

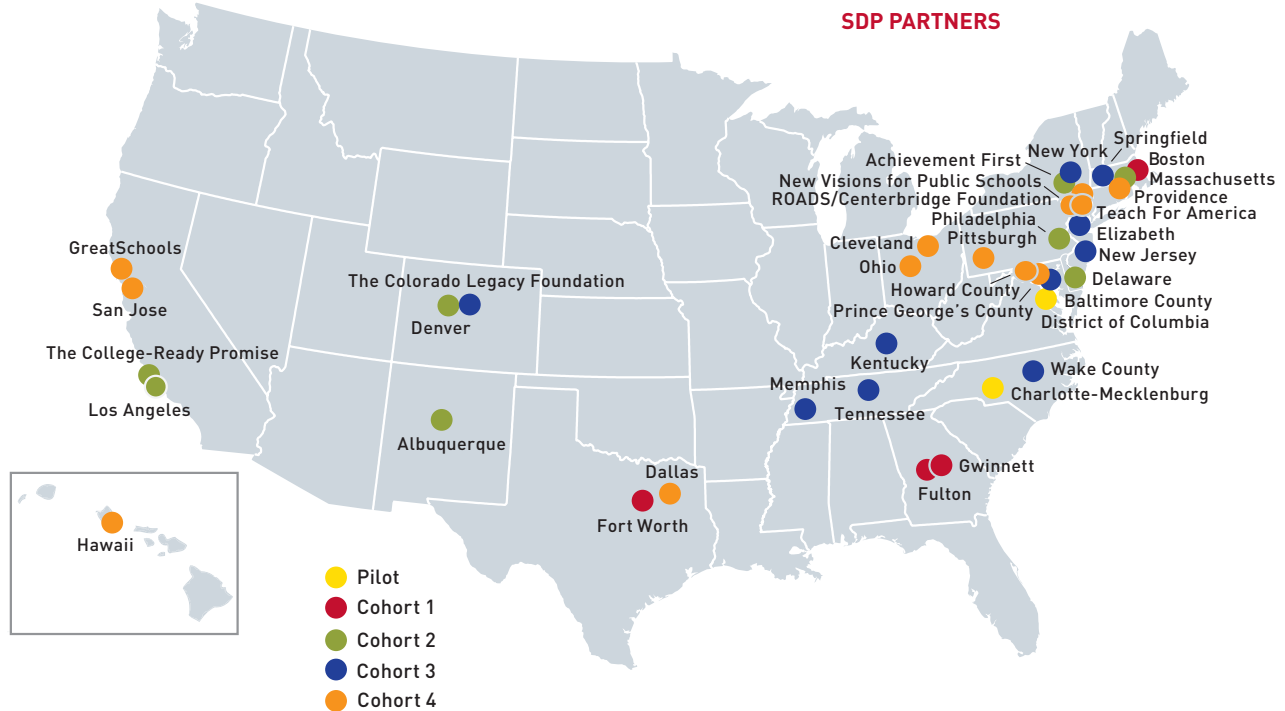
STRATEGIC **DATA** PROJECT

SDP HUMAN CAPITAL DIAGNOSTIC

Los Angeles Unified School District

November 2012





THE STRATEGIC DATA PROJECT

The Strategic Data Project (SDP), housed at the Center for Education Policy Research at Harvard University, partners with school districts, school networks, and state agencies to bring high-quality research methods and data analysis to bear on management and policy decisions.

SDP's theory of action is that if we are able to bring together the right people, the right data, and the right analysis, educational leaders can significantly improve decisions, thereby increasing student achievement.

SDP fulfills this theory of action with three primary strategies:

1. conducting rigorous "diagnostic" analysis on teacher effectiveness and college-going success using agency data,
2. placing and supporting data strategists in partner agencies, and
3. distributing our analytic results and learnings to support broad adoption of methods and data use practices throughout the education sector.

SDP was launched in June 2009 and currently partners with over thirty-five states, school districts, networks of charter schools, and nonprofit organizations. The project is supported by the Bill & Melinda Gates Foundation.

SDP HUMAN CAPITAL DIAGNOSTIC

INTRODUCTION AND BACKGROUND

Teachers play a critical role in student learning and achievement. Research has shown that a teacher's effectiveness has more impact on student achievement than any other factor controlled by school systems, including class size or the school a student attends.¹ Only recently, however, has the data become available to measure teacher effectiveness in ways that can inform education policy and practice.

To this end, we at the **Strategic Data Project** designed the human capital diagnostic as a means to:

1	better inform district leaders about the distribution of teachers within the district, and
2	identify potential focus areas in human capital management that could result in improved student achievement.

This report illuminates patterns of teacher effects in the Los Angeles Unified School District (LAUSD) and compares these patterns across a combination of teacher, school, and student characteristics.

The Human Capital Diagnostic is not an exhaustive set of analyses, nor does it contain specific recommendations for the district to implement. It is intended as a representative set of analyses that can help the district better understand its current performance and set future goals. We believe that clearly understanding where you are is a prerequisite to developing focused strategies for improvement.

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The diagnostic is also meant to demonstrate how districts can capitalize on existing data to better inform decision making. For the diagnostic, researchers connected student data, including demographics and test scores, to human resources data about certificated teachers. By doing this, researchers were able to calculate teacher effect measures for a subset of teachers. Many of the diagnostic analyses explore the relationship of these measures with characteristics of teachers, schools, and students. They are not intended to draw conclusions about the overall contribution made by any individual teacher.

These analyses were completed by members of the research team at the Center for Education Policy Research at Harvard University with the support of LAUSD staff and the LAUSD SDP Fellows.

Many of the findings included in this brief have also been completed in other SDP partner districts. Leveraging the Strategic Data Project's extensive network of partners, SDP periodically publishes comparative results, called strategic performance indicators (SPIs), with the goal of establishing a set of common human capital indicators for education systems. The SPIs can be found online at:

www.gse.harvard.edu/sdp/strategic-performance-indicators.

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THE SDP PATHWAY FOR HUMAN CAPITAL

The **SDP Pathway for Human Capital** is a framework that is used to examine teacher employment patterns from recruitment until separation.

Five key components of a teacher's career are included in this framework.

SDP HUMAN CAPITAL PATHWAY	
	The recruitment process is a district's first opportunity to secure a highly effective teaching force for its students. Understanding the pace of hiring and how new hires are allocated across the district can inform the development of recruitment strategies that maximize the district's ability to attract effective teachers.
RECRUITMENT	
	Teachers are not randomly assigned to students. Examining teacher placement patterns can identify opportunities to raise student achievement and reduce achievement gaps through a more equitable distribution of the most effective teachers across the system and within schools.
PLACEMENT	
	Teachers have long and varied careers in the profession. Along the way, many encounter opportunities to develop their teaching skills and increase their instructional effectiveness. SDP explores the extent to which methods of development commonly accessed by teachers—such as earning graduate degrees or learning from experience—are associated with gains in student achievement.
DEVELOPMENT	
	Performance evaluations that are currently in place in most districts make few distinctions among teachers. Examining the distribution and predictive power of teacher effects provides perspective for how a district can recognize and learn from especially effective teachers and target struggling teachers for additional support.
EVALUATION	
	Many urban districts lose half of their new teachers within their first five years of teaching. High attrition rates among new teachers may lower student achievement as teachers improve most in their first years in the classroom. It would also be problematic if more effective teachers leave at higher rates than less effective teachers. SDP examines retention patterns across various teacher characteristics, including classroom effectiveness, to understand how attrition impacts student achievement.
RETENTION/ TURNOVER	

SDP HUMAN CAPITAL DIAGNOSTIC

SUMMARY FINDINGS

HUMAN CAPITAL PATHWAY

1. Teacher effects vary substantially in LAUSD, more than in many other districts. The difference between a 25th and 75th percentile elementary math teacher is over one-quarter of a standard deviation, which is roughly equivalent to a student having eight additional months of instruction in a calendar year.



