STRATEGIC DATA PROJECT

Learning About Teacher Effectiveness: The SDP Human Capital Diagnostic

Fulton County Schools, Georgia
February 2011

The Strategic Data Project

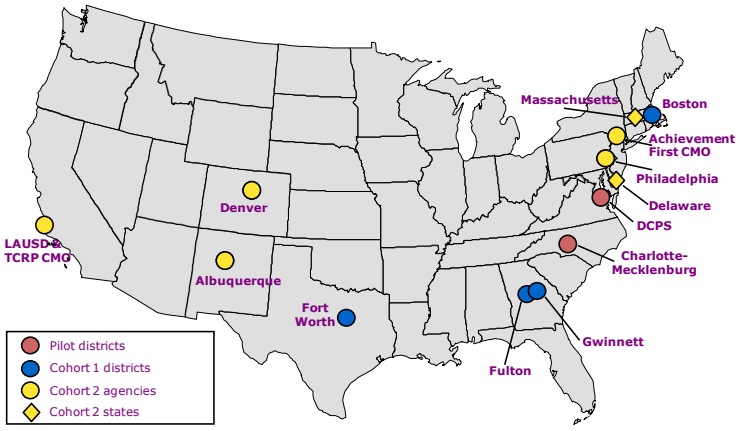
The Strategic Data Project (SDP), housed at the Center for Education Policy Research at Harvard University, partners with school districts, school networks, and state agencies to bring high-quality research methods and data analysis to bear on management and policy decisions.

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 top-notch analysts as data fellows in partner agencies for two years;
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 ten school districts and one network of charter management organizations. Collectively, these agencies serve 1.5 million students, 65 percent of whom are eligible for free or reduced price lunch and 82 percent of whom are racial/ethnic minorities. The project is supported by the Bill & Melinda Gates Foundation.



About the Human Capital Diagnostic

Teachers play a critical role in student learning and achievement. Recent research has shown that a teacher's effectiveness is more important—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 patterns of effectiveness among their teachers and 2) identify potential areas for policy change that could leverage teacher effectiveness to improve student achievement. This report, which represents a selection of findings from our full diagnostic, includes the following sections:

- **The SDP Pathway for Human Capital**
- **Key Findings**
- **Understanding Teacher Effects**
- **Summary Analyses**

This Human Capital Diagnostic is the result of a partnership between SDP and Fulton County Schools (FCS) to bring data to bear on policy and management decisions. As such, it is neither an exhaustive set of analyses nor does it contain specific recommendations to adopt in the district. It is, however, a set of standardized analyses that can help the district better understand its current performance, set future goals, and strategically plan responses.

Additionally, the diagnostic is meant to demonstrate how districts can capitalize on existing data to better inform decision making. For the first time in FCS, researchers connected student data (including demographics and test scores) to teacher human resource data, allowing the calculation of objective measures of teacher effectiveness that can be linked to teacher characteristics. The diagnostic analyses exploit these effectiveness measures to explore their relationships with characteristics of teachers, schools, and students. They are not intended to draw conclusions about the overall contribution made by any individual teacher.

Analyses were completed by members of the research team at the Center for Education Policy Research at Harvard University with the support of FCS staff, the FCS SDP Fellows, and faculty advisors.

The full set of analyses and a technical appendix can be found online at: www.gse.harvard.edu/sdp.

The SDP Pathway for Human Capital

The SDP Pathway for Human Capital is a framework used to examine the movement and allocation of teachers in FCS.

Five key phases of a teacher's career in the district are included in this framework:

Recruit

The recruitment process is a district's first opportunity to secure a high quality teaching force for its students. For instance, understanding the pace of hiring and how new hires are allocated across the district can inform the development of strategies to attract effective educators.

Place

Teachers are not randomly assigned to students. In some districts, more experienced teachers may be placed with more advantaged students, which may widen existing achievement gaps. Examining teacher placement patterns can identify opportunities to raise student achievement and reduce achievement gaps by more equitably distributing teachers across the system.

