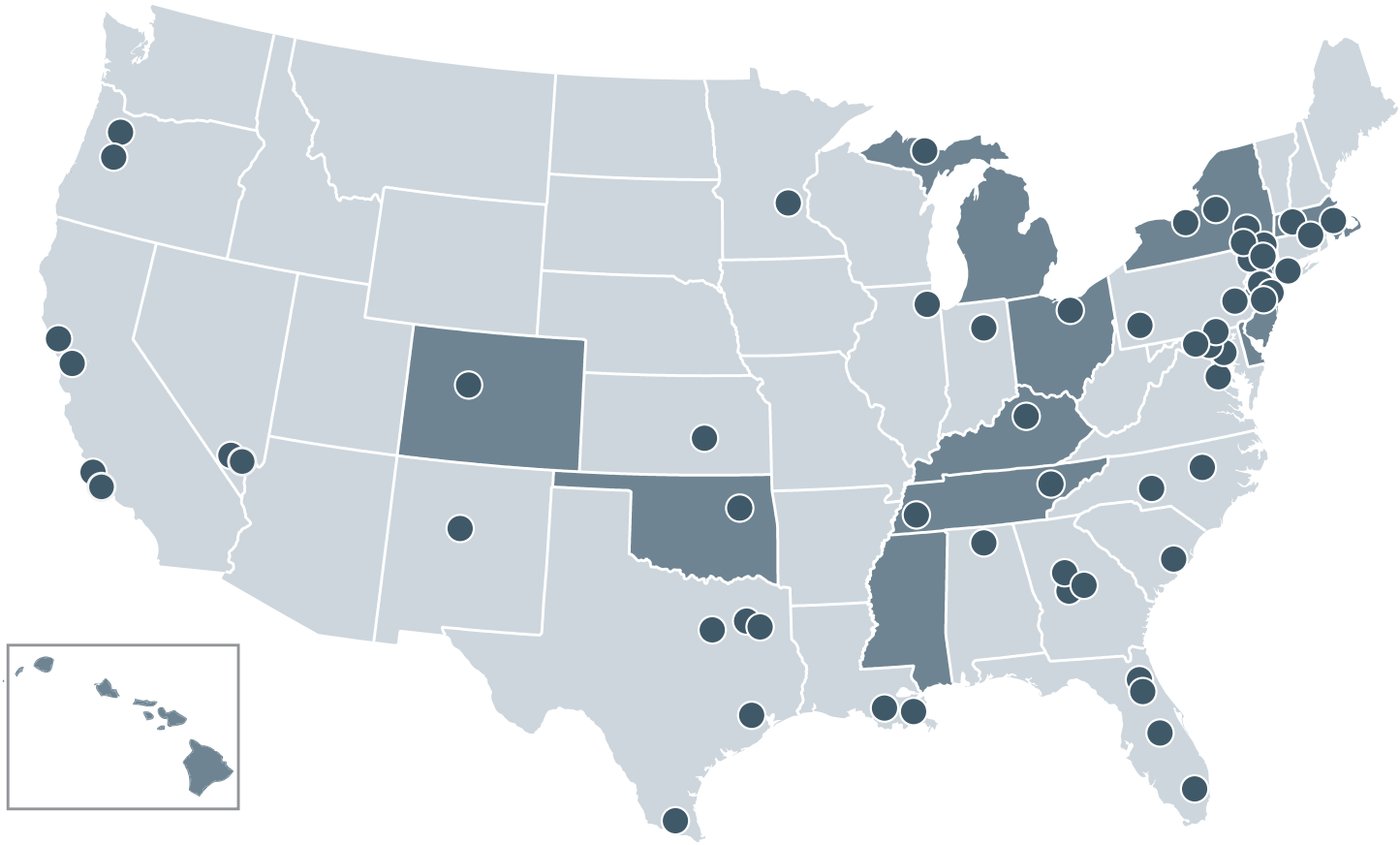
STRATEGIC DATA PROJECT

SDP EDUCATOR DIAGNOSTIC

Delaware Department of Education

April 2015



THE STRATEGIC DATA PROJECT (SDP)

MISSION AND VISION

Since 2008, SDP has partnered with 75 school districts, charter school networks, state agencies, and nonprofit organizations to bring high-quality research methods and data analysis to bear on strategic management and policy decisions. **Our mission is to transform the use of data in education to improve student achievement.**

Part of the Center for Education Policy Research at Harvard University, SDP was formed on two fundamental premises:

1. Policy and management decisions can directly influence schools' and teachers' ability to improve student achievement.
2. Valid and reliable data analysis significantly improves the quality of decision making.

THEORY OF ACTION

SDP believes that if we are able to bring together the right people, assemble the right data, and perform the right analysis, we can help leaders make better decisions—ultimately improving student achievement significantly.

To make this happen, SDP pursues three strategies:

Strengthening Analytic Capacity
Placing and supporting data strategists in partner organizations who will influence policy at the local, state, and national levels

Uncovering New Insights through Applied Research
Creating policy- and management-relevant analyses for districts and states

Supporting Network Growth and Improved Decision-Making
Transforming how data is used in the education sector through broad dissemination of analytic tools, methods, and best practices

The project is supported by the Bill & Melinda Gates Foundation.

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Introduction and Background

Teachers play a critical role in student learning and achievement. Recent 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, the Strategic Data Project has designed the educator diagnostic[2] as a means to

- Better inform agency leaders about patterns of effectiveness among their teachers, and
- Identify potential areas for policy change that could leverage teacher effectiveness to improve student achievement.

This report, which represents a culmination of the Strategic Data Project's research engagement with the state of Delaware, illuminates patterns related to three critical areas of policy focus for the state: the recruitment, placement, and success of new and early career teachers; teacher impact on student learning; and teacher retention and the stability of the state's teacher workforce.

This report does not represent an exhaustive set of findings, nor does it contain specific recommendations for the state to implement. Rather, it is intended as representative of a set of analyses that can help Delaware and its public school districts better understand its current performance and set future goals. We believe that clearly understanding current status is a prerequisite to developing focused strategies for improvement. Within this context, we also highlight several key policy initiatives underway in Delaware that the state has taken in response to these analyses.

This diagnostic is also meant to demonstrate how educational agencies can capitalize on existing data to better inform decision making.[3] To conduct these analyses, researchers connected student data (including background characteristics and test scores) to human resources data about the state's educator workforce over a several-year period from 2006–07 through 2011–12. By doing so, researchers were able to calculate measures of teachers' impact on student learning for a subset of teachers. The diagnostic analyses leverage 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.

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

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Key Findings

The Delaware Department of Education expressed strong interest in three focal areas for the SDP Educator Diagnostic: new and early career teachers; teacher impact on student learning; and teacher retention, transfer, and turnover. In this section, we summarize key findings in each of these focal areas. The summary is then followed by a detailed presentation of the analyses underlying the key findings. Two appendices describe the model used to estimate teacher impact, and the data sources and definitions.