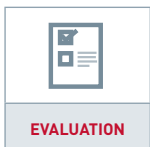
2. Teach for America and Career Ladder teachers have higher math effects on average than other novices in their first year by 0.05 and 0.03 standard deviations respectively, which is roughly equivalent to one to two months of additional learning. These differences persist over time.
3. LAUSD has increased its reliance on extended substitutes in the last several years. Relative to other new hires in middle school, extended substitutes have large positive effects in math, though not in other subjects.



4. First-year teachers are assigned to students who begin the year academically behind students assigned to more experienced teachers.
5. Early-career elementary teachers change grade assignments at higher rates than more experienced teachers. Teachers have slightly lower effects after a change in grade assignment than those who do not change grades.



6. LAUSD math teachers show substantial growth in effectiveness during their first five years in the classroom with a 0.12 standard deviation gain in their average teacher effect, which is roughly equivalent to three additional months of instruction in a calendar year.
7. LAUSD teachers with advanced degrees do not have higher effects, on average, than their colleagues without such degrees.
8. On average, National Board Certified teachers outperform other teachers with the same levels of experience by 0.07 and 0.03 standard deviations in elementary math and English/language arts (ELA) respectively, which is roughly equivalent to two months of additional math instruction and one month of additional ELA instruction.



9. Performance in the first few years of teaching, as measured by teacher effects, is predictive of later performance. In fact, in the third year of teaching, teachers who previously had high teacher effects for two years (the top 25 percent) outperform teachers who previously demonstrated low teacher effects (the bottom 25 percent) by almost seven months of instruction.



10. Teachers who were laid off in 2008-09 and 2009-10 had similar average teacher effects as their colleagues who were not laid off.

SDP HUMAN CAPITAL DIAGNOSTIC

UNDERSTANDING TEACHER EFFECTS

■ What is a teacher effect and how is it estimated?

In the LAUSD Human Capital Diagnostic teacher effects are based on students' performance on the California Standards Tests (CSTs). Teacher effects are estimated by statistically isolating the effect a teacher has on his or her students' learning and separating it from factors teachers have no control over, such as student poverty, English-learner status, and the prior academic performance of classroom peers.² This implies that teacher effects are relative, not absolute, measures. Even if LAUSD teachers as a group were amongst the most effective in the nation, half would still have negative teacher effects because they are being compared to the average teacher in LAUSD. Teacher effects can only be estimated for teachers who can be linked to a classroom roster of students in grades for which CST information is available on student performance from the previous and current year.

■ What is considered a large effect size?

Throughout this report we will present findings in student test score standard deviation units, or effect sizes. However, there is no specific cut-off for determining whether an effect size is large or small. Effect estimates greater than 0.20 are often considered large for educational interventions. One point of comparison is the achievement gap between Latino and White students in LAUSD, which is 0.65 standard deviations in fifth-grade math.

We also convert effect sizes into a months of learning measure in this report. On nationally normed standardized tests, research has shown that an effect size of 0.20 is roughly equivalent to six additional months of learning above the average year's learning in math.³ To come to this estimate, the average annual student gains in math were calculated from six nationally normed standardized tests and averaged across grade transitions from third to eighth grade. While the CSTs are not nationally normed tests, we use these estimates as a rough approximation to translate effect sizes into a months of learning measure.

■ How is LAUSD's measure of Academic Growth Over Time related to the teacher effects used in this report?

SDP's teacher effects model is very similar to the model used to calculate Academic Growth Over Time (AGT), which is measured at the school- and teacher-level in LAUSD. There are two primary differences. First, the scale used to report teacher effects in this brief is different from that used to report AGT. Teacher effects in this brief will be reported in test score standard deviation units, where zero represents the average teacher effect, a negative estimate represents a below average teacher effect, and a positive estimate represents an above average teacher effect. In contrast, AGT estimates range from 1 to 5, where a 3 represents a teacher effect that is not significantly different from the average teacher. Second, AGT is intended to be used as a measure of individual teachers' impact, while analyses in this report are focused on the average effects of groups of teachers.

■ What teachers are included in this report?

In this report, we primarily present results for math teachers tied to students in grades three through eight from 2004–05 to 2010–11. We conducted similar analyses for ELA teachers in grades three through nine during the same timespan. In total, teacher effects were estimated for a little over 30% of certificated teachers. All data for the analyses come from LAUSD administrative records.

Generally, we do not present ELA results in this report for two reasons. First, the variation in effects among ELA teachers is substantially smaller than that among math teachers. This finding is consistent with other research on teacher effects and may suggest that other factors outside of the classroom have a larger influence on children’s ELA performance than is the case in other subjects. Current research also suggests that ELA state tests may also be less sensitive to instruction.⁴ Second, we do not present results among ELA teachers because, in most instances, they are very similar to our findings concerning math teachers (though some are smaller in magnitude). We explicitly make note of instances where ELA and math results diverge.

■ What are the limitations of teacher effects?

Teacher effects are valuable measures because they attempt to objectively capture the impact that individual teachers have on students while not holding teachers responsible for things out of their control (most importantly, prior academic achievement of students). As with any performance measure, however, they come with several caveats.

- Teacher effects measure teachers’ performance only as it relates to student achievement on the CST. Effective teachers do more than raise student test scores. Further, teacher effects are only as good as the assessment used to formulate them. Assessments that are insufficiently challenging or that are poorly aligned to the curriculum that the district expects its teachers to cover will not yield useful estimates.
- Some students may receive supplemental instruction (such as working with reading specialists or math coaches) that influences students’ academic progress. Supplemental instructors’ influence is not accounted for when estimating teacher effects. This is primarily a concern when estimating individual teacher effects. When looking at the effects of large groups of teachers, such supplemental instruction would only be problematic for estimating teacher effects if students receiving supplemental instruction are not randomly distributed across classrooms. For example, if students receiving supplemental instruction are placed with novice teachers at much higher rates than other students, this would present a problem for interpreting the relative effects of novice teachers.
- SDP analyses aim to elucidate aggregate trends, not to evaluate individual teachers. Even so, care is required when interpreting results concerning group averages of teacher effects. Although we often report findings concerning differences in average teacher effects of teachers from different groups, there is often far more variation in teacher effects within these groups than between them. As shown in Figure 15, teachers who previously had high teacher effects (the top 25 percent) are, on average, more effective than their peers who previously had low teacher effects (the bottom 25 percent). Yet, some bottom quartile teachers outperform top quartile teachers in their third year.

It is important to note that while teacher effects have limitations, none of the other widely used measures that are used as proxies for teacher effectiveness are strongly related to improvement in student outcomes. The most commonly rewarded indicators of teacher quality—years of experience and advanced degrees—account for little of the variation in teachers’ performance in improving student achievement.⁵ Until very recently, most teacher evaluation systems used in the vast majority of school districts did a very poor job of differentiating teachers at all—with up to 99% of teachers rated as “satisfactory.”⁶

SDP HUMAN CAPITAL DIAGNOSTIC

DETAILED FINDINGS

1. How much do teacher effects vary among LAUSD math teachers?

Teacher effects vary substantially in LAUSD, more than in many other districts. The difference between a 75th and 25th percentile elementary math teacher is over one-quarter of a standard deviation, which is roughly equivalent to a student having eight additional months of instruction in a calendar year.

