

Relationship Between Teacher Performance and Students' College Enrollment

Introduction

In July 2012, the Pennsylvania General Assembly enacted Act 82, which required school districts to evaluate teachers using multiple measures of effectiveness, including observations of their classroom instruction and measures of student outcomes. This legislation formalized work that public education stakeholders in the Pittsburgh Public Schools (PPS) had already begun. During the 2010–11 school year, PPS leadership began working in collaboration with educators and the Pittsburgh Federation of Teachers (PFT) to develop an appropriate set of measures for evaluating teachers' performance. Together, these parties developed a measure of teachers' effectiveness that included classroom observations from RISE¹ (weighted 50%), a measure of teachers' individual value-added (or a score from RISE 3f,² weighted 30%), student survey data from Tripod (weighted 15%), and school value-added (weighted 5%).

In addition to providing teachers with critical information about their instructional practice, data from the new evaluation system allow policymakers and researchers to examine the relationships between PPS students' exposure to effective teaching and longer-term outcomes of interest, such as students' enrollment in college. During the 2013–14 school year, PPS partnered with the Strategic Data Project (SDP) to explore questions of this nature.

This Key Findings Report highlights the results from the analysis of the relationship between high school students' exposure to teachers of different levels of effectiveness and their subsequent college enrollment rates. Results suggest that there is a positive relationship between teachers' performance levels and students' enrollment in two- and four-year institutions, controlling for a range of student and school characteristics.

Table 1. Percentage of PPS High School Graduates, 2011 through 2013, by Teacher Performance Levels

		Instances of Distinguished Teaching			
		0	1	2	3+
Instances of Failing Teaching	0	21.0%	11.6%	8.8%	11.7%
	1	13.5%	8.4%	5.1%	4.1%
	2	4.7%	3.5%	1.7%	0.9%
	3+	3.3%	0.7%	0.6%	-

Note. The lower-right cell is suppressed for having fewer than 20 students.

Evidence

To begin, we examined the extent to which PPS high school graduates received instruction from teachers of different levels of effectiveness in each of their core courses from Grades 9–12.³ Subsequently, we investigated whether these students' exposure to teachers of different levels of effectiveness in their core courses enrolled in two- or four-year institutions at higher rates after controlling for numerous student, school, and course characteristics. Table 1 depicts the percentage of PPS high school graduates whose core courses were taught by different permutations of teachers rated as either Distinguished or Failing.⁴ Students' core courses could be taught by zero, one, two, or three or more teachers performing at either the Distinguished or Failing level.

As the table illustrates, 21% of the PPS students who graduated between 2011 and 2013 were taught by teachers whose performance levels were neither Distinguished nor Failing (i.e., all of the students' core courses were taught by teachers rated Proficient or Needs Improvement). Looking at the total of the results in the blue cells in the Table, we see that slightly more than half of PPS high school graduates (54.5%) had no more than one teacher performing at the Distinguished or Failing level, and about a third (32.9%, the total of all results reported in orange cells) had two or more teachers performing at the Distinguished level.

Table 2. PPS Graduates' College Enrollment Rates, 2011 through 2013, by Teacher Performance Levels

		Instances of Distinguished Teaching			
		0	1	2	3+
Instances of Failing Teaching	0	35.4%	53.3%	62.1%	74.7%
	1	43.1%	55.2%	60.6%	71.7%
	2	36.0%	40.1%	63.9%	63.2%
	3+	31.9%	29.0%	36.0%	-

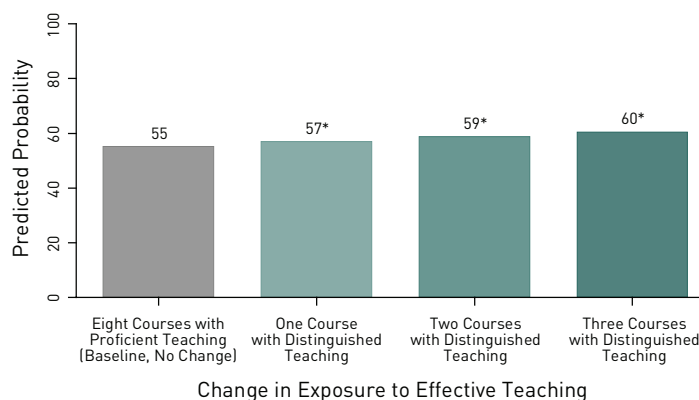
Note. The lower-right cell is suppressed for having fewer than 20 students.

As we might expect, students' college enrollment rates were related to their exposure to Distinguished teaching in core courses. As Table 2 depicts, students who were exposed to at least two instances of Distinguished teaching had notably higher college enrollment rates than their peers whose core courses were taught by either zero or one teacher performing at the Distinguished level.