Develop

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. Development analyses explore the extent to which methods of development commonly accessed by teachers—such as earning graduate degrees or learning from experience—are most associated with gains in student achievement.

Evaluate

Performance evaluations in most districts make few distinctions among teachers. The lack of rich information on performance hampers a district's ability to pay special attention to underperforming teachers, target professional development to those teachers, or counsel out poor performers. In the absence of detailed evaluation data, SDP examines the extent to which teachers' past classroom effectiveness predicts their effectiveness in the future.

Retain/
Turnover

Many urban districts lose half their new teachers within their first five years of teaching. High attrition rates among new teachers may lower student achievement if it is the most effective teachers who leave and teachers improve most during their first years in the classroom. SDP explores retention patterns overall and across various teacher characteristics, including classroom effectiveness, to understand how attrition impacts student achievement.

The SDP Pathway for Human Capital frames a series of questions answered in the diagnostic such as:

- How does FCS assign inexperienced teachers to schools and students?
- How do advanced degrees and experience relate to teacher effectiveness in FCS?
- How well do estimates of FCS teachers' current effectiveness predict their performance in the future?
- How successful is FCS in retaining its most effective teachers?

Key Findings

I. Teacher effectiveness varies substantially in Fulton County Schools.

Recruit

II. High poverty schools in FCS have greater proportions of novice and newly hired teachers than low poverty schools.

Place

III. FCS places less experienced teachers with lower performing students both districtwide and within specific schools.

IV. Although there is little difference in average teacher effectiveness between low and high poverty schools, there is considerable variation in effectiveness across schools in the same poverty level.

Develop

V. FCS teachers become more effective during their first two years in the classroom for both math and ELA. After two years, however, returns to experience are generally small and inconsistent across subjects.

VI. FCS teachers with advanced degrees are no more effective than their colleagues without such degrees.

Evaluate

VII. Teacher effects for novice FCS teachers are, on average, predictive of future effectiveness.

Retain/
Turnover

VIII. FCS retains its most effective novice math teachers at higher rates than its least effective novice math teachers. However, the same pattern is not evident among novice ELA teachers or among experienced teachers in either subject.

Understanding Teacher Effects

A. What is a teacher effect and how is it estimated?

A teacher effect is an estimate of an individual teacher's impact on the amount his or her students learn from one year to the next, as measured by their performance on a standardized test of student achievement. In the FCS Human Capital Diagnostic, teacher effects are based on students' performance on the state of Georgia's Criterion-Referenced Competency Tests (CRCT). Teacher effects are estimated by statistically isolating the portion of each student's test score growth attributable to that student's primary teacher from such other factors as achievement in the previous year, demographic characteristics, and peer effects.

Intuitively, a teacher effect measures the amount a FCS student would be expected to learn as a result of being assigned to a particular teacher as compared to what they would have learned from the average teacher in the district. As this implies, teacher effects are relative, not absolute, measures. Even if FCS teachers as a group were among the most effective in the nation, some would still be categorized as "least effective" for the purposes of this diagnostic.

B. What teachers were included in this report?

Teacher effects can only be estimated for teachers who can be linked to a classroom roster of students in grades for which information is available on their test performance the previous year. In this report, we primarily present results for math teachers tied to students in grades 2-8 using the school years 2007-08 to 2009-10. We conducted similar analyses for reading and English/Language Arts (ELA) teachers in those same grades and years but generally do not present those results in this report for two reasons. First, the variation in effectiveness among reading teachers is substantially smaller than that among math and ELA teachers. This finding is consistent with other research on teacher effectiveness and may suggest that families and other factors outside the classroom have a larger influence on children's reading performance than is the case in other subjects. Second, we do not present results among ELA teachers because, in most instances, they are very similar to our findings concerning math teachers. We explicitly make note in the text of instances where ELA and math results diverge in the text.

Our full diagnostic report for FCS includes results for reading teachers in grades 2-5 in addition to math and ELA teachers in grades 2-8. All data for these analyses came from FCS administrative records.