Section I. New Teachers

Students in Delaware's high-poverty schools are more likely to be taught by newly hired teachers, and Delaware's new teachers are more likely to teach students who are the furthest behind academically.

A substantial share of Delaware's teacher workforce is made up of new or early-career teachers. Specifically, over one quarter of public school teachers in Delaware have taught for five or fewer years, and 8% of teachers are novices with no prior teaching experience. How these new and early-career teachers are distributed across schools and students in the state is an important policy question; both national evidence and Delaware-specific findings reveal that novice teachers tend to have less impact on student learning than those with more years of teaching experience. Related to this, we find that in Delaware, students in high-poverty schools are more likely to be taught by newly hired teachers, and that Delaware's new and early-career teachers typically teach students who are further behind academically than the students their veteran colleagues teach.

Section II. Teacher Impact on Student Learning

Delaware teachers' impact on student test scores varies significantly; the difference can be up to a year of learning.

The Strategic Data Project uses a value-added measure to understand teachers' impact on student learning (see Appendix A for a more detailed discussion of methodology). In contrast to traditional systems of teacher evaluation that show little variation in teachers' ratings, we find that value-added estimates of teacher impact vary substantially across teachers in Delaware. The difference between a 25th and 75th percentile math teacher is 0.15 standard deviations, which is roughly equivalent to four additional months of instruction.[4]

By examining teachers' impact as they progress in the profession, we additionally observe that teachers show substantial growth in their impact on student learning during their first several years in the classroom. Specifically, between Years 1 and 4, teachers exhibit a 0.12 standard deviation gain in their impact on student learning, on average. This is roughly equivalent to an additional three months of instruction. In addition, we observe that teacher impact on student achievement in any two years of teaching is a strong predictor of impact in the next year.

Section III. Teacher Retention

Year-to-year teacher retention is significantly lower in the state's highest-poverty schools.

Analyses focused on teacher retention in Delaware reveal mixed results. The teaching force in Delaware is relatively stable overall. More than eight in 10 Delaware teachers return to teach in the same school from one year to the next, and an additional 7% of teachers remain teaching in Delaware although they have made a change of either school or district. Compared to retention rates overall, however, newly hired teachers are much less likely to be retained from one year to the next. Five years after being hired, six in 10 teachers remain teaching in Delaware, and only four in 10 remain teaching in the same school. Finally, just as retention patterns differ by teachers' years of experience, they also differ by school characteristics, with high-poverty schools and charter schools experiencing higher rates of teacher turnover.

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Analyses: New Teachers

Section I. New Teachers

Research has found that many easily observable teacher characteristics, such as whether a teacher has a master's degree, have little relationship to teacher impact on student achievement.[5] One characteristic that has been shown to be relevant, however, is whether a teacher has no prior classroom experience.[6] On average, students placed with novice teachers tend to achieve less academic growth than peers who are taught by more experienced teachers. In fact, in Delaware as well as in many other Strategic Data Project partner sites, we find that teacher impact on student achievement improves steadily in a teacher's first several years of experience, on average. The first few years are a critical period of professional growth for teachers in Delaware.

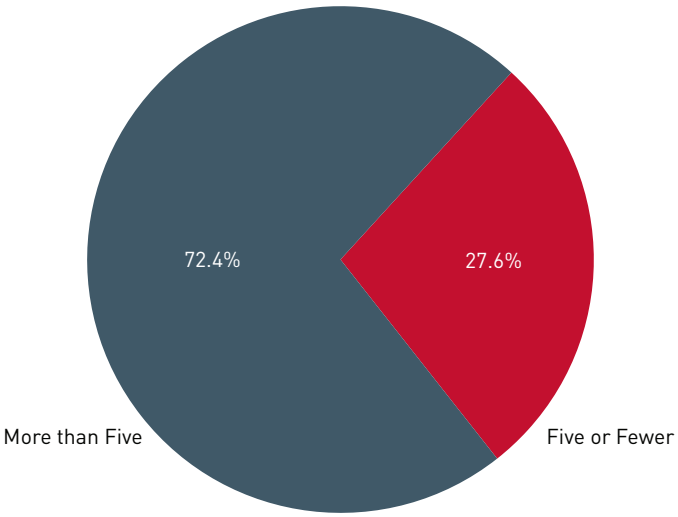
At the same time, the fact that students placed with inexperienced teachers may be at a disadvantage raises equity concerns. If students who are academically disadvantaged are placed with inexperienced teachers, this could cause them to fall further behind and potentially widen achievement gaps. Thus, it is important for education systems to consider not just the growth and development of their early-career teachers, but also where and who they are teaching.

This section of the diagnostic brief focuses on Delaware's new and early-career teachers. Specifically, it includes information on the share of Delaware teachers who are new to or early in the profession and information on the placement of students with teachers according to their prior teaching experience.

Over several recent school years, a substantial share of teachers in Delaware—over one quarter—were early-career teachers with five or fewer years of experience in the classroom (Figure 1). Further, over this same period, nearly one in 10 teachers was new to teaching in Delaware (Figure 2).[7] Given the substantial representation in the Delaware teaching force of new and early-career teachers and the likelihood that these rates will increase in the years ahead with the retirement of the baby boom generation, Delaware should pay particular attention to the characteristics, placement, and experiences of this segment of the teacher population. To support this focus, in the subsequent analyses, we examine features of where and whom beginning teachers teach.

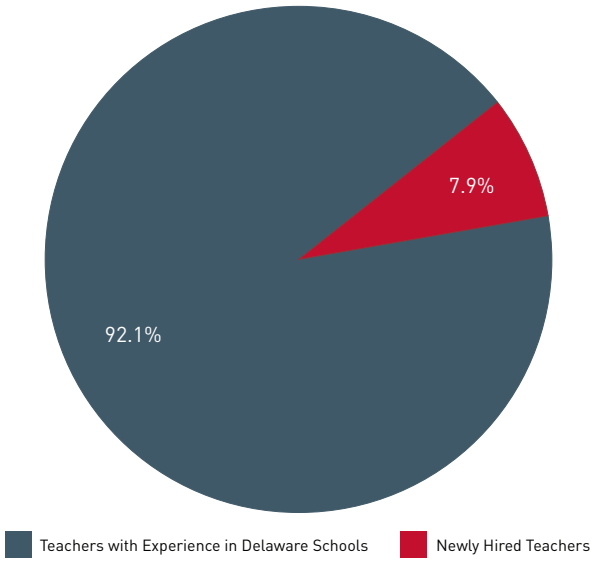
Over one quarter of public school teachers in Delaware have taught for five or fewer years, and 8% of teachers are new hires.

Figure 1. Distribution of Teachers, by Years of Experience



Note. Sample includes teachers with teacher job codes in comprehensive, vocational, and magnet schools in the 2007–08 through 2011–12 school years, with 37,609 teacher years and 9,836 unique teachers. All data are from Delaware Department of Education records.

Figure 2. Distribution of Teachers, by New Hire Status



Note. Sample includes teachers with teacher job codes in comprehensive, vocational, and magnet schools in the 2007–08 through 2011–12 school years, with 38,487 teacher years and 10,140 unique teachers. All data are from Delaware Department of Education records.