Nationwide, research has shown that teacher effects vary widely and can account for an important share of the differences in the academic progress made by students.⁷ In LAUSD, math teacher effects vary substantially as well. The difference between a 75th and 25th percentile elementary math teacher is over one-quarter of a standard deviation (Figure 1), which is larger than observed in many other SDP districts and much of the research literature.⁸ In middle school math, the difference between a 75th and 25th percentile teacher is smaller at 0.18 standard deviations (Figure 2).

To illustrate the practical importance of the spread of math teacher effects, consider that students assigned to a 75th percentile elementary teacher will have learned on average 0.28 standard deviations more in math than students assigned to a 25th percentile teacher. How large is the elementary math difference? A 0.28 standard deviation improvement is equivalent to an 11 percentile point increase on the CST math exam for a fourth-grade student at the 50th percentile. Another way of looking at this is that an effect size of 0.28 standard deviations is roughly the same as an additional eight months of learning beyond the typical year's learning.

Nationwide, ELA teacher effects do not vary as much as math teacher effects. Other factors outside of the classroom may have a larger influence on ELA performance, and ELA state tests may be less sensitive to instruction.⁹ Variation in ELA teacher effects are smaller in LAUSD relative to math effects as well. The difference between a 75th and 25th percentile teacher is 0.16 standard deviations in elementary school and 0.08 standard deviations in middle school (not shown).

Figure 1: Distribution of Elementary School Math Teacher Effects

Grades 3–5 Math Teachers, 2004–05 to 2010–11

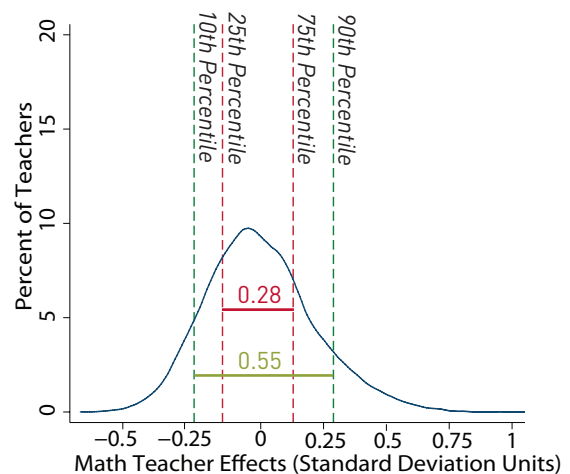
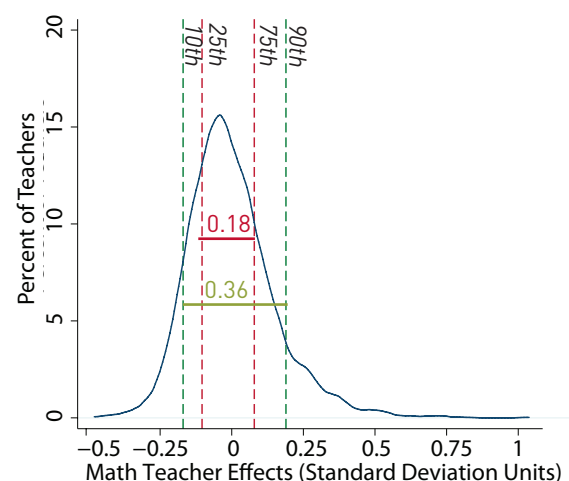


Figure 2: Distribution of Middle School Math Teacher Effects

Grades 6–8 Math Teachers, 2004–05 to 2010–11



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DETAILED FINDINGS: RECRUITMENT

2. How do teacher effects differ for Teach for America and Career Ladder teachers compared to other novice and more experienced teachers?



Teach for America and Career Ladder teachers have higher math effects on average than other novices in their first year by 0.05 and 0.03 standard deviations respectively, which is roughly equivalent to one to two months of additional learning.

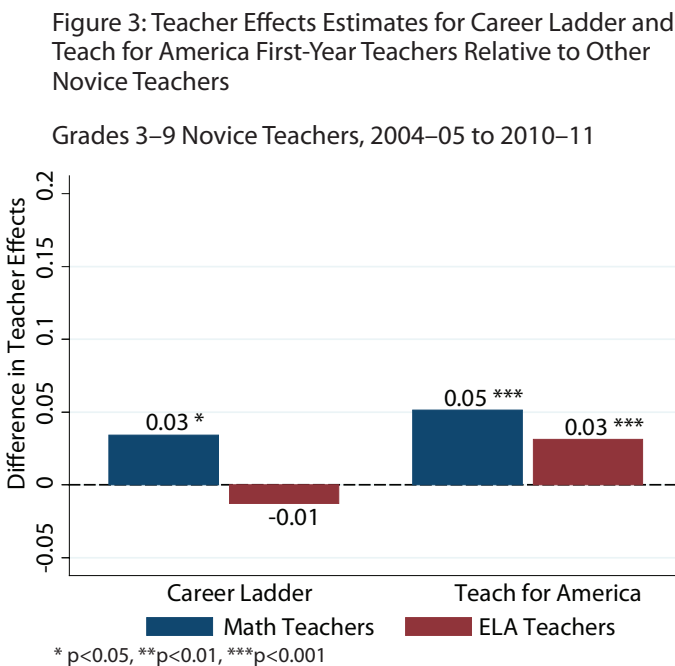
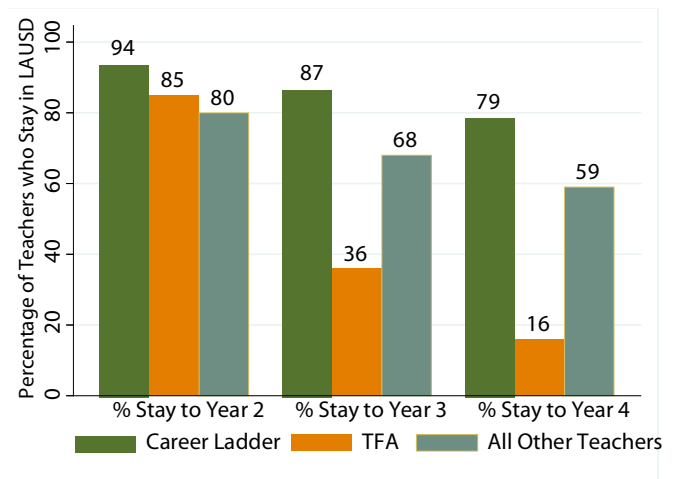


Figure 4: Percentage of First-Year Teachers Who Remain Teaching in LAUSD for Years 2, 3, and 4

Novice Teachers, 2004-05, 2005-06 and 2006-07 Cohorts



Teach for America (TFA) and the LAUSD Career Ladder program are two of the pathways into teaching in the district. TFA is a competitive national program that recruits and trains recent college graduates and professionals to teach in high-needs schools. The Career Ladder program provides a pathway for LAUSD paraprofessionals to become certificated teachers. Collectively, these programs have provided 13% of all new hires to the district in the last six years.

