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Research Brief

Teacher Preparation and Student Achievement

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Despite fiery debates about the best way to recruit and prepare teachers, with fierce proponents of both *alternative* and *traditional* pathways, most researchers would agree that the distinctions between what are commonly called alternative and traditional routes are blurry at best. Research also suggests that the differences in teacher effectiveness across pathways are less than the differences among teachers who entered teaching from the same pathway. This has led some researchers to downplay the importance of preparation altogether and focus instead on weeding out less effective teachers once they've been in the classroom (Kane and Staiger 2002). Another approach identifies more effective ways to prepare teachers and ensure that they are better prepared to succeed. Our study was designed to investigate the features of how teachers are prepared—across different pathways—that are related to teachers' impact on student achievement in their early years of teaching. Knowing what aspects of teacher preparation have the biggest impact on student outcomes could inform efforts to strengthen initial teacher preparation and fill a gap in the research on outcomes of teacher education (Cochran-Smith and Zeichner 2005; Wilson, Floden, and Ferrini-Mundy, 2001). The questions we investigated in the study included—

- Do programs make a difference? How do programs differ in the average effectiveness of their graduates, as measured by value-added scores?
- How do particular features of preparation programs affect teachers' impact on student achievement gains in math and ELA, again as measured by value-added scores? Here we look at both data we collected on programs as well as teachers' reports of their experiences in teacher preparation.

Study Desciption

Our research in New York City looked for teacher preparation features that cut across different pathways and related to teachers' effectiveness in their first two years. This work relied on a number of data sources—including program documents, surveys of graduates, and interviews with program administrators—to collect information about 31 different programs in 16 institutions that prepare most of NYC's elementary school teachers. Of these programs, 26 were more traditional college-recommending programs in which students were expected to complete all coursework and student teaching prior to becoming teacher of record in a classroom; 5 were "fast-track" programs enabling participants to be teacher of record after 6 weeks preparation, generally in summer. We collected information from a variety of sources on 5 areas identified in the literature as important indicators of program quality: program structure; subject-specific preparation in reading and math; preparation in learning and child development; preparation to teach racially, ethnically, and linguistically diverse students; and characteristics of field experiences (c.f. Cochran-Smith and Zeichner 2005; Darling-Hammond, Bransford, LePage, Hammerness, and Duffy 2005; Wilson, Floden, and Ferrini-Mundy 2001).

In addition to program data, we amassed a great deal of administrative data, including data on student achievement, teacher characteristics, student characteristics, as well as characteristics of classrooms and schools. We used these data to look at teachers' impact on student achievement gains—their "value-added"—in their first years of teaching. The use of value-added methodologies to assess teacher effectiveness using statistical adjustments has both advantages and disadvantages (McCaffrey, Koretz, Lockwood, and Hamilton 2003). Many stakeholders see student achievement gains as a logical metric with which to measure the effectiveness of teaching, in that we care most about how teachers affect students, and these measures are widely available. However, even though the link to student outcomes is central to measuring teacher effectiveness, there is no consensus on the particular methodology that best captures the relationship between teachers and student performance. To start with, student test scores are never perfect indicators of what students know or what teachers have taught. Researchers have raised concerns about whether these tests are valid measures of the domains of knowledge that we care about, whether they reliably measure student learning, and, even if they do, whether they reliably measure the aspects of learning that teachers are able to affect (see, for examples, Feldt and Brennan 1989; Messick 1989). However, researchers generally feel more comfortable using such value-added analyses to look at the impact not of individual teachers, but of a school, or in our case, teacher preparation programs.

With these caveats in mind, we used multiple versions of value-added approaches (see Boyd, Grossman, Lankford, Loeb, and Wyckoff 2009 for technical details) to estimate the relationship between features of teacher preparation and teachers' impact on student achievement.

Programs Matter

First, we found that both institutions and programs differ with respect to the impact of their graduates on student achievement gains. The difference between the average of the institutions and the institution with graduates with the highest impact on value-added scores is approximately 0.07 standard deviations in both math and ELA, which is about the same effect in average learning between students eligible for free- or reduced-price lunch and those who are not, something most people would agree is a meaningful effect. We see similar patterns when looking at program effects. The differences in effects across programs are somewhat larger in math (with a range of approximately 0.18 standard deviations than in English/Language Arts (ELA) with a range of 0.10. As was true of institutions, programs that produce effective teachers in elementary ELA also, on average, produce effective elementary teachers in math (correlation 0.73).