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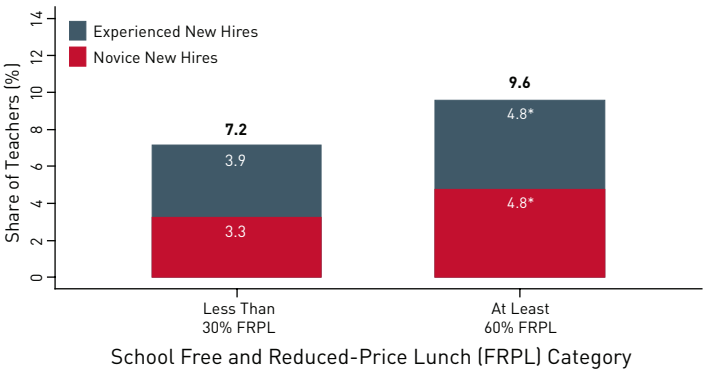
Analyses: New Teachers

Students in high-poverty schools are more likely to be taught by newly hired teachers.

Figure 3. Share of Teachers Who Are New Hires, by Level of Experience and School Poverty



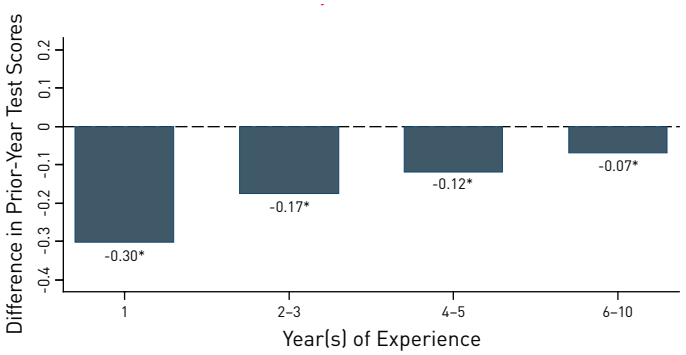
* Significantly different from the less than 30% FRPL value, at the 95% confidence level.
Note. Sample includes teachers with teacher job codes in comprehensive, vocational, and magnet schools in the 2007–08 through 2011–12 school years, with 38,280 teacher years and 10,088 unique teachers. School free and reduced-price lunch (FRPL) shares are calculated using pooled student data from the 2006–07 through 2011–12 school years. All data are from Delaware Department of Education records.

Newly hired teachers, both with and without prior teaching experience, make up larger shares of the teaching force in schools serving disadvantaged students. We define low-poverty schools as those serving a student population in which less than 30% of students qualify for free or reduced-price lunch (FRPL) and high-poverty schools as those serving a student population in which at least 60% of students qualify for FRPL. As shown in Figure 3, while approximately 7% of teachers in low-poverty schools are new hires, in high-poverty schools this rate is nearly 10%. In addition, we observe significant differences in the share of novice teachers in these two types of schools (3.3% of teachers in low-poverty schools compared to 4.8% of teachers in high-poverty schools).

While these differences may seem small, it is important to consider the implications that these figures have for students' exposure to new or inexperienced teachers over the course of their educational careers. For example, assuming that novice teachers are evenly distributed across grades and subjects and that the share of novices does not change over time, these snapshot differences would suggest that over 13 years of elementary and secondary education, students in high-poverty schools have nearly a 50% chance of being taught by a novice at least once in a given subject. In contrast, this same rate is approximately 35% for those in low-poverty schools.

Both across and within schools, Delaware's new and early-career teachers typically teach students who are further behind academically than the students their veteran colleagues teach.

Figure 4. Difference in Average Prior Math Performance of Students Assigned to Early-Career Teachers Compared to Teachers With 11 or More Years of Teaching, Elementary Schools: Overall



* Significantly different from zero, at the 95% confidence level.
Note. Sample includes comprehensive and magnet school teachers with teacher job codes and their students in Grades 4 and 5 with prior-year test scores in the 2006–07 through 2011–12 school years, with 3,576 teacher years, 76,169 student years, 1,162 unique teachers, and 50,712 unique students. Test scores are normalized to have an average of 0 and a standard deviation of 1, and are shown in standard deviation units. All data are from Delaware Department of Education records.

Figure 5. Difference in Average Prior Math Performance of Students Assigned to Early-Career Teachers Compared to Teachers With 11 or More Years of Teaching: Within Elementary Schools

* Significantly different from zero, at the 95% confidence level.
Note. Sample includes comprehensive and magnet school teachers with teacher job codes and their students in Grades 4 and 5 with prior-year test scores in the 2006–07 through 2011–12 school years, with 3,576 teacher years, 76,169 student years, 1,162 unique teachers, and 50,712 unique students. Test scores are normalized to have an average of 0 and a standard deviation of 1, and are shown in standard deviation units. All data are from Delaware Department of Education records.

Analyses: New Teachers

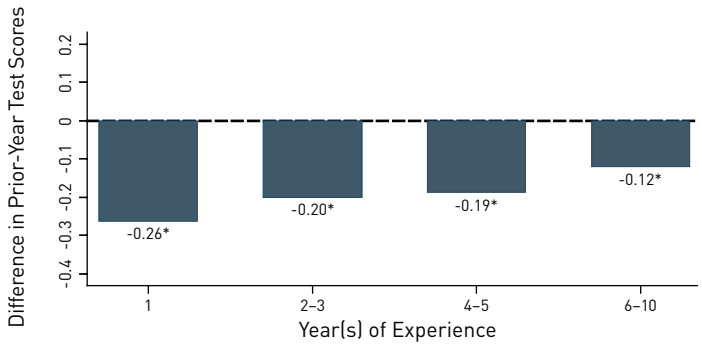
In Figures 4 and 5, we present information on the prior achievement of students assigned to early-career teachers with one to 6–10 years of teaching experience. We compare the average prior achievement of students taught by these teachers with the average prior achievement of students taught by teachers with 11 or more years of experience. The difference in student achievement is measured in standard deviation units.

Across Delaware, students assigned to first-year teachers are approximately nine months behind (0.30 standard deviations) their counterparts assigned to very experienced teachers, and students assigned to second- and third-year teachers are approximately five months behind (0.17 standard deviations) (Figure 4). There are several potential explanations for these placement patterns. For example, schools with lower-performing students may also tend to have high turnover and thus more novice teachers. That is, these patterns may exist primarily because of differences between schools. On the other hand, it may be that novice teachers tend to be assigned to lower-performing students, even within schools.

When looking exclusively within schools, lower-performing students are still placed disproportionally with novice teachers (Figure 5), and these placement gaps remain statistically significant for teachers with 1-5 years of experience. Nevertheless, these within-school differences are approximately half as large as the overall differences. Within schools, novice teachers tend to be paired with students who are starting the school year approximately five months (0.16 standard deviations) behind their same-school peers served by the most experienced teachers.