TFA and Career Ladder teachers have modestly higher math effects than other novices in their first year, and these differences persist over time. Career Ladder math teachers outperform other novice math teachers by 0.03 standard deviations, which is roughly equivalent to an additional month of math instruction (Figure 3). TFA math teachers outperform their peers by 0.05 standard deviations, which is roughly equivalent to a month and a half of additional math instruction.

The results are mixed, however, for ELA teachers. Novice Career Ladder ELA teachers perform similarly other novice ELA teachers on average. TFA ELA teachers slightly outperform other novice ELA teachers. The magnitude of this effect is smaller than in math.

As Figure 4 illustrates, retention rates are much higher for Career Ladder teachers compared to other teachers returning for their third and fourth years. While 87% of Career Ladder teachers stay in the classroom for their third year of teaching, only 36% of TFA teachers and 68% of all other newly hired LAUSD teachers stay.

These findings examine only two of the many sources of LAUSD’s teachers. LAUSD should also examine the effects of teachers coming from other credentialing programs. However, data on the other programs is currently incomplete.

SDP HUMAN CAPITAL DIAGNOSTIC

DETAILED FINDINGS: RECRUITMENT

3. What effects do extended substitute teachers have in comparison to teachers newly hired into the district and teachers with district experience?

LAUSD has increased its reliance on extended substitutes in the last several years. Relative to other new hires in middle school, extended substitutes have large positive effects in math, though not in other subjects.

Due to ongoing budget challenges, the percentage of new hires in LAUSD has decreased dramatically over the past few years from 7% of the teacher workforce in 2007–08 to 1% in 2010–11. At the same time, extended substitute teaching has become more prevalent, increasing from 0.1% to 3% of the teacher workforce in the same timespan (Figure 5). It may be that extended substitutes are, to some degree, substituting for permanent hires or serving as an alternative to laying off experienced teachers. Given these trends, it is important to understand both the backgrounds of extended substitutes and their teacher effects in comparison to other LAUSD teachers.

In middle school math, extended substitutes have higher teacher effects compared to all teachers. Their students outperform new hires by 0.13 standard deviations and other experienced teachers by 0.05 standard deviations on average (Figure 6). However, in middle school English, extended substitutes have slightly lower teacher effects compared to other experienced teachers.

Extended substitutes are less prevalent in LAUSD elementary schools. However, extended substitute elementary teachers have lower math effects as compared to new hires by 0.11 standard deviations and lower ELA effects as compared to experienced teachers by 0.04 standard deviations (not shown).

The extended substitute pool is not homogeneous in LAUSD. Half of extended substitutes have experience within LAUSD as teachers prior to being hired as extended substitutes, and the other half are new to the district and to teaching. Therefore, the implication of these finding is not necessarily that the district should employ more extended substitutes at the middle school level. The above findings suggest that district should further explore the characteristics of successful extended substitutes and the reasons for hiring extended substitutes at all levels.



Figure 5: Percent of LAUSD Workforce Who Are New Hires or Extended Substitutes

All Certificated Teachers, 2007–2008 to 2010–11

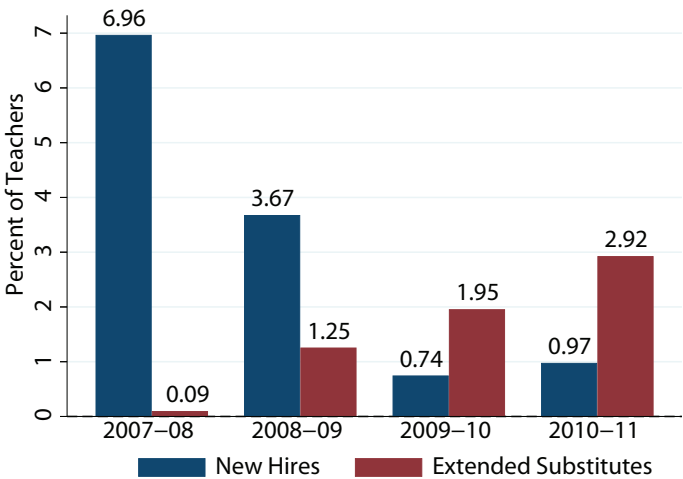
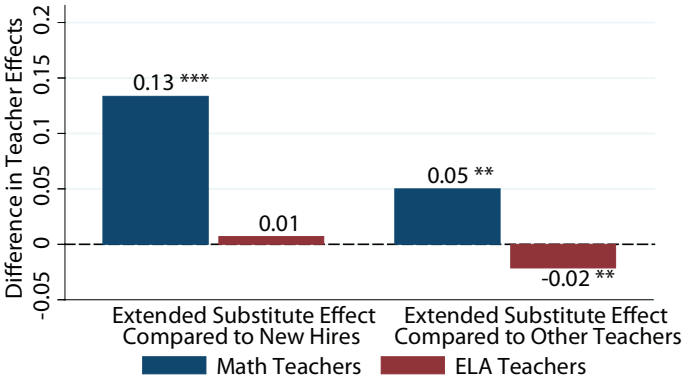


Figure 6: Average Teacher Effects of Extended Substitutes in Middle School as Compared to New Hires and All Other Teachers

Grades 6-8 Teachers, 2007-08 to 2010-11



* p<0.05, **p<0.01, ***p<0.001

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DETAILED FINDINGS: PLACEMENT

4. How academically prepared are students who are placed with inexperienced teachers?



First-year teachers are assigned to students who begin the year academically behind students assigned to more experienced teachers.

Figure 7: Difference in Average Prior Math Performance of Students Assigned to Early-Career Teachers Compared to Teachers with More than Six Years of Experience

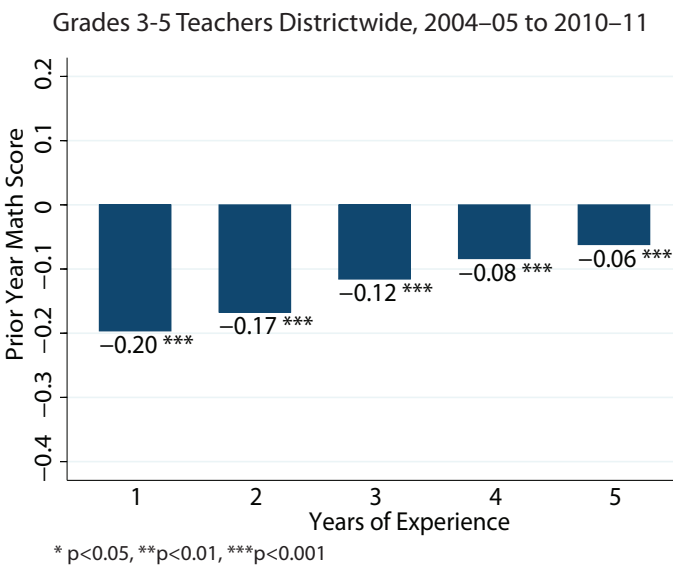
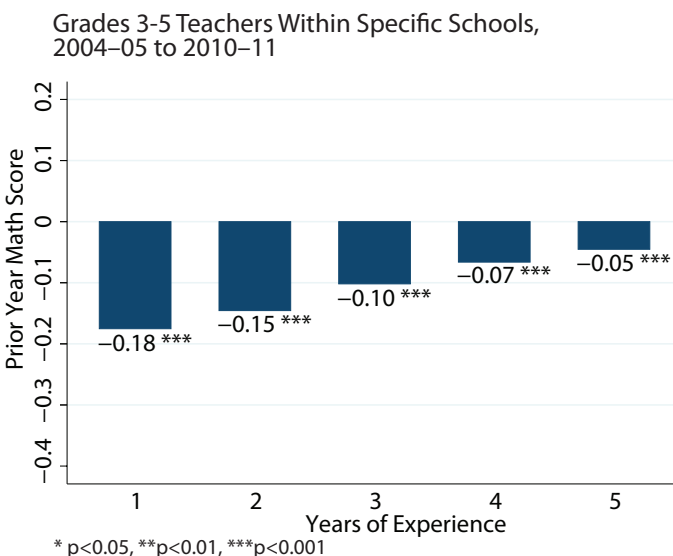