C. What are the limitations of teacher effects?

Teacher effects are a uniquely valuable performance measure, objectively capturing the impact individual teachers have on students while controlling for the most important ways in which teachers and students are assigned to classrooms (i.e. teachers being assigned to classrooms with lower or higher achieving students). As with any performance measure, however, they come with several caveats. Most notably, teacher effects measure teachers' peformance only as it relates to student achievement on the CRCT. Teacher effects are only as good as the assessments used to formulate them. Assessments that are insufficiently challenging or that are poorly aligned to the curriculum the district expects its teachers to cover will not yield accurate estimates. Second, some students receive supplemental instruction, for example from reading specialists or math coaches, that influences their academic progress and cannot be accounted for when estimating teacher effects. Finally, care is required when interpreting results concerning group averages of teacher effects. Although we often report findings concerning differences in average effectiveness of teachers from different groups, there is often far more variation in teacher effects within these groups than between them. For example, while novice teachers are, on average, less effective than their more experienced peers, many novice teachers outperform more experienced teachers.

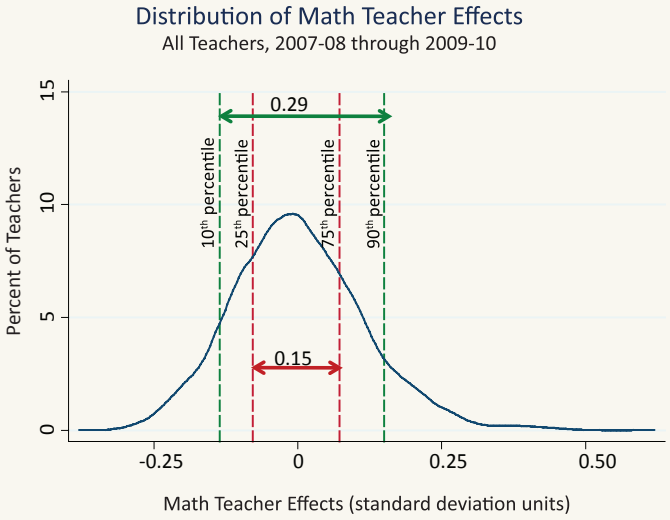
Summary Analyses

I. *How much does teacher effectiveness vary among FCS math teachers?*

Teacher effectiveness varies substantially in FCS.

Students assigned to a teacher at the 90th percentile of teaching effectiveness in math and also ELA (not shown) learn 0.29 standard deviations more, on average, than students assigned to a teacher at the 10th percentile. How large is this difference? For students at the 50th percentile of the FCS test score distribution, a 0.29 standard deviation improvement would raise their achievement to the 61st percentile. A difference of 0.29 standard deviations is also roughly equivalent to an additional year of learning for students in upper elementary grades.[2]

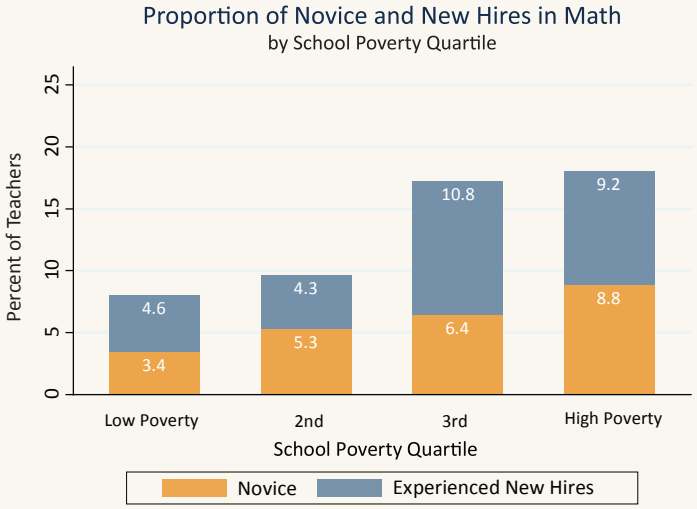
In other words, as in other districts and states where similar analyses have been conducted, the effectiveness of individual teachers varies widely and can account for a large share of the differences in the academic progress made by FCS students.