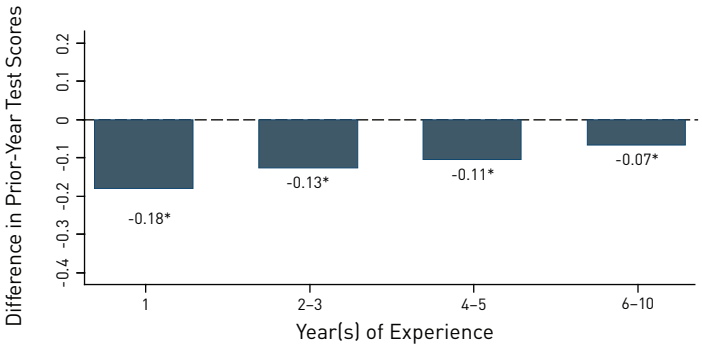
These placement trends have important implications for both students and staff. From a student perspective, both previous research and SDP analyses of administrative data show that students placed with novice teachers tend to achieve less academic growth (as measured by standardized test scores) than do peers assigned to more experienced teachers.[8] From the standpoint of teacher retention, existing research suggests that new teachers with more challenging assignments are more likely to leave their schools while the same is not true for more experienced teachers.[9] Therefore, it may be worth considering whether placing earlier career teachers (relative to experienced teachers) in highly challenging teaching situations is the best path to improvements in student achievement, teacher development, and teacher retention. As shown in Figures 6 and 7, we observe similar patterns at the middle school level.

Figure 6. Difference in Average Prior Math Performance of Students Assigned to Early-Career Teachers Compared to Teachers With 11 or More Years of Teaching, Middle Schools: Overall



* Significantly different from zero, at the 95% confidence level.
Note. Sample includes comprehensive and magnet school teachers with teacher job codes and their students in Grades 6 through 8 with prior-year test scores in the 2006–07 through 2011–12 school years, with 1,824 teacher years, 108,302 student years, 580 unique teachers, and 56,974 unique students. Test scores are normalized to have an average of 0 and a standard deviation of 1, and are shown in standard deviation units. All data are from Delaware Department of Education records.

Figure 7. Difference in Average Prior Math Performance of Students Assigned to Early-Career Teachers Compared to Teachers With 11 or More Years of Teaching: Within Middle Schools



* Significantly different from zero, at the 95% confidence level.
Note. Sample includes comprehensive and magnet school teachers with teacher job codes and their students in Grades 6 through 8 with prior-year test scores in the 2006–07 through 2011–12 school years, with 1,824 teacher years, 108,302 student years, 580 unique teachers, and 56,974 unique students. Test scores are normalized to have an average of 0 and a standard deviation of 1, and are shown in standard deviation units. All data are from Delaware Department of Education records.

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Spotlight on Action: New Teachers

Spotlight on Action: New Teacher Preparation and Mentoring in Delaware

The SDP Diagnostic analyses were a timely and well-positioned collaboration for the state of Delaware. As Delaware Governor Jack Markell headed into his second term as governor, a key component of his agenda was to ensure that every student in Delaware had access to a high-quality teacher and that new teachers would be "ready to make a difference on their first day in the classroom."[10]

Trends revealed in the SDP analyses about the classroom placement patterns of early-career teachers helped inform the governor's thinking around these goals. Understanding that novice teachers were more often placed with students with the highest needs, the state began implementing policy efforts to ensure Delaware's new teachers receive high-quality preparation. In 2013, Governor Markell worked with state policy and education leaders to pass Senate Bill 51, a bill to strengthen educator preparation. The legislation was designed to raise the bar for entry into Delaware teacher preparation programs, establish high-quality student teaching experiences, require rigorous exit assessments, and increase preparation program accountability by tracking graduates' impact on student achievement up to five years after graduation.

Delaware policymakers also sought to improve the mentoring experience for Delaware's novice teachers to ensure success in their roles. The state launched the Comprehensive Induction Innovation Grant in 2013 to support Local Education Agencies' (LEAs) development and implementation of innovative induction and mentoring programs. The purpose of the comprehensive induction grant program was to provide novice educators with additional support to become familiar with school and district policies and procedures, hone their professional skills, help them evaluate and reflect upon their own professional performance, and develop an individualized growth plan to improve their effectiveness. Since 2012, the Delaware Department of Education has conducted two rounds of the Competitive Induction Program grant and has awarded around $400,000 in grants to Delaware LEAs. A third round is scheduled for 2015.

Analyses: Teacher Impact on Student Learning

Section 2. Teacher Impact on Student Learning

Research shows that teachers have the largest influence on student learning among factors within an educational system's control.[11] In the past, education policymakers had limited usable information about teachers' impact on student achievement. With the advent of longitudinal data systems that allow the analysis of student growth from year to year, it has become possible to isolate and estimate teachers' impact on student test scores. In the analyses, SDP used a student growth-based measure, value-added, to shed light on patterns of teacher impact. Appendix A describes details of how this measure is calculated and its benefits and limitations.

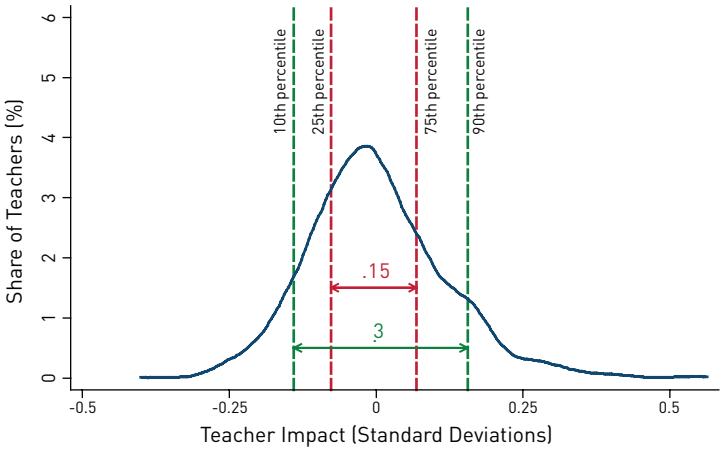
The analyses in this section use the value-added measure to address several important questions: How do teacher impacts on student test scores vary? How do they change as teachers gain experience? Are teacher qualifications such as advanced degrees related to student achievement? How well does impact from one time period predict impact in a future year? The answers to these questions will help Delaware develop policies that maximize the effectiveness of its teacher workforce.

Nationwide research has shown that teacher impacts vary widely and can account for an important share of the differences in academic progress made by students.[12] In Delaware, math teacher impact on student learning varies substantially as well. The difference between 25th and 75th percentile math teachers is 0.15 standard deviations (Figure 8), roughly four additional months of instruction, and the difference between 10th and 90th percentile math teachers is twice as large.

At the same time, national research has shown that 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.[13] Variation in ELA teacher effects is smaller in Delaware relative to math effects as well. The difference between 25th and 75th percentile ELA teachers is approximately 0.13 standard deviations, and the difference between a 10th and 90th percentile ELA teacher is approximately 0.25 standard deviations (not shown).