Figure 8: Difference in Average Prior Math Performance of Students Assigned to Early-Career Teachers Compared to Teachers with More than Six Years of Experience



Across the country and in LAUSD, novice teachers have been shown to have lower effects than their more experienced peers.¹⁰ Therefore, placing students who are already academically behind their peers with novice teachers is likely to exacerbate achievement gaps. Districtwide, novice and early career elementary teachers disproportionately teach students with lower standardized math scores from the previous year. In fact, first-year elementary teachers are assigned to students who begin the year approximately 0.2 standard deviations, or about six months, behind students placed with more experienced teachers in terms of academic proficiency (Figure 7).

If schools with lower-performing students also have a high teacher turnover rate, these results might hold districtwide, but not within individual schools. To learn more about that, we restricted the analysis to compare only teachers within the same school. The same patterns are evident *within* individual elementary schools, indicating that new teachers systematically receive students who begin the year academically behind the students assigned to more experienced teachers *in their same building* (Figure 8). Findings are similar, yet more pronounced, for middle school teacher and student placements, where there is more explicit placement based on academic achievement levels (not shown).

Districtwide findings in LAUSD are comparable with findings from other SDP school districts.¹¹ When examining differences within schools, however, many other SDP districts see less sorting by prior achievement between novice and experienced teachers' students than is evident in LAUSD.

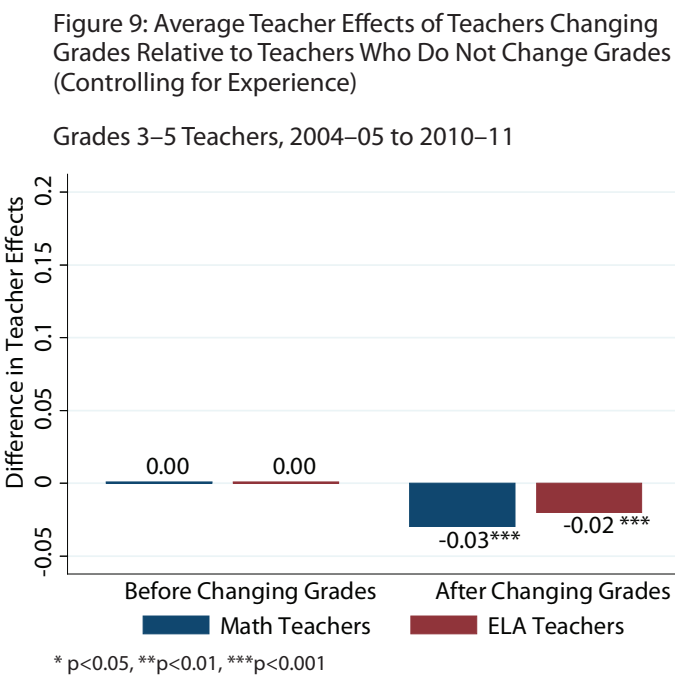
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DETAILED FINDINGS: PLACEMENT

5. How is grade changing related to teacher experience and effects at the elementary level?



Early-career elementary teachers change grade assignments at higher rates than more experienced teachers. Teachers have slightly lower effects after a change in grade assignment than those who have not changed grades.



Turnover in LAUSD reflects national trends, with between 10 and 20% of teachers exiting their schools or leaving the district each year.¹² However, this understates the amount of teacher movement occurring in the district. Teacher movement is higher when considering teachers changing grades within schools. At the elementary level, early-career teachers change grades at higher rates than their more experienced peers with more than three years of experience. 32% of early-career teachers change grades as compared to 25% of experienced teachers.

Grade changing is related to slightly lower teacher effects, on average, in the year after the change. In fact, students in classrooms with elementary teachers who have changed grades experience 0.03 standard deviations less growth in math and 0.02 less in ELA, on average, in the year after the teacher changes grades as compared to performance of students who had teachers that did not switch grades (Figure 9). The lower teacher effects after grade changing correspond to about a month less of math or ELA instruction. This finding has implications for both teachers and students, especially when combined with other dynamics. For example, novice teachers have lower effects on average and movement between grades may compound this.

We note that there was more grade-changing in the last several years due to layoffs and declining and shifting student enrollment. However, these findings hold true when the analysis was restricted to earlier years of the analysis period.

SDP HUMAN CAPITAL DIAGNOSTIC

DETAILED FINDINGS: DEVELOPMENT

6. How do teacher effects change over the course of a teacher’s career?



LAUSD math teachers show substantial growth in effectiveness during their first five years in the classroom with a 0.12 standard deviation gain in their average teacher effect, which is roughly equivalent to an additional three months of instruction.

Studies in other districts show that early-career teachers make gains in terms of effects as they accrue the first few years of additional experience, while the returns largely plateau around year four for the average teacher.¹³ We largely see a similar pattern in LAUSD. In both math and ELA, LAUSD teachers generate the largest gains in terms of teacher effects during their first five years of teaching and appear to continue to improve over time. For example, fifth-year math teachers typically have made gains of 0.12 standard deviations since their first year of teaching, which is roughly equivalent to three months of additional math instruction (Figure 10). There is a similar upward trajectory for ELA teachers, although not as steep as that experienced by math teachers. On average, fifth-year ELA teachers have made gains of 0.06 standard deviations since their first year of teaching (not shown).

7. What effects do teachers with advanced degrees have as compared to teachers with bachelors degrees?

LAUSD teachers with advanced degrees do not have higher effects, on average, than their colleagues without such degrees.

Like other districts, LAUSD’s teacher salary schedule compensates teachers for pursuing advanced degrees. Over a quarter of LAUSD teachers have master’s or doctoral degrees, and a larger percentage have course credit beyond a bachelor’s degree. However, the average effects of elementary and middle school math and ELA teachers with advanced degrees are not substantially different than their counterparts lacking such degrees (Figure 11). This result is consistent with findings in the national literature.¹⁴ Because LAUSD’s salary schedule also compensates teachers for credit accrual, we investigated credit attainment as well and saw no consistent relationship with teacher effects (not shown).