II. *What proportion of teachers are less experienced across schools with different poverty levels?*

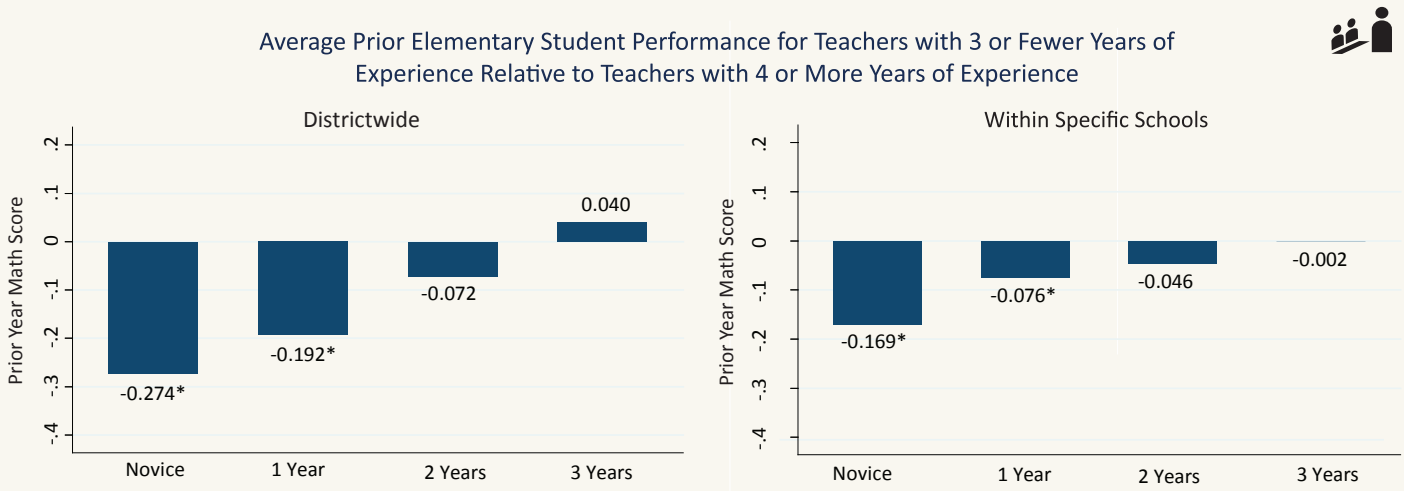
High poverty schools in FCS have greater proportions of novice and newly hired teachers than low poverty schools.

Schools in the high poverty quartile have over twice as many novice math teachers relative to schools in the low poverty quartile. They also have higher rates of experienced new hires, suggesting that overall staff turnover rates are highest in high poverty schools. While this figure is based on math teachers in grades 2-8, similar patterns are evident for teachers across all grades and subjects in FCS (not shown).



Summary Analyses

III. *With what kinds of students are more inexperienced teachers being placed?*



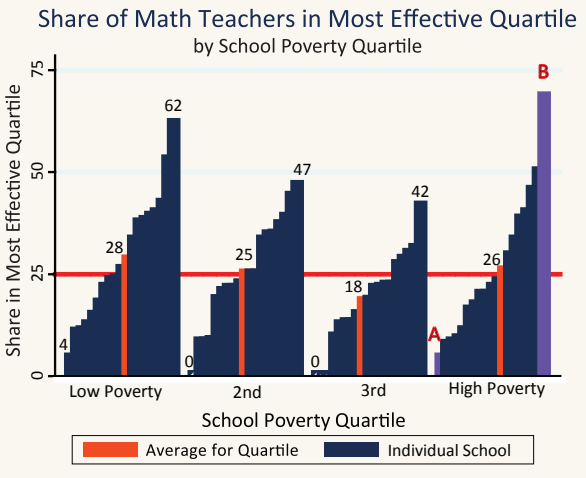
FCS places less experienced teachers with lower performing students both districtwide and within specific schools.