Teacher impacts on student achievement vary substantially across teachers in Delaware. The difference between 25th and 75th percentile math teachers is 0.15 standard deviations, which is roughly equivalent to four additional months of instruction.

Figure 8. Distribution of Math Teacher Impact



Note. Sample includes comprehensive and magnet school teachers with teacher job codes and math students in Grades 4 through 8 in school years 2006–07 to 2011–12 with 1,759 unique teachers. All data are from Delaware Department of Education Records.

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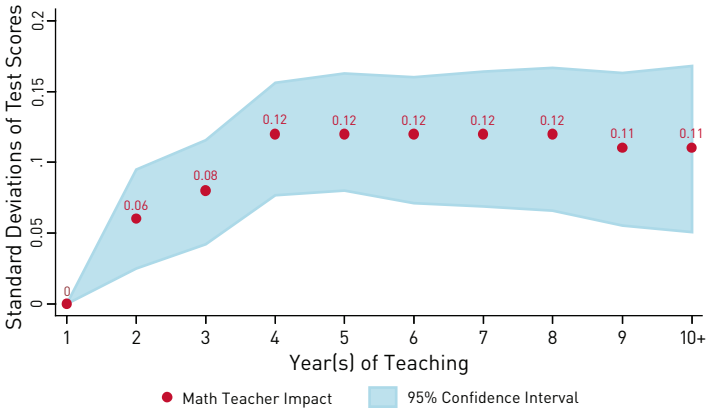
Analyses: Teacher Impact on Student Learning

Delaware math teachers show substantial growth in their impact on student achievement during their first several years in the classroom.

Figure 9. Math Teacher Impact Over Time, Compared to Impact in the First Year of Teaching

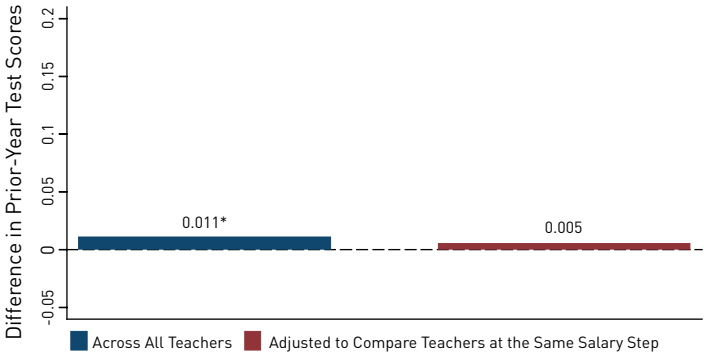


Note. Sample includes comprehensive and magnet school teachers with teacher job codes in the 2006–07 through 2011–12 school years and teacher impact estimates who are linked to fourth-through eighth-grade students, with 5,448 teacher years and 1,721 unique teachers. Teacher impacts on student test scores are average within-teacher gains compared to novice teachers. All data are from Delaware Department of Education records.

Studies in other agencies show that early-career teachers make gains in terms of their impact on students' test-based achievement as they accrue the first few years of teaching experience, while the returns largely plateau around year 4 for the average teacher.[14] Figure 9 reveals a similar pattern for Delaware teachers. In both math and ELA, Delaware teachers generate the largest gains in terms of impacts on student learning during their first four years of teaching. For example, fourth-year math teachers typically have made gains of 0.12 standard deviations since their first year of teaching. This is roughly equivalent to three months of additional math instruction.

Delaware teachers with advanced degrees do not have larger impacts on student learning, on average, than their colleagues without advanced degrees.

Figure 10. Math Teacher Impact of Teachers With an Advanced Degree, Relative to Teachers With a Bachelor's Degree Only



*Significantly different from zero, at the 95% confidence level.
Note. Sample includes comprehensive and magnet school teachers with teacher job codes and teacher impact estimates who are linked to students in schools in the 2006–07 to 2011–12 school years, with 5,346 teacher years and 1,655 unique teachers. All data are from Delaware Department of Education records.

Like other agencies, teacher salary schedules in Delaware compensate teachers for pursuing and obtaining advanced degrees. Fifty-five percent of Delaware teachers have master's or doctoral degrees, and a larger percentage have course credit beyond a bachelor's degree. However, the average impact of elementary and middle school teachers with advanced degrees is not substantially different from their counterparts lacking such degrees. In Figure 10, the difference in average teacher impact when comparing those teachers with and without advanced degrees is shown in blue. Because teachers with advanced degrees are likely also to have more years of teaching experience, the result in red controls for that possibility by making comparisons only among groups of teachers with a similar level of classroom experience. In neither case do teachers with advanced degrees appear to outperform teachers without them. This result is consistent with the national literature.[15]

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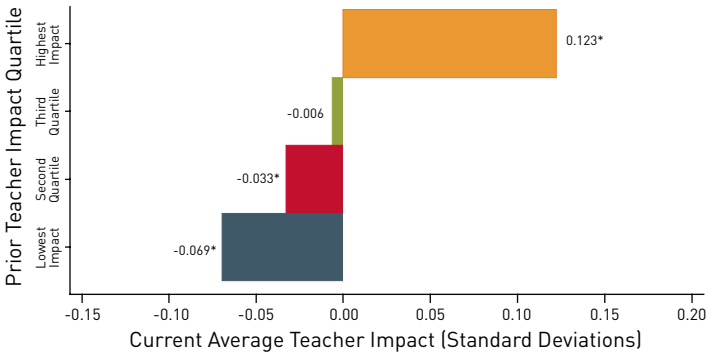
Analyses: Teacher Impact on Student Learning

When considering an average teacher's performance, it is important to consider the stability of the teacher impact estimate in order to make decisions about professional development and strategic placement. Figure 11 groups middle school teachers with three years of impact measures into quartiles based on their teacher impact scores during the first two years. Each bar represents the average teacher impact score during the third year. Teachers who ranked in the top quartile after the first two years (gold bar) continued to exhibit larger impact estimates in their third year than teachers ranked in the three lower quartiles. The difference between those in the top and bottom quartile is nearly 0.20 standard deviations, the equivalent of more than six months of classroom instruction. This result suggests that performance during one time period is predictive of later performance, as measured by teacher impacts.

Nevertheless, it is important to note that while these teacher impact estimates are informative, they are imperfect. Teacher impacts can vary widely from year to year for individual teachers. Figure 12 illustrates the distributions of teacher impacts in the third year for teachers who demonstrated high and low performance in the prior two years (e.g., teachers in the top and bottom quartiles of teacher impacts). The ranges in teacher impacts overlap such that some previously bottom quartile teachers outperform previously top quartile teachers (and vice versa).

On average, teachers in the top quartile of student impact over a two-year period continue to have the highest impact in a third year.