Figure 10: Math Teachers’ Returns to Experience
Grades 3–8 Math Teachers, 2004–05 to 2010–11

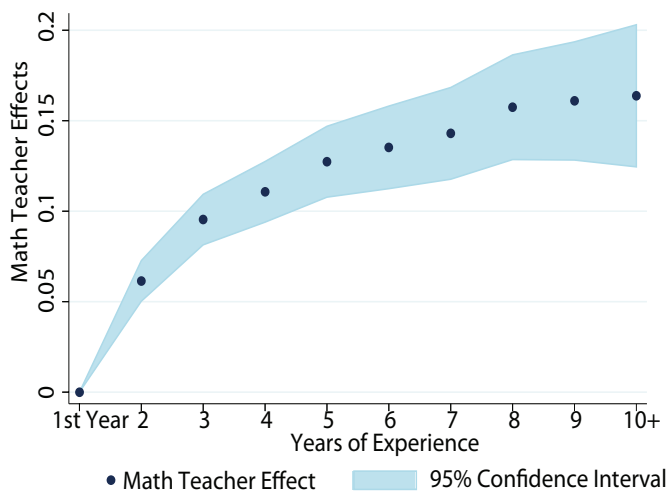
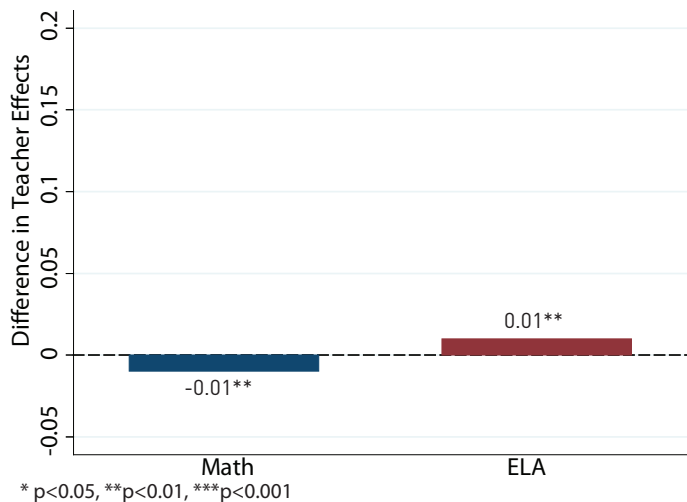


Figure 11: Teacher Effect Estimates of Teachers with an Advanced Degree Relative to Teachers with only a Bachelor Degree (Controlling for Teacher Experience)
Grades 3–9 Teachers, 2004–05 to 2010–11



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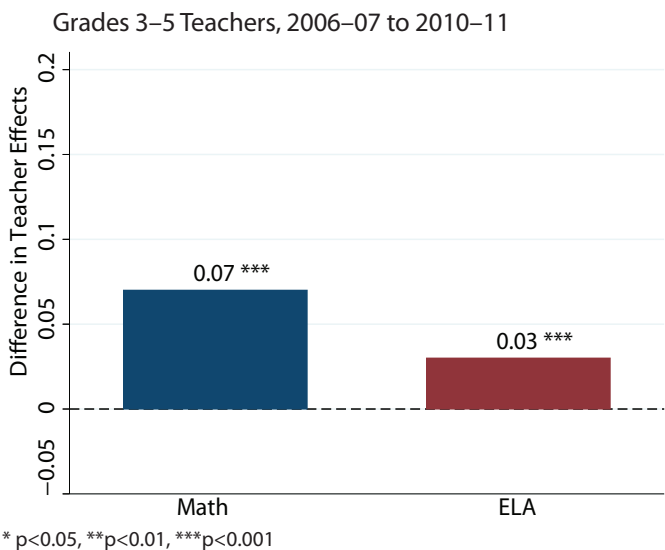
DETAILED FINDINGS: DEVELOPMENT

8. What effects do National Board Certified teachers have in LAUSD as compared to those teachers without certification?



On average, National Board Certified (NBC) teachers outperform other teachers with the same levels of experience by 0.07 and 0.03 standard deviations in elementary math and ELA respectively, which is roughly equivalent to one to two months of additional instruction.

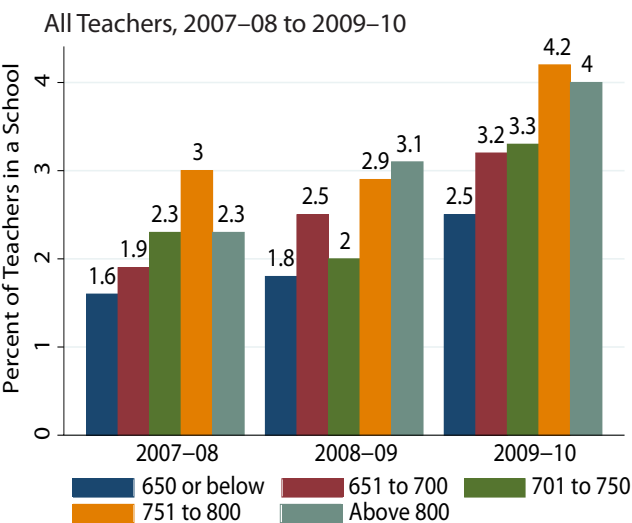
Figure 12: Average Effect of Teachers with National Board Certified Teachers Relative to Non-NBC Teachers (Controlling for Experience)



LAUSD also compensates teachers for completing National Board Certification. Obtaining certification is a demanding process that almost 4% of current LAUSD teachers (or almost 1,000 teachers) have completed. Over 60% of NBC teachers are concentrated in the elementary grades. After controlling for experience, NBC elementary math teachers have effects that are 0.07 standard deviations higher, on average, than teachers without National Board Certification (Figure 12). NBC elementary ELA teacher effects are 0.03 higher on average. These effects are roughly equivalent to two months of additional math instruction and one month of additional ELA instruction. This analysis cannot parse out whether returns to NBC result from the certification process itself or are a reflection of which teachers successfully complete the program.

While NBC teachers make up a small proportion of all teachers in LAUSD, these teachers are not distributed evenly across schools in the district. There are more NBC teachers in schools that have high academic performance indexes (API), which is calculated by the California Department of Education and is based on multiple measures of school performance and growth. For example, in 2009–10, 4% of teachers in schools with an API score above 800 were certified as compared to 2.5% of teachers in schools with API scores at 650 or below (Figure 13).

Figure 13: Percent of Teachers in Schools with NBC By School Academic Performance Index (API)



SDP HUMAN CAPITAL DIAGNOSTIC

DETAILED FINDINGS: EVALUATION

9. Among novice teachers, do estimates of teacher effects predict future performance?



Effect estimates from the first two years of a teacher's career are predictive of teacher effects in the third year.

When considering an average novice teacher's performance, it is important to consider the stability of the teacher effect estimate in order to make decisions about professional development and strategic placements. Figure 14 groups third-year teachers into quartiles based on their teacher effect scores over the prior two years combined. Each bar represents the average teacher effect score in a teacher's third year. Teachers who ranked in the top quartile after the first two years continued to exhibit larger teacher effect estimates in their third year than teachers ranked in the three lower quartiles.

This result suggests that performance in the first few years of teaching is predictive of later performance, as measured by teacher effects. In fact, in the third year of teaching, teachers who previously had high teacher effects for two years (the top 25 percent) outperform teachers who previously had low teacher effects (the bottom 25 percent) by 0.24 standard deviations in math, which is roughly equivalent to seven months of learning. This finding holds true for ELA teachers as well. ELA teachers who previously demonstrated high performance outperform ELA teachers who previously demonstrated low performance by 0.12 standard deviations (not shown).

We note that prior teacher effect estimates and rankings, while informative, are imperfect. Teacher effects in the third year can vary widely for individual teachers. Figure 15 plots the distributions of third-year teacher effects for teachers who previously demonstrated high and low performance (the top and bottom quartiles). The ranges in teacher effects overlaps such that some bottom quartile teachers outperform top quartile teachers in their third year and vice versa.