However, these observed college enrollment rates likely conflate a number of factors beyond just students' exposure to teachers of different levels of effectiveness. For example, students with better college prospects may be more likely to attend schools with more effective teachers. Further, within schools, higher achieving students may be more likely to be assigned to the highly effective teachers who are tasked with teaching advanced subjects.⁵ In addition, the achievement of students in these advanced, college-track courses is likely to be higher, thus introducing the possibility that a student's peers might also contribute to his or her success in these courses and beyond. To better understand the relationship between teachers' effectiveness and students' college enrollment outcomes, we need to control for students' characteristics, their prior academic achievement, the high school they attend, and the level, or track, of their high school courses.⁶

Figure 1 depicts students' predicted college enrollment rates, controlling for these factors. In the figure, the gray bar on the left depicts a predicted college enrollment rate for students whose core courses are taught by teachers performing at the Proficient level (considered the baseline for subsequent comparisons). The green bars to the right of the baseline bar report PPS high school students' predicted college enrollment rates if one, two, or three of their teachers were to move from Proficient to Distinguished performance.

As the figure reveals, controlling for the factors mentioned above, PPS high school students whose core courses were taught by teachers performing at the Proficient level have a predicted college enrollment rate in two- or four-year institutions of 55%. If one teacher's performance changed

Figure 1. Predicted College Enrollment Rates When Changing Teacher Effectiveness in Core Courses, With School Fixed Effects

*Indicates statistically significant difference between student's outcome with eight courses with proficient teaching (baseline) and student's outcome when exposed to a higher level of teaching effectiveness, with 95% confidence. Note. This sample includes 3,576 2010–11 through 2012–13 high school graduates. Due to school closure, 2010–11 graduates of Peabody and Schenley high schools are missing college enrollment data from the National Student Clearinghouse and are thus omitted from this analysis. All data from National Student Clearinghouse or administrative records.

from Proficient to Distinguished, students' predicted college enrollment rates would rise to 57%, and if students were exposed to two or three teachers performing at the Distinguished level in their core courses, their predicted college enrollment rates would rise to 59% or 60%, respectively [all of these differences are statistically significant].⁷ We also examined how students' predicted college enrollments would change if one, two, or three of their core courses were taught by teachers rated as Failing (not shown), but these predicted enrollment rates were not statistically different from the baseline model in which all of students' core courses were taught by teachers rated as Proficient.

The figure shows that after controlling for various student, school, and course characteristics, students' predicted college enrollment rates differ substantially from the observed rates depicted in Table 2. This underscores the points made earlier about how students' observed college enrollment rates conflate many factors that affect this outcome. As Table 2 reveals, in practice, PPS high school graduates who were taught by three or more teachers performing at the Distinguished level had college enrollment rates of over 70%. However, after controlling for all of the previously noted observed characteristics, we predict that a prototypical PPS high school graduate who was exposed to three teachers performing at the Distinguished level would have a 60% college enrollment rate. Similarly, in practice, PPS graduates who were not taught by any teachers performing at the Distinguished level had enrollment rates under 45%; however, after controlling for numerous factors, we predict that the prototypical PPS student whose core courses were taught by teachers rated to be Proficient would have a 55% college enrollment rate.⁸

Implications

The findings from these analyses have a number of implications. First, the results indicate that there is a positive relationship between students' exposure to Distinguished teaching and their college enrollment, even after controlling for a range of variables. This suggests that strengthening the effectiveness of students' core course teachers is likely to influence students' postsecondary outcomes. PPS has recently invested a great deal of resources in enhancing teachers' effectiveness and initiatives of this nature are likely to have an effect on students' longer term success and well-being.

At the same time, the results also indicate areas for improvement. Practically speaking, the predicted college enrollment rate is low (55%) for the average PPS high school graduate whose core courses are taught by teachers performing at the Proficient level. As Table 1 reveals, students who are exposed to neither Distinguished nor Failing teaching represent a substantial proportion of PPS students. Exposing the same prototypical student to three instances of Distinguished teaching is associated with a 60% college enrollment rate—a higher rate, but undoubtedly not as high as administrators, practitioners, and students would ideally like. Moreover, given that less than a fifth of recent PPS high school graduates were exposed to Distinguished teaching in three or more of their core courses (see Table 1), altering students' exposure to this many instances of Distinguished teaching is likely to require a substantial effort to strengthen instruction in students' core courses. This suggests the importance of complementing efforts to strengthen teachers' effectiveness with other initiatives targeted at increasing college enrollment and persistence. Research has shown that some low-cost interventions, such as providing students with assistance completing financial aid forms or sending them short text message reminders about important deadlines, can have a profound effect on the same postsecondary outcomes.⁹