While perhaps it seems commonsensical to many that programs might differ in their effectiveness, very little research has ever been able to make this link between teacher education programs and the student achievement of their graduates. This is a difficult link to make, since many factors other than a preparation program can impact teachers' effectiveness. Given the current movement to assess teacher education programs based on the effectiveness of their graduates, understanding both the potential and the challenges in making such linkages is critical.

Program Features Matter

We also found that features of programs, as documented through both program information and reports of graduates, are related to student achievement. For example, in looking at data collected from programs, we found that when programs exercised greater oversight over the field experiences of their students—including taking primary responsibility for selecting cooperating teachers, requiring cooperating teachers to have a minimum number of years of teaching experience, and requiring supervisors to observe student teachers at least 5 times—this led to greater impact on student achievement among their

graduates. In addition, programs that included a capstone project, which could include an action research project or a portfolio of a teacher's work, had graduates with greater impact on student achievement. These findings held for achievement in both ELA and math. However, the number of math content courses required by a program was associated with greater effectiveness in math, but increased courses in ELA content was not associated with impact on achievement in ELA.

To look at students' reports of their experiences in teacher education, we conducted a survey in spring of 2005 of all first-year teachers in New York City; the survey had an overall response rate of 71%. We asked a wide range of questions, including questions about their experiences in teacher education, the mentoring they received in their first year of teaching, their goals for students, and their teaching practices. We then created measures of opportunities to learn about teaching math; opportunities to learn about teaching ELA; opportunities to learn about handling student misbehavior; and opportunities to learn about teaching English language learners. We also created measures of the extent to which preparation included links to the work of teaching through, for example, assignments that involve working with students; opportunities to study the New York City curriculum; whether or not the teacher had student-teaching experiences, not as the teacher-of-record in the classroom; and the congruence between their student-teaching placement and their current job assignment in terms of subject matter or grade level.

In looking at these different features of teacher education, we found that a number of them were related to the subsequent achievement gains of pupils. For example, teachers who reported relatively greater opportunities to study the New York City Curriculum had greater impact on student achievement in both math and ELA; opportunities to engage in practices that are similar to teaching, such as analyzing student work in math or conducting a guided reading lesson, were also strongly related to impact on student achievement in math for all teachers, and in ELA for teachers who entered through college-recommending pathways. In contrast, not having an opportunity to student teach was negatively associated with student achievement; in other words, some student teaching is important, although our results suggest that more student teaching is not necessarily better. Finally, first-year teachers who had jobs that were similar to their placements during student teaching tended to do better, particularly in math.

Implications for Policy and Practice

This study is one of the first to find an empirical link between how teachers are prepared and their subsequent impact on student achievement. This line of work, while still in its earliest stages, suggests a way of moving beyond research that tries simply to compare alternate pathways with more traditional pathways into teaching. Because there is so much variation within these broad designations of alternative or traditional pathways, such debates about which pathway is better are often unproductive (Grossman and Loeb 2010). We believe that there is greater potential for change in exploring particular features of preparation across programs, both alternative and traditional, that contribute to gains in student achievement. Our goal is to provide information that is useful for designing and implementing effective teacher preparation programs. Our study suggests the importance of program oversight over the quality of field experiences, and the value of experiences that are closely tied to the actual work of teaching. Recent calls for investments in more clinically-oriented teacher education (NCATE 2010) echo the importance of grounding the preparation of teachers in practice. Our results suggest, however, that simply requiring more time in student teaching does not necessarily contribute to greater effectiveness in the classroom. Additional work on this data set suggests that the quality of the schools in which students are placed also has a significant impact on their subsequent effectiveness (Ronfeldt 2010). Understanding more about how best to prepare teachers for the demands of practice can help us build better teachers in the long run.

Table 1
Relationship between Program Features and VA in Math and ELA

	Math			ELA		
	2001-06 1st Year	2005&06 1st Year	2001-06 2nd Year	2001-06 1st Year	2005&06 1st Year	2001-06 2nd Year
Capstone	0.0410**	0.1216**	-0.0077	0.0496***	0.1019*	-0.0271
	(0.0159)	(0.0545)	(0.0221)	(0.0112)	(0.0501)	(0.0178)
Oversight	0.0324***	0.1240***	-0.0145	0.0122~	0.1038**	0.0022
	(0.0075)	(0.0345)	(0.0125)	(0.0073)	(0.0387)	(0.0138)
Math courses	0.0239***	0.0098	0.0225**	-0.0034	0.0014	0.0011
	(0.0062)	(0.0174)	(0.0091)	(0.0084)	(0.0200)	(0.0088)
ELA courses	-0.0026	-0.0272***	0.0087	-0.0091**	-0.0060	0.0113**
	(0.0050)	(0.0085)	(0.0056)	(0.0039)	(0.0096)	(0.0051)
Percent Tenure	0.1184**	0.0614	0.0857	0.0184	-0.0478	0.0077
	(0.0503)	(0.1242)	(0.0805)	(0.0338)	(0.0874)	(0.0548)