Figure 14: Average Math Teacher Effect in Third Year By Ranking After First Two Years

Grades 3–8 Novice Math Teachers, 2005–06

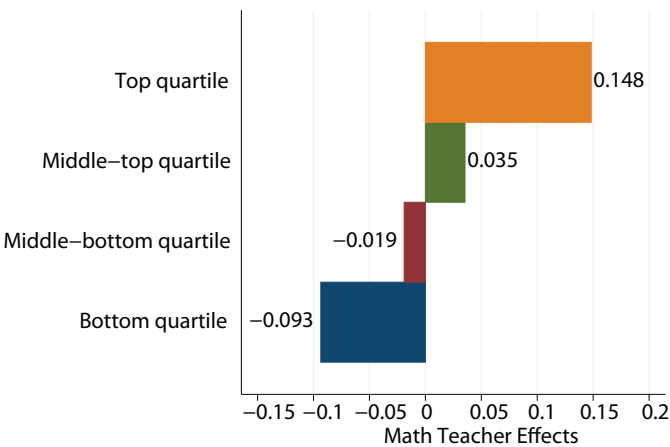
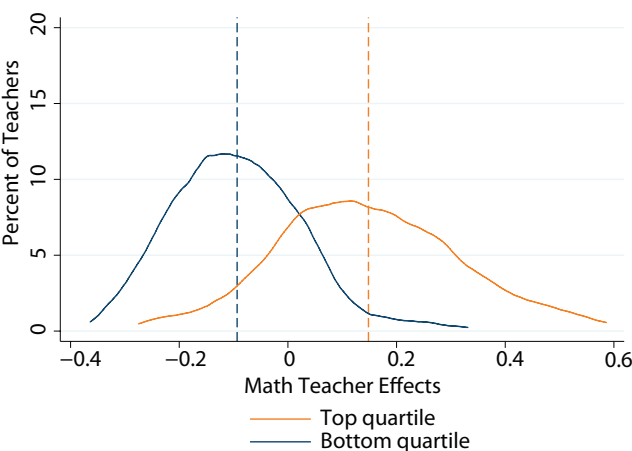


Figure 15: Distribution of Math Teacher Effect Estimates in the Third Year of Teaching By Ranking After First Two Years

Grades 3–8 Novice Math Teachers, 2005–06



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DETAILED FINDINGS: RETENTION/TURNOVER

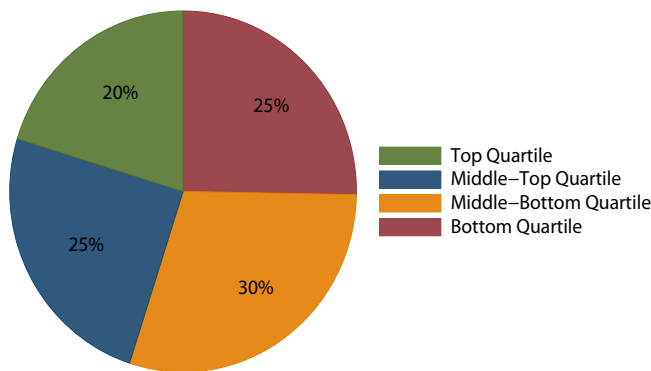
10. How are layoffs related to teacher effects?



Teachers who were laid off in the past several years had similar average teacher effects as their colleagues who were not laid off.

Figure 16: Distribution of Laid-Off Teachers, By Prior Year's Math Teacher Effect Quartile

Grades 3-8 Laid-Off Teachers, 2008-09 and 2009-10



Due to budget shortfalls and declining student enrollment, LAUSD has been forced to layoff large numbers of teachers since the 2008-09 school year. Generally, teacher seniority is the primary criterion for determining who is laid off, although there are notable exceptions. These exceptions include LAUSD's decisions to lay off teachers out of seniority order if they did not meet No Child Left Behind's Highly Qualified Teacher certification requirements and, in 2011, to protect teachers with less seniority who taught in the district's highest need schools.

Figure 16 illustrates that, as expected, layoffs driven primarily by seniority did not have a strong relationship to teacher effects. In both 2008-09 and 2009-10, laid-off teachers were slightly less effective on average compared to those teachers that were not laid off. Still, 45% of laid-off teachers were in the top two quartiles of teacher effectiveness.

If a district goal is to ensure that students are taught by the best possible teachers, basing layoff decision primarily on seniority rather than on performance is unlikely to further that goal. Of course, seniority and teacher effects estimates alone are both limited measures of teacher performance. Ideally, the district would have access to multiple measures to ensure that critical decisions such as layoffs are handled to minimize potential harm to student achievement.

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DETAILED FINDINGS

How can findings from this brief help to inform human capital strategies?

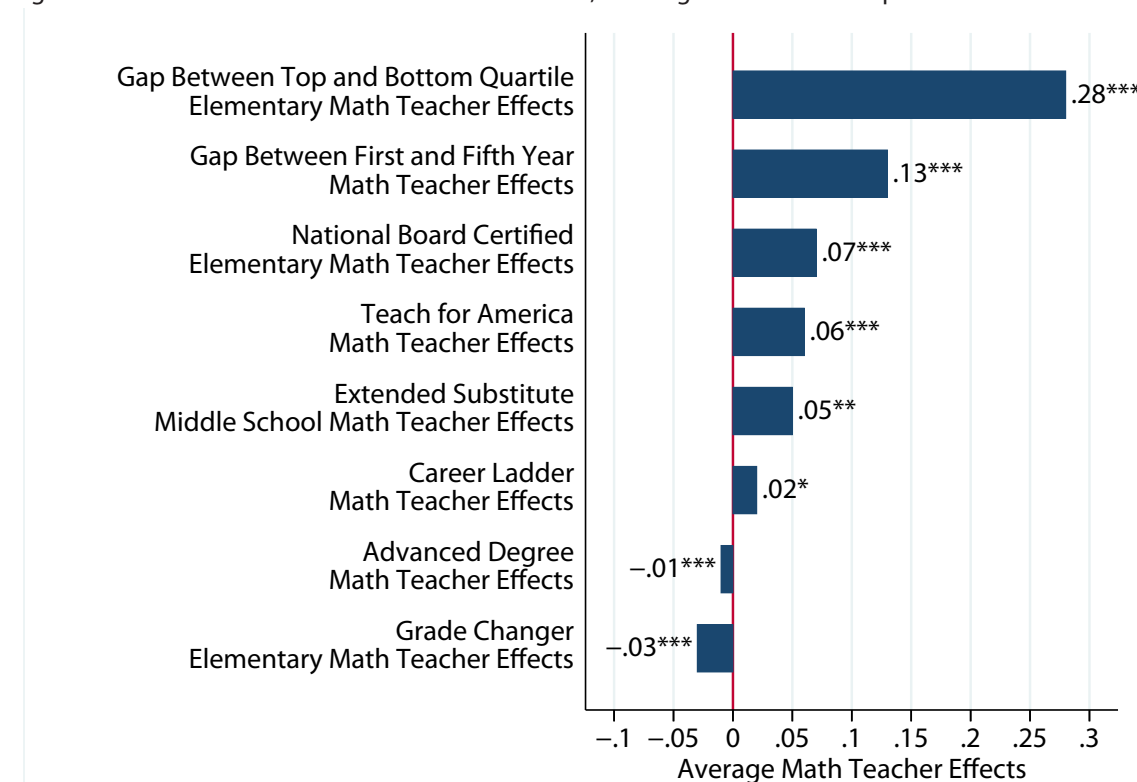
Multiple human capital strategies will need to be pursued in order to reduce and eliminate the achievement gaps in LAUSD.