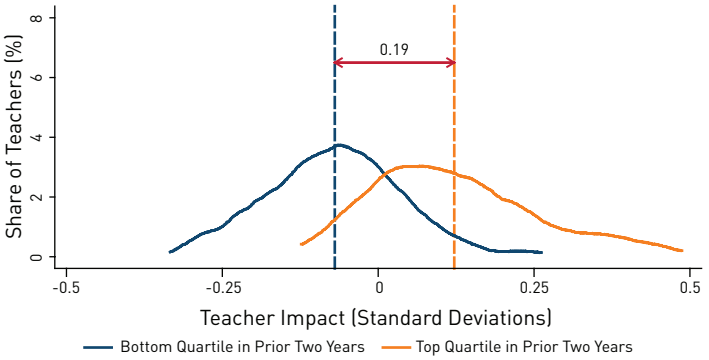
Figure 11. Average Math Teacher Impact in Third Year by Quartile Rank From Prior Two Years, Middle Schools



*Significantly different from zero at the 95% confidence level.
Note. Sample includes comprehensive and magnet school math teachers with teacher job codes and teacher impact estimates who are linked to students in Grades 6 through 8 in the 2006–07 though 2011–12 school years, with 296 teachers. All data are from Delaware Department of Education records.

While estimates of teacher impact are informative, they can also vary from year to year for individual teachers.

Figure 12. Distribution of Math Teacher Impacts in the Third Year of Teaching, by Teacher Impact Quartile Rank During the Prior Two Years



Note. Sample includes comprehensive and magnet school math teachers with teacher job codes and teacher impact estimates who are linked to students in Grades 6 through 8 in the 2006–07 through 2011 school years, with 296 unique teachers. All data are from Delaware Department of Education records.

Spotlight on Action: Teacher Impact on Student Learning

Spotlight on Action: Delaware's Committee to Advance Educator Compensation and Careers

As findings from the SDP Educator Diagnostic for Delaware were presented across the state, two teacher impact findings sparked conversations among policymakers: the plateau in improvement that occurred after the fourth year of teaching and the lack of a strong connection between attainment of an advanced degree and increased student achievement. These proved to be helpful as the state began to grapple with hard questions about the traditional salary schedule that was based on years of experience and degree attainment.

During the 2013 State of the State address, Governor Markell requested that the Delaware General Assembly collaborate on a re-examination of the pay structure for teachers. His goal was to recognize Delaware's current and future K–12 educators as valuable professionals in order to attract high-quality novice teachers and promote growth and advancement across educator's careers. Together, they passed Senate Bill 254 in June 2014 and established the Committee to Advance Educator Compensation and Careers (CAECC), charged with developing an alternative compensation structure and educator career pathway for the state.[16]

With guidance from the SDP analyses,[17] the CAECC began developing an alternative compensation plan that would reward teachers for performance and responsibility in addition to knowledge, skills, and years of experience. Through a series of public meetings, the committee refined their proposal. The new system would supplement the current structure by offering opportunities for teachers to earn additional pay for taking on leadership responsibilities and developing senior leadership roles for "a small subset of educators who have demonstrated the highest levels of effectiveness."[18] The proposal also included plans to improve recruitment and retention of effective teachers by increasing starting salaries and enabling educators to reach higher salary rates sooner in their careers. A final proposal is expected to be presented to the governor in the spring of 2015.

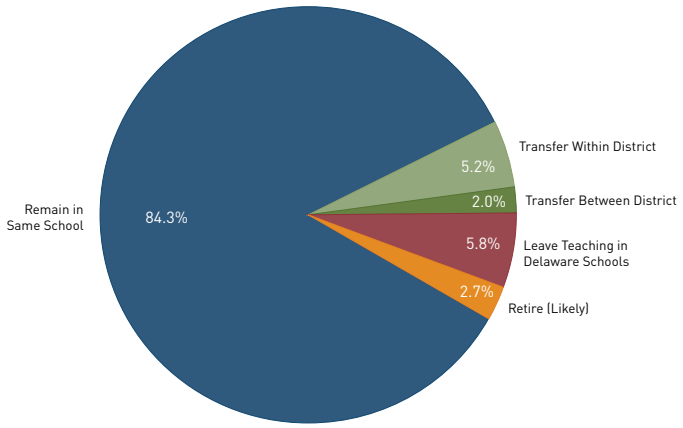
Analyses: Teacher Retention

Section 3. Teacher Retention

Recruiting, hiring, and training new teachers is costly, and new teachers improve significantly during the first several years in their work (e.g., Figure 9). Analyses of teacher retention and turnover can help state education agencies identify patterns in teachers' movements into, across, and out of districts in the state, which can, in turn, inform numerous human capital policies related to teacher preparation, hiring, and retention. The analyses in this section examine the share of teachers who stay in the same school, transfer to another school or district, or leave teaching in Delaware each year.

There is a high rate of teacher stability across Delaware with more than eight in 10 Delaware teachers returning to teach in the same school from one year to the next.

Figure 13. One-Year Teacher Retention Rates

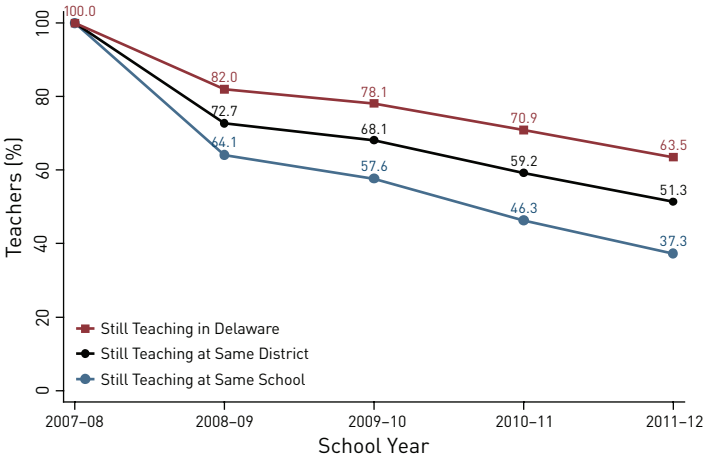


Note. Sample includes comprehensive, vocational, and magnet school teachers with teacher job codes in the 2006–07 through 2010–11 school years, with 38,159 teacher years and 10,045 unique teachers. Retention analysis are based on on-year retention rates. All data are from Delaware Department of Education records.

Using five years of state administrative data, we examined the average one-year retention rate for Delaware teachers. Across all public school teachers in Delaware, there is a high rate of teacher stability from one year to the next. As shown in Figure 13, approximately 84% of teachers remain teaching in the same school, and another 7% of teachers remain in the Delaware education system but transfer across schools and/or districts from one year to the next. Approximately 9% of teachers leave teaching in Delaware schools, including exits due to retirement.

Compared to retention rates overall, newly hired teachers are much less likely to be retained from one year to the next. Five years after being hired, six in 10 teachers remain teaching in Delaware, and only four in 10 remain teaching in the same school.

Figure 14. Five-Year Retention Patterns for Newly Hired Teachers



Note. Sample includes comprehensive, vocational, charter, and magnet school teachers with teacher job codes in the 2007–08 school year, with 821 unique teachers. All data are from Delaware Departmet of Education records.