Novice and early career elementary teachers are being disproportionately placed with students who had lower standardized math scores in the previous year. This is due in part to higher turnover rates in schools with low performing students, but the same patterns are evident even within specific schools. This matters because, on average, novice teachers are 0.054 standard deviations less effective than their peers with four or more years of experience (not shown). This pattern of teacher placement also holds true for elementary school teachers in ELA and middle school teachers in math and ELA.

IV. *How are the most effective teachers distributed across schools of different poverty levels?*

Although there is little difference in average teacher effectiveness between low and high poverty schools, there is considerable variation in effectiveness across schools in the same poverty level.

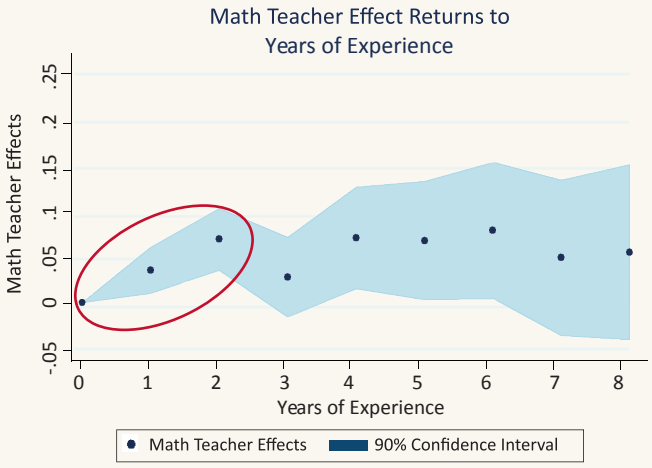
Though less experienced FCS teachers are being placed with lower performing students, teacher effectiveness does not vary systematically between high and low poverty schools. For example, there is little difference across school poverty quartiles in the average share of a school's math teachers who are in the most effective quartile. This is the case despite the presence of considerable variation within FCS as a whole and within a given poverty quartile in the share of most effective teachers. For instance, though schools A and B are both high poverty, more than two-thirds of school B's teachers are most effective as compared to just 4 percent in school A. We find very similar results concerning the distribution of least effective math teachers and the most and least effective teachers in ELA (not shown).

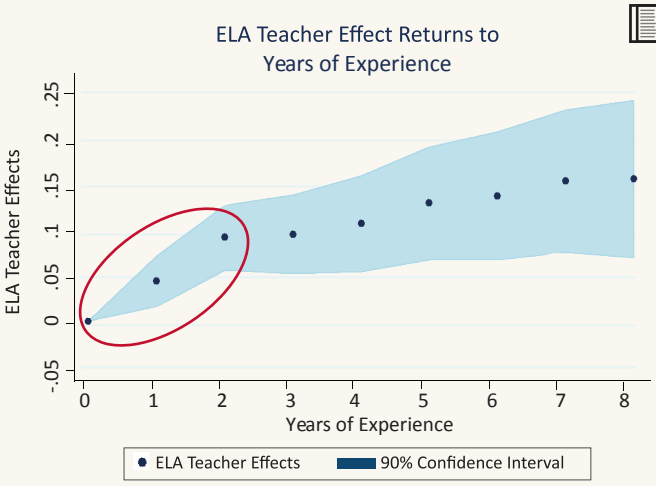


A: 4% of the teachers in school A are in the most effective quartile.
B: 68% of the teachers in school B are in the most effective quartile.