Achievement gaps in LAUSD remain large. In fact, the difference between Black and White students' performance and Latino and White students' performance in fifth-grade math is 0.85 and 0.65 standard deviations respectively. These Black-White and Latino-White gaps are roughly equivalent to differences of over one and a half years of learning.

The achievement gaps in LAUSD can provide context for the findings in this brief. The effect sizes from several findings are summarized in Figure 17. Note that no

single effect on its own is large enough to eradicate LAUSD's test score gaps. Yet, teachers remain a critical school-based input for improving student performance. Therefore, the district will need to consider multiple strategies to close achievement gaps. While the findings in this brief only scratch the surface of potential human capital strategies, they illustrate that teacher recruitment, placement, development, evaluation, and retention make significant impacts on student performance in the district.

Figure 17: Overview of Relative Effect Sizes in LAUSD, Findings from Human Capital Brief



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NOTES

Endnotes

1. Rivkin, S.G., Hanushek, E.A., and Kain, J.F. (2005). Teachers, Schools, and Academic Achievement. *Econometrica*, 73(2): 417–458.
2. At the student level, the model controls for prior achievement, gender, race/ethnicity, participation in free or reduced price lunch, English language learner classification, homelessness, special education classification, gifted program participation, whether a student was retained, and whether the student was new to the school (this includes a control for structural transitions from elementary to middle schools as well as a control for non-structural changes). In addition, the student-level variables are averaged by a student's classroom peers and a student's grade-level peers (cohort) in the same school. The peer and cohort averages are also included in the model.
3. Hill, C.J., Bloom, H.S., Black, A.R., and Lipsey, M.W. (2008). Empirical Benchmarks for Interpreting Effect Sizes in Research. *Child Development Perspectives*, 2(3):172–177.
4. Kane, T., & Cantrell, S. (2010). Learning about teaching: Initial findings from the measures of effective teaching project. *MET Project Research Paper, Bill & Melinda Gates Foundation*, p. 9.
5. Gordon, R., Kane, T.J., and Staiger, D.O. (2006). Identifying Effective Teachers Using Performance on the Job. *Hamilton Project Discussion Paper, The Brookings Institution*.
6. The 2009 New Teacher Project study, the Widget Effect, found that in evaluation systems with ratings of "satisfactory" and "unsatisfactory" 99% of teachers earned "satisfactory." In evaluation systems with more than two ratings, 94% of teachers received one of the top two ratings and less than 1% were rated unsatisfactory.
7. Aaronson, D., Barrow, L. and Sander, W. (2007). Teachers and Student Achievement in the Chicago Public Schools. *Journal of Labor Economics*, 25(1): 95–135.
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13. Boyd, D.J. (2006). How Changes in Entry Requirements Alter the Teacher Workforce and Affect Student Achievement. *Education Finance and Policy*, 1(2):176–216.
14. Gordon, R., Kane, T.J., and Staiger, D.O. (2006). Identifying Effective Teachers Using Performance on the Job. *Hamilton Project Discussion Paper, The Brookings Institution*.
15. Center for Education Policy Research. (2011). Learning About Teacher Effectiveness: SDP Human Capital Diagnostic, Fulton County Public Schools, Georgia, Strategic Data Project. Cambridge, MA: Center for Education Policy Research at Harvard University.
16. Rivkin, S.G., Hanushek, E.A., and Kain, J.F. (2005). Teachers, Schools, and Academic Achievement. *Econometrica*, 73(2): 417–458.
17. Staiger, D. and Rockoff, J. (2010). Searching for Effective Teachers with Imperfect Information. *The Journal of Economic Perspectives*, 24 (3): 97–117.
18. Harris, D. and Sass, T.R. (2011). Teacher Training, Teacher Quality, and Student Achievement. *Journal of Public Economics*, 95(7–8): 798–812.

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NOTES CONTINUED

Figure Notes

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1. Sample: Third- through fifth-grade unique math teachers in 2004–05 through 2010–11. N=11,871.
2. Sample: Sixth- through eighth-grade unique math teachers in 2004–05 through 2010–11. N=2,799. Figures are based on three-year pooled estimates of teacher effects for each teacher.

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3. Sample: Third- through eighth-grade unique math teachers and third- through ninth-grade unique ELA teachers in 2004–05 through 2010–11 who were newly hired at the district within the same time period. Math teachers=1,686; ELA teachers= 2,036.
4. Sample: All unique teachers newly hired between 2004–05 and 2006–07. Career Ladder=442; TFA=423; All Other Teachers=7347. Note: We restricted to earlier cohorts because retention rates from 2008 onward were affected by reductions in force (RIFs).

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5. Sample: Extended substitutes and teachers newly hired into LAUSD elementary, middle, and high schools between 2007–08 and 2010–11. New hires=3,682; Extended substitutes=1,714.
6. Sample: Sixth- through eighth-grade extended substitutes and teachers newly hired into LAUSD middle schools between 2007–08 and 2010–11. Math teacher-year records=8,881; ELA teacher-year records=14,613.

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- 7, 8. Sample: Third- through fifth-grade elementary school students in 2004–05 through 2010–11 with prior math CST test scores and a primary math teacher; also, their corresponding elementary school math teachers in 2004–05 through 2010–11 with teacher effect estimates. Student-year records=882,546; Teacher-year records=41,440.

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9. Sample: Third- through fifth-grade math and ELA teachers from 2004–05 to 2010–11 with teacher effect estimates. Math teacher-year records=31,016. ELA teacher-year records=31,019.

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10. Sample: Third- through ninth-grade math and ELA teachers from 2004–05 to 2010–11 with teacher effect estimates. Math teacher-year records=50,293; ELA teacher-year records=56,064. Effects are estimated using teacher fixed effects.

11. Sample: Third- through ninth-grade math and ELA teachers from 2004–05 to 2010–11 with teacher effect estimates and information regarding their advanced degree status. Math teacher-year records=44,168; ELA teacher-year records=49,403. Degree information is based on salary grade. Having a master, specialized, or doctoral degree all count as an advanced degree. Additional analyses were conducted to see if there were differential effects amongst all advanced degree types. Because there were no differential effects, this analysis focuses on the aggregate effect of having an advanced degree.

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- 12, 13. Third- through fifth- grade math and ELA teachers from 2006–07 to 2010–11 with teacher effect estimates and information regarding National Board Certification. Math teacher-year records=35,426; ELA teacher-year records=39,166.

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- 14, 15. Sample: Third- through eighth-grade novice math teachers in 2005–06 who stay and teach for at least three years (through 2007–08) and who have teacher effect estimates in all three years. Unique teachers=197.

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16. Sample: Third- through eighth-grade math teachers in 2007–08 and 2008–09 with teacher effect estimates who were laid off in 2008–09 and 2009–10. We use the prior year effects estimates because of the potential that receipt of Reduction-in-Force (RIF) and layoff notices may affect current year estimates. Bottom quartile: N=145; middle-bottom quartile: N=171; middle-top Quartile: N=142; top quartile: N=116.

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17. Compilation of significant effect sizes from Figures 1, 3, 6, 9, 11, 12, and 14.

The Strategic Data Project thanks Emily Mohr, Hansheng Chen, and LAUSD staff members who participated in the LAUSD Human Capital Steering Committee for their input and guidance. These analyses were conducted by Julia Bloom and Nicole Wagner. Jared Serwer created this report.



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