While there is a great deal of stability in the teaching force in Delaware overall (Figure 13), Figure 14 reveals that there is far less stability in retention patterns for those newly hired to teach in the state. Compared to 9% of all teachers leaving teaching in Delaware from one year to the next, approximately 18% of newly hired teachers do not return for a second year of teaching. After five years, nearly 40% of newly hired teachers have left Delaware classrooms. Of those that do remain, many also move across schools and districts during these first five years in Delaware, such that only four in 10 newly hired teachers are retained in the same school for five years.

Given the investments required to identify, screen, and hire new teacher candidates, Delaware may want to consider efforts to increase the rates with which they are able to retain their early-career teachers, particularly those that exhibit strong performance in their first several years in the classroom.

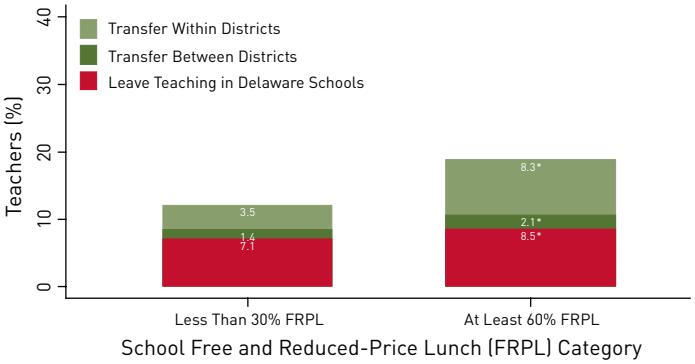
Analyses: Teacher Retention

Just as teacher turnover is more prevalent among certain types of teachers, it is also more prevalent in certain types of schools. As shown in Figure 15, from one year to the next, high-poverty schools experience a greater level of teacher turnover. Compared to the comprehensive, vocational, and magnet school in the same county, teachers in these schools are more likely to transfer schools within the same district, to transfer to teaching positions in other districts, and to leave teaching in Delaware all together. This aligns with the finding presented at the beginning of this brief that high-poverty schools have higher shares of new teachers.

In addition, in Figure 16 we observe that teacher turnover tends to be more prevalent in charter schools compared to their same-county traditional school counterparts. This may relate to the fact that charter schools tend to have different hiring and retention practices. First, charter schools are more likely to hire inexperienced or early career teachers, and they are also more likely to let go teachers who may be a poor fit for their school environment.[19] Due to data limitations, however, we were not able to investigate this issue further in the Delaware data.

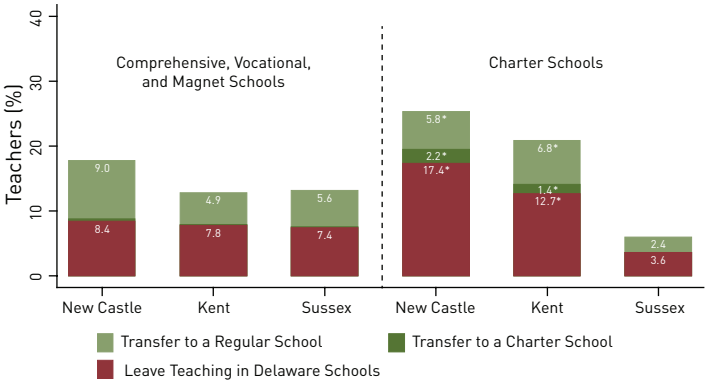
Certain types of schools experience higher rates of teacher turnover.

Figure 15. Teacher Turnover by School Poverty



*Significantly different from less than 30% FRPL value, at the 95% confidence level.
Note. Sample includes teachers with teacher job codes in comprehensive, vocational, and magnet schools in the 2006–07 to 2011–12 school years, with 37,955 teacher years and 9,993 unique teachers. School free and reduced-price lunch (FRPL) shares are calculated using pooled student data from the 2006–07 and 2011–12 school years. All data are from Delaware Department of Education records.

Figure 16. Teacher Turnover by School Type and County



*Significantly different from traditional schools in same county, at the 95% confidence level.
Note. Regular schools include comprehensive, vocational, and magnet, and charter schools in the 2006–07 through 2010–11 school years, with 40,885 teacher years and 10,861 unique teachers. Retention analysis is based on one-year retention rates. All data are from Delaware Department of Education records.

Spotlight on Action: Teacher Impact on Student Learning

Spotlight on Action: Talent Recruitment and Retention Efforts in Delaware

During the diagnostic process, Delaware leadership such as Governor Markell and State Secretary of Education Mark Murphy expressed specific interest in the results from retention analyses. Informed by figures such as the high attrition rate in high-poverty schools and the low retention rate for newly hired teachers, the state began several policy initiatives to "attract great teachers where we need them" and to "incentivize teaching in high-needs schools and critical subjects, raise starting teacher pay, and reward teacher leadership."[20]

One of the initiatives launched by the state is the Delaware Talent Cooperative, which recruits and retains exemplary teachers in its highest-need schools. The program provides incentives (up to $20,000) for high-impact educators to transfer to or continue teaching in high-need schools in addition to school grants and professional development for educators in the program. During the 2012–13 school year, 168 educators from 13 schools participated in the program and school year 2013–14 added 173 more.

Another initiative is the statewide recruitment portal (www.joindelawareschools.org), launched in 2013 as part of the larger campaign to recruit the best educators to teach in Delaware. All school districts are now connected to this central hiring website, intended to make it easier for schools to recruit and retain high-quality educators. Finally, the state also raised the profile of a pilot program, created in 2011, that encouraged early hiring. Through this program, the state estimated each district's enrollment for the following year in May and then guaranteed state funds to each district to cover 98% of the state's share of hiring the teachers justified by that enrollment estimate. After the pilot program was found to have a major impact on promoting earlier hiring, it was made permanent in 2014 as House Bill 259 was signed into law.

SDP EDUCATOR DIAGNOSTIC

Appendix A: Measuring Teacher Impact

What is teacher impact, and how is it estimated?

In the SDP Educator Diagnostic for Delaware, measures of teacher impact are based on students' performance on the state standardized achievement tests. Specifically, we considered student performance on the Delaware Student Testing Program (DSTP) for academic years 2005–06 through 2009–10 and on the Delaware Comprehensive Assessment System (DCAS) for academic years 2010–11 and 2011–12. Teacher impact is estimated by statistically isolating the impact a teacher has on his or her students' test performance 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.[21] This implies that value-added measures of teacher impact are relative, not absolute, measures. Even if Delaware teachers as a group were among the most effective in the nation, half would still have negative impact estimates because they are being compared to the average teacher in Delaware. Teacher impacts can only be estimated for teachers who can be linked to a classroom roster of students in grades for which standardized test information is available on student performance from the previous and current year.

What is considered a large impact size?

Throughout this report, we 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. Impact estimates greater than 0.20 are often considered large for educational interventions. One point of comparison is the achievement gap between Black students and White students in Delaware, which was 0.60 standard deviations in fifth-grade math in the 2011–12 school year.

We also convert effect sizes into a months-of-learning measure. On nationally normed standardized tests, research has shown that an effect size of 0.42 is roughly equivalent to a year's worth of academic growth.[22] 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 Delaware's standardized tests are not nationally normed tests, we use these estimates as a rough approximation to translate effect sizes into a months-of-learning measure.