Summary Analyses

V. *How does teacher effectiveness change over the course of a teacher's career?*

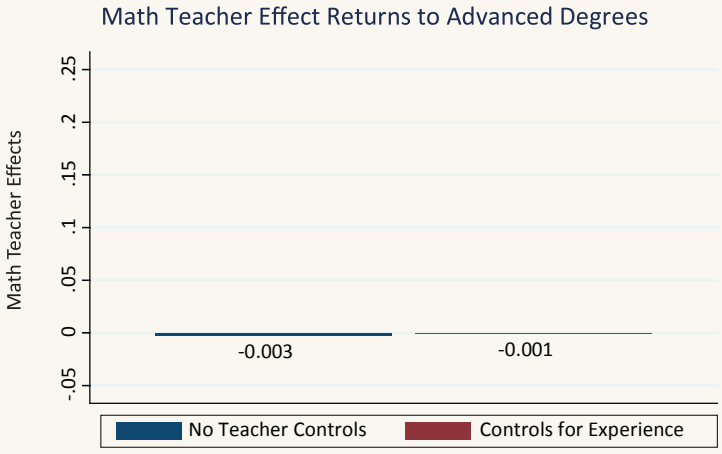




FCS teachers become more effective during their first two years in the classroom for both math and ELA. After two years, however, returns to experience are generally small and inconsistent.

FCS teachers improve their effectiveness most in their first two years of teaching in both math and ELA. This pattern is consistent with many studies of teachers in other districts and states nationwide, which show that a teacher's performance largely plateaus by his or her third or fourth year.[3]

VI. *How effective are teachers with advanced degrees?*

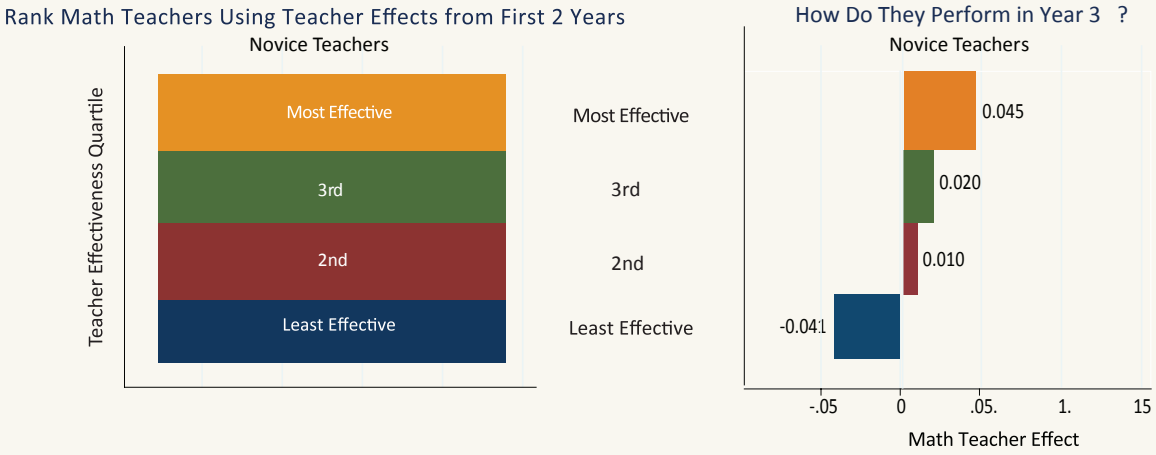


FCS teachers with advanced degrees are no more effective than their colleagues without such degrees.

Georgia's teacher salary schedule pays teachers with advanced degrees more; however, on average, teachers with advanced degrees are no more effective than their counterparts lacking such degrees. This result is consistent with findings in the national literature.[4]

Summary Analyses

VII. *Do estimates of teacher effectiveness among novice teachers predict future performance?*



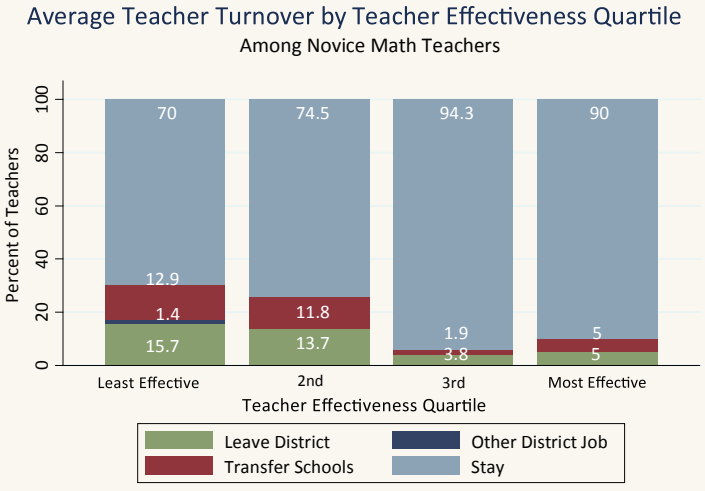
Teacher effects for novice FCS teachers are, on average, predictive of future teacher effectiveness.

