Economy* 126(5), 2072-2107. doi.org/10.1086/699018
- <sup>6</sup> California Department of Education. (2016). *Preparing all students for college, career, life, and leadership in the 21st century. Report prepared by the Superintendent's Advisory Task Force on Accountability and Continuous Improvement*. Sacramento, CA. Retrieved from <https://www.education.nh.gov/essa/documents/acitf-report.pdf>
- <sup>7</sup> The full working paper can be found at: <https://edpolicyinca.org/publications/can-we-measure-classroom-supports-sel>
- <sup>8</sup> Blazar & Kraft, op. cit., Jackson, op. cit.
- <sup>9</sup> Fricke, H., Loeb, S., Meyer, R. H., Rice, A. B., & Pier, L. (2019). *Stability of school contributions to student social-emotional learning gains*. Stanford, CA: Policy Analysis for California Education. <https://edpolicyinca.org/publications/stability-school-contributions-student-social-emotional-learning-gains>
- <sup>10</sup> Loeb, S., Christian, M. S., Hough, H., Meyer, R. H., Rice, A. B., & West, M. R. (2019). School differences in social-emotional learning gains: Findings from the first large-scale panel survey of students. *Journal of Educational and Behavioral Statistics*, 44(5), 507-542. doi.org/10.3102/1076998619845162
- <sup>11</sup> West, M. R., Buckley, K., Krachman, S. B., & Bookman, N. (2018). Development and implementation of student social-emotional surveys in the CORE districts. *Journal of Applied Developmental Psychology* 55, 119-129. doi.org/10.1016/j.appdev.2017.06.001
- <sup>12</sup> Muraki, E. (1992). *A Generalized Partial Credit Model: Application of an EM algorithm*. ETS Research Report 92-06. Princeton, NJ: Educational Testing Service.
- <sup>13</sup> Meyer, R., Wang, Y., & Rice, A. (2018). *Measuring students' social-emotional learning among California's CORE districts: An IRT modeling approach*. Stanford, CA: Policy Analysis for California Education. <https://edpolicyinca.org/publications/sel-measurement>
- <sup>14</sup> Fuller, W. (1987). *Measurement error models*. Hoboken, N.J.: John Wiley & Sons. <https://www.wiley.com/en-us/Measurement+Error+Models-p-9780470095713>
- <sup>15</sup> McKown, C., & Taylor, J. J. (2018). Introduction to the special issue on social-emotional assessment to guide educational practice. *Journal of Applied Developmental Psychology*, 55, 1-3. <https://www.sciencedirect.com/journal/journal-of-applied-developmental-psychology/vol/55/suppl/C>

## Policy Analysis for California Education (PACE)

Policy Analysis for California Education (PACE) is an independent, non-partisan research center led by faculty directors at Stanford University, the University of Southern California, the University of California Davis, the University of California Los Angeles, and the University of California Berkeley. PACE seeks to define and sustain a long-term strategy for comprehensive policy reform and continuous improvement in performance at all levels of California's education system, from early childhood to postsecondary education and training. PACE bridges the gap between research and policy, working with scholars from California's leading universities and with state and local policymakers to increase the impact of academic research on educational policy in California.

Founded in 1983, PACE

- Publishes policy briefs, research reports, and working papers that address key policy issues in California's education system.
- Convenes seminars and briefings that make current research accessible to policy audiences throughout California.
- Provides expert testimony on educational issues to legislative committees and other policy audiences.
- Works with local school districts and professional associations on projects aimed at supporting policy innovation, data use, and rigorous evaluation.

### Related Publications

Erin M. Fahle, Monica G. Lee, Susanna Loeb. [\*A Middle School Drop: Consistent Gender Differences in Students' Self-Efficacy\*](#). Policy Analysis for California Education. October 2019.

Hans Fricke, Susanna Loeb, Robert H. Meyer, Andrew B. Rice, Libby Pier, Heather Hough. [\*Measuring School Contributions to Growth in Social-Emotional Learning\*](#). Policy Analysis for California Education. May 2019.

Hunter Gehlbach, Heather Hough. [\*Measuring Social Emotional Learning Through Student Surveys in the CORE Districts: A Pragmatic Approach to Validity and Reliability\*](#). Policy Analysis for California Education. May 2019.

Julie A. Marsh, Susan McKibben, Heather Hough, Michelle Hall, Taylor N. Allbright, Ananya M. Matewos, Caetano Siqueira. [\*Enacting Social-Emotional Learning: Practices and Supports Employed in CORE Districts and Schools\*](#). Policy Analysis for California Education. April 2018.

Martin R. West, Libby Pier, Hans Fricke, Heather Hough, Susanna Loeb, Robert H. Meyer, Andrew B. Rice. [\*Trends in Student Social Emotional Learning: Evidence from the CORE Districts\*](#). Policy Analysis for California Education. April 2018.



Stanford Graduate School of Education  
520 Galvez Mall, CERAS 401  
Stanford, CA 94305-3001  
Phone: (650) 724-2832  
Fax: (650) 723-9931

[edpolicyinca.org](http://edpolicyinca.org)