Which teachers are included in this report?

In this report, we primarily present results for math teachers tied to students in Grades 4 through 8 from 2006–07 to 2011–12. We conducted similar analyses for English language arts (ELA) teachers during the same timeframe. In total, teacher impacts were estimated for approximately 20% of Delaware teachers. Because high school students are not tested annually, it is more challenging to calculate value-added estimates at the high school level. For this reason, we focus on the elementary and middle school years, when students are tested at the end of each grade. All data for the analyses come from Delaware Department of Education administrative records.

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.[23] 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).

Appendix A: Measuring Teacher Impact

What are the limitations of teacher impacts?

Value-added measures of teacher impact are valuable 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.

- Value-added measures of teachers' performance relate exclusively to student achievement on standardized tests. Effective teachers do more than raise student test scores. Further, teacher impact measures 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 math coaches or reading specialists) that influences students' academic progress. Supplemental instructors' influence is not accounted for when estimating teacher impacts. This is primarily a concern when estimating individual teacher impacts. When looking at the impacts of large groups of teachers, such supplemental instruction would only be problematic 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 impacts. Although we often report findings concerning differences in average teacher impacts of teachers from different groups, there is often far more variation in teacher impact within these groups than between them. As shown in Figure 11, teachers who previously had high teacher effects (the top 25%) are, on average, more effective than their peers who previously had low teacher effects (the bottom 25%). Yet, some bottom quartile teachers outperform top quartile teachers in their third year.

Despite these recognized limitations, it is important to note that none of the other measures that are widely 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.[24] Until very recently, 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."[25] This was true of Delaware's former teacher evaluation system, under which essentially all teachers were rated as satisfactory.

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Appendix B: Definitions and Data Sources

I. Definitions

Teacher

For the purposes of this brief, a teacher refers to an individual who has a teacher job code in comprehensive, vocational, magnet, and charter schools in the Delaware Department of Education administrative records. Individuals with substitute teacher job codes are excluded.

Novice Teacher

We determine novice teachers based on their years of experience. A "novice" teacher is a teacher with no prior teaching experience.

Newly Hired Teacher

A newly hired teacher is a teacher who appears in the Delaware Department of Education administrative records for the first time between the 2007–08 school year and the 2011–12 school year. Newly hired teachers may or may not have prior teaching experience.

Likely retiree

A teacher is flagged as a likely retiree if she was more than 60 years old during her last year of teaching at her school.

II. Data Sources

To perform these analyses, we connected student data (e.g., demographics, state test scores, etc.) to teacher human resource data (e.g., hiring data, scheduling data, experience, etc.). These data were available from the 2006–07 school year through the 2011–12 school year. Details for each figure are presented in figure notes. Students and teachers in alternative, pre-kindergarten, and special education schools are not included in any of the analyses presented in this brief.

SDP EDUCATOR DIAGNOSTIC

Endnotes

[1] Rivkin, S.G., Hanushek, E.A., & Kain, J.F. (2005). Teachers, schools, and academic achievement. *Econometrica, 73*(2), 417–458.

[2] In conjunction with leadership at the Delaware Department of Education, the SDP Human Capital Diagnostic was renamed the Educator Diagnostic. This decision was made in order to specifically highlight to external audiences that the primary research focus of the project was on teachers.

[3] Many of the findings included in this brief have also been completed in other SDP partner agencies. 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 http://www.cepr.harvard.edu/sdp/strategic-performance-indicators

[4] The conversions of standard deviations of student achievement to months of learning reported in this document are based on Hill, C.J., Bloom, H.S., Black, A.R., & Lipsey, M.W. (2008). Empirical benchmarks for interpreting effect sizes in research. *Child Development Perspectives, 2*(3), 172–177.

[5] Gordon, R., Kane, T.J., & Staiger, D.O. (2006). *Identifying effective teachers using performance on the job* (Hamilton Project Discussion Paper). Washington, DC: The Brookings Institution; Rivkin et al. (2005).

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[7] While some new hires may be novice teachers who are in their first year of teaching in any school, the definition of new hires in this analysis includes any teacher who was not teaching in Delaware schools in the prior year, even if they have additional experience outside of Delaware or are returning to teaching after a gap.

[8] See, for example, Strategic Data Project. (2012). *SDP Human Capital Diagnostic for Los Angeles Unified School District.* Retrieved from http://cepr.harvard.edu/cepr-resources/files/news-events/sdp-lausd-hc.pdf

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[11] Rivkin et al. (2005).

[12] Aaronson, D., Barrow, L., & Sander, W. (2007). Teachers and student achievement in the Chicago public schools. *Journal of Labor Economics, 25*(1), 95–135.

[13] Kane, T., & Cantrell, S. (2010). *Learning about teaching: Initial findings from the measures of effective teaching project.* Seattle, WA: Bill & Melinda Gates Foundation.

[14] 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.

[15] Gordon et al. (2006).

[16] Delaware Senate Bill 254, 147th General Assembly. (2014). Retrieved from http://legis.delaware.gov/LIS/lis147.nsf/vwLegislation/SB+254

[17] Committee to Advance Educator Compensation and Careers. (2015). *Meeting #14.* Retrieved from http://caecc.us/wp-content/uploads/2014/10/CAECC-meeting-14-1.30.2015-vF.pdf

[18] Committee to Advance Educator Compensation and Careers (2014). *Kickoff Meeting.* Retrieved from http://caecc.us/wp-content/uploads/2014/10/CAECC-7.30.2014-Kickoff-Meeting.pdf

[19] U.S. Department of Education, National Center for Education Statistics, Institute of Education Sciences. (2013). C*haracteristics of public and private elementary and secondary school teachers in the United States: Results from the 2011–12 schools and staffing survey* (NCES Report No. 2013-314). Washington, DC: U.S. Department of Education. Retrieved from http://nces.ed.gov/pubs2013/2013314.pdf; Stuit, D., & Smith, T. (n.d.) *Teacher turnover in charter schools.* Nashville, TN: National Center on School Choice. Retrieved from http://www.vanderbilt.edu/schoolchoice/documents/briefs/brief_stuit_smith_ncspe.pdf; Carruthers, C.K. (2012). The qualifications and classroom performance of teachers moving to charter schools. *Education Finance and Policy, 7*(3), 223–268; Cowen, J.M., Winters, M.A. (2013) Do charters retain teachers differently? Evidence from elementary schools in Florida. *Education Finance and Policy, 8*(1), 14–42.

[20] Markell (2013).

[21] 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 nonstructural 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.

[22] Hill et al. (2008).

[23] Kane & Cantrell (2010), 9.

[24] Gordon et al. (2006).

[25] 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 Weisberg, D., Sexton, S., Mulhern, J., & Keeling, D. (2009). *The widget effect: Our national failure to acknowledge and act on teacher effectiveness differences.* New York: The New Teacher Project. Retrieved from http://tntp.org/assets/documents/TheWidgetEffect_2nd_ed.pdf

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