It is also important to be mindful that this analysis, while as rigorous as possible with existing data, does not account for other factors that might influence students' college enrollment. For example, access to college counseling, test preparation resources, and assistance with applications outside of core academic courses may influence students' enrollment outcomes. Further, this analysis focuses on PPS high school graduates, students who have already cleared a large hurdle (i.e., high school graduation). Future research should examine whether and how ninth graders' trajectories through high school are influenced by their exposure to different levels of effective teaching.¹⁰

Additional research may help PPS to continue to examine the relationship between teachers' effectiveness and students' college enrollment. For example, while this analysis uses the district's overall measure of teacher effectiveness, it may be instructive to examine whether specific components within the teacher evaluation systems (i.e., teachers' value-added scores, classroom observation ratings, and student survey results) are more or less predictive of students' postsecondary success. Analyses of this nature may help PPS policymakers ascertain whether the design or implementation of their new teacher evaluation system could be strengthened to more accurately characterize teachers' relative effectiveness and/or to provide teachers with valuable feedback that could help inform their ongoing development.

In distributing this Key Findings Report, SDP and PPS collectively hope that these findings may facilitate continuous improvement in teacher growth and teacher evaluation systems here and in other districts as they begin to adopt these systems.

Endnotes

¹ RISE (Research-based Inclusive System of Evaluation) is Pittsburgh Public Schools' system-wide method of teacher evaluation and professional growth that assesses four levels of performance across 24 components of practice and classroom-based observations conducted at least twice per year.

² RISE 3f is the sixth component, "Assessment Reports and Student Learning," in Domain 3, "Teaching and Learning," out of the four Domains and 24 components of the RISE evaluation instrument.

³ We use ratings of teacher effectiveness from the 2011–12 and 2012–13 combined measure. By focusing on core courses in grades 9–12 for students who graduated between 2011 and 2013, we introduce teaching in the academic years 2007–08 through 2012–13. To assign performance levels to teachers before 2011–12, we take information available for teachers in 2011–12 and 2012–13 and match the ratings to the same teachers for earlier years when we can. In case teachers have two different performance levels in 2011–12 and 2012–13 (e.g. Proficient and Distinguished) we assign the higher level (i.e. Distinguished). We do the same for teaching in 2011–12 and 2012–13 so all teachers have only one performance level across years. Core courses include courses in mathematics (algebra I, geometry, and algebra II), English (English I–IV), science (biology, chemistry, and physics), and social studies (civics, U.S. history, and world history).

⁴ State-designated categories for performance include Distinguished (at the highest end), Proficient, Needs Improvement, and Failing (at the lowest end).

⁵ Jackson, C. K. (2014). Teacher quality at the high school level: the importance of accounting for tracks. *Journal of Labor Economics*, 32(4).

⁶ Controls for students' characteristics include gender, race, limited English proficiency, eligibility for free- and reduced-price lunch, gifted status, disability status, high school attended, eighth-grade test scores in math and reading, and indicators for participation in honors and remedial courses at any point in high school. Predictors related to teaching effectiveness include the percentage of teachers students have in each of the four categories of performance (e.g., 0.25 in each category) as well as dummy variables to control for the total number of teachers observed. (Given that we match teacher ratings across years, we are not able to assign ratings to the same number of teachers for each student in the data.)

⁷ A statistically significant difference indicates that that the average predicted probability of the alternative scenario is different from the average predicted probability at the baseline with 95% confidence. Statistical significance is calculated using a chi-squared test.

⁸ While we control for observable differences between students, it is important to note that students may be assigned to teachers for reasons that are unobservable in the data (such as motivation or behavior) and positively correlated with outcomes like college enrollment, so to the extent that teachers are in classrooms with unobservably "better" students, estimated relationships will capture this effect in addition to any causal effect of teaching quality on students' outcomes. Therefore, these relationships should not be interpreted as causal.

⁹ See, for example, Castleman, B., and Page, L. (April 2013, updated January 2014). Summer nudging: can personalized text messages and peer mentor outreach increase college going among low-income high school graduates? *EdPolicyWorks Working Paper Series No. 9*. University of Virginia: Charlottesville, VA.

¹⁰ Separate SDP analyses provide suggestive evidence that higher exposure to teaching at the Distinguished level for entering ninth-grade students is associated with higher likelihood of graduating on time and graduating at the highest level (College Ready) of four levels in PPS' college readiness indicator system based on GPA and attendance.



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