Table 2
Relationship between First-year Teachers' Reported Experiences in Teacher Preparation and Student Test Performance in Math

	Full Sample			College Recommended		
	Fixed-effects	Random-effects	OLS	Fixed-effects	Random-effects	OLS
Practice	0.061	0.044	0.027	0.122	0.053	0.033
	(0.011)***	(0.011)***	(0.007)***	(0.016)***	(0.012)***	(0.008)***
NYC Curriculum	0.025	0.028	0.026	0.029	0.025	0.044
	(0.012)**	(0.011)**	(0.007)***	(0.017)*	(0.015)*	(0.009)***
No Student Teaching	-0.088	-0.015	0.056	-0.026	0.052	0.116
	(0.039)**	(0.038)	(0.024)**	(0.044)	(0.052)	(0.033)***
Congruence with Job	0.072	0.038	0.024	0.059	0.050	0.042
	(0.013)***	(0.011)***	(0.007)***	(0.017)***	(0.016)***	(0.010)***
Math 2	-0.072	-0.023	-0.016	0.022	0.033	-0.012
	(0.046)	(0.045)	(0.030)	(0.083)	(0.079)	(0.047)
Math 3	-0.114	0.000	0.034	0.013	0.015	0.010
	(0.060)*	(0.053)	(0.032)	(0.093)	(0.081)	(0.048)
Math 4	-0.114	0.010	0.014	-0.123	0.022	-0.010
	(0.062)*	(0.056)	(0.034)	(0.085)	(0.085)	(0.049)
Learning	0.011	-0.005	-0.001	0.044	-0.012	0.007
	(0.014)	(0.013)	(0.008)	(0.017)***	(0.017)	(0.010)
ELL	0.032	0.005	0.001	0.086	0.029	0.013
	(0.014)**	(0.012)	(0.008)	(0.021)***	(0.017)*	(0.010)
Misbehavior	0.019	0.016	0.017	-0.007	0.017	0.012
	(0.012)	(0.012)	(0.007)**	(0.030)	(0.018)	(0.011)
Observations	7037	7037	7037	4482	4482	4482
Number of schools	233	233		162	162	
R-squared	0.526		0.629	0.524		0.622

Table 3
Relationship between First-year Teachers' Reported Experiences in Teacher Preparation and Student Test Performance in ELA

	Full Sample			College Recommended		
	Fixed-effects	Random-effects	OLS	Fixed-effects	Random-effects	OLS
Practice	0.001	0.010	0.009	0.037	0.021	0.022
	(0.013)	(0.009)	(0.007)	(0.020)*	(0.010)**	(0.008)***
NYC Curriculum	-0.010	0.015	0.019	0.036	0.027	0.030
	(0.012)	(0.011)	(0.008)**	(0.024)	(0.013)**	(0.009)***
No Student Teaching	-0.062	-0.028	-0.006	-0.111	0.027	0.066
	(0.051)	(0.033)	(0.024)	(0.073)	(0.039)	(0.033)**
Congruence with Job	0.004	-0.005	-0.005	-0.018	-0.000	0.003
	(0.015)	(0.011)	(0.007)	(0.021)	(0.014)	(0.009)
ELA	0.001	-0.012	-0.020	-0.033	-0.022	-0.035
	(0.021)	(0.013)	(0.010)**	(0.034)	(0.016)	(0.012)***
Learning	-0.004	0.011	0.013	-0.015	0.010	0.024
	(0.014)	(0.012)	(0.009)	(0.021)	(0.015)	(0.011)**
ELL	0.031	0.004	-0.005	0.024	0.012	0.002
	(0.015)**	(0.012)	(0.009)	(0.029)	(0.015)	(0.011)
Misbehavior	0.025	0.014	0.010	-0.022	0.010	0.006
	(0.015)*	(0.012)	(0.007)	(0.026)	(0.015)	(0.010)
Observations	7112	7112	7112	4735	4735	4735
Number of schools	238	238		167	167	
R-squared	0.479		0.617	0.494		0.623

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