After ranking novice teachers in quartiles using two years of math teacher effectiveness data, these teachers, on average, perform similarly in their third year. This result suggests predictive power for estimating future effectiveness. These results hold true for ELA teachers as well (not shown).

VIII. *At what rates are the most and least effective novice FCS teachers being retained?*

FCS retains its most effective novice math teachers at higher rates than its least effective novice math teachers. However, the same pattern is not evident among novice ELA teachers or among experienced teachers in either subject.

A higher proportion of top quartile novice math teachers remain teaching than their less effective peers. Novice ELA teachers, on the other hand, remain teaching in the district at similar rates across quartiles (not shown). Additionally, among experienced math teachers, the most effective are more likely to take other non-teaching jobs within the district. Their retention rates, however, are similar to their least effective counterparts (not shown).



Notes

Endnotes

1. Rivkin, S.G., Hanushek, E.A., and Kain, J.F., "Teachers, Schools, and Academic Achievement," Econometrica, Vol. 73, No. 2 (March 2005), pages 417–458.

2. Hill, C.J., Bloom, H.S., Black, A.R., and Lipsey, M.W., "Empirical Benchmarks for Interpreting Effect Sizes in Research," Child Development Perspectives, Vol. 2, No. 3 (December 2008), pages 172-177.

3. Boyd, D.J., "How Changes in Entry Requirements Alter the Teacher Workforce and Affect Student Achievement." Education Finance and Policy, Vol. 1, No. 2 (Spring 2006), pages 176–216.

4. Gordon, R., Kane, T.J., and Staiger, D.O., "Identifying Effective Teachers Using Performance on the Job," Hamilton Project Discussion Paper (March 2006), The Brookings Institution.

Figure Notes

Page 7

I. Sample: 2nd-8th grade unique math teachers in 2007-08 through 2009-10 using three year pooled estimates. N=2,134.

II. Sample: 2nd-8th grade math in 2007-08 through 2009-10 with teacher effect estimates. Experienced new hires may have one or more years of previous teaching experience. Low Poverty Quartile: N=1,060; 2nd Quartile: N=1,053; 3rd Quartile: N=1,030; High Poverty Quartile: N=1,041.

Page 8

III. Sample: Elementary school students in 2007-08 through 2009-10 with prior math CRCT test scores and elementary school math teachers in 2007-08 through 2009-10. N(students)=62,040; N(teachers)=2,120. *p<.05

IV. Sample: 2009-10 math teachers using two year pooled estimates. Only schools with at least fifteen teachers with teacher estimates are included. School poverty status is calculated using the proportion of students eligible for free or reduced price lunch.

Page 9

V. Sample: 2nd-8th grade math and ELA teachers in 2007-08 through 2009-10. N(math teachers)=2,062; N(ELA teachers)=2,064. Effects are estimated using teacher fixed effects.

VI. Sample: 2nd-8th grade math teachers in 2007-08 through 2009-10. Degree information based on salary grade.

Page 10

VII. Sample: 2nd-8th grade novice FCS math teachers in 2005-06, 2006-07, and 2007-08 who stay and teach for at least three years (through 2007-08, 2008-09, or 2009-10). N=153.

VIII. Sample: 2nd-8th grade novice math teachers in 2007-08 through 2008-09. Least Effective Quartile: N=80; 2nd Quartile: N=62; 3rd Quartile: N=58; Most Effective Quartile: N=46.

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Questions regarding the FCS Human Capital Diagnostic?

SDP@GSE.HARVARD.EDU
WWW.GSE.HARVARD.EDU/SDP

Center for Education Policy Research
HARVARD UNIVERSITY