A Study on the Impact of Teach For America Teachers in the Los Angeles Unified School District

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THE IMPACT OF TEACH FOR AMERICA TEACHERS IN LAUSD

EXECUTIVE SUMMARY

BACKGROUND

In 2008, The Eli and Edythe Broad Foundation funded an analysis conducted by Vazha Nadareishvili, Ph.D. candidate, Pardee RAND Graduate School, to measure the impact Teach For America teachers within the Los Angeles Unified School District (LAUSD) were having on student achievement, in comparison to their peer teachers.

The study sought to determine whether Teach For America teachers within LAUSD outperform non-Teach For America teachers, including those with similar and or many more years of experience, in a statistically significant manner. Furthermore, the study analyzed whether Teach For America teachers within LAUSD outperform their non-Teach for America counterpart teachers, in a statistically significant manner, when those counterparts had five years or less classroom experience. Finally, the study also analyzed various value-added methodologies such as a gain score methodology and a covariate adjustment methodology to assist Teach For America as it builds its own capacity to analyze the student achievement growth of its corps members nationwide.

RESULTS

Teach For America teachers within LAUSD outperformed non-Teach For America teachers in raising student achievement in the same school, to a statistically significant degree, even though more than half of the non-Teach For America teacher comparison group had far more experience in the classroom. Teach For America teachers produced student achievement gains that were 3 scale score points higher than non-Teach For America teachers, including those with many more years of teaching experience.

In addition, when compared to other early career non-Teach For America teachers in the same school (with "early career" defined as those with five years of teaching experience or less), Teach For America teachers in LAUSD schools demonstrated even greater out-performance in terms of raising student achievement. Teach For America teachers produced student achievement gains that were 4 scale score points higher than other early career non-TFA teachers (those with five or less years of teaching experience).

The results within LAUSD are consistent with previous studies published about the relative impact Teach for America teachers are having compared to their peer teachers in other parts of the country.

METHODOLOGY

Data for the study was provided by LAUSD and E&R Services President Denise Quigley served at the methodology consultant for the analysis.

The study included 119 second-year or alumni Teach For America teachers who taught either reading or math in grades 2-12 during both 2005 and 2006 in 27 different LAUSD schools. As a control, the study also evaluated the impact of 1,190 non-Teach For America teachers who taught the same grade levels and subjects in the same schools as the Teach For America teachers.

The Teach For America teachers were compared with two groups of non-Teach For America teachers in these same 27 schools:

1. All non-Teach For America teachers, regardless of number of years of classroom teaching experience; and
2. All non-Teach For America teachers who had five years or less of classroom teaching experience.

All 119 Teach For America teachers evaluated had five years or less of teaching experience. In contrast, more than half of the non-Teach For America teachers evaluated, or 642, had more than five years of teaching experience.

The dataset contained reading and math California Standards Test (CST) test scores from 74,127 students (grades 2-12) who were taught during 2005 and 2006 by either a Teach For America teacher or a non-Teach For America teacher and were tested in the same subjects (reading and/or math).

After different value-added methodology models were tested, the evaluation was conducted using a covariate adjustment model, which proved to represent the best fit for the data. The covariate adjustment model was run with original scale scores on the reading and math CST exams.

Abstract
With over 5,000 corps members serving in the United States, Teach For America (TFA) is the nation's largest provider of teachers for low-income communities. As TFA continues to expand the number of regions, schools and students it serves, it is critical to develop a systematic and standardized method for measuring the impact of TFA teachers on student achievement. In this study, the Broad Foundation used a value-added model methodology to investigate the impact of TFA teachers compared with non-TFA teachers in 27 Los Angeles Unified School District (LAUSD) schools. Results of the study found a statistically significant advantage of TFA teachers compared to non-TFA teachers especially when TFA teachers were compared to other novice teachers with 5 or less years of experience.

Introduction

Teach for America (TFA) was founded in 1989 to address educational inequities facing children in low-income communities across the United States. TFA focuses recruitment on people with strong academic records and leadership capabilities, whether or not they planned to teach or have taken education courses. TFA is particularly interested in candidates who have the potential to be effective in the classroom, but would not have considered a teaching career but for TFA's existence. Consequently, most TFA recruits do not have education-related majors in college and therefore have not received the same training that traditional teachers are expected to have. The teacher training TFA provides its recruits is limited in duration, but quite intensive.

The Eli and Edythe Broad Foundation (TBF) has funded TFA since 2002. TBF is highly committed to measuring the impact of its investment on student achievement. As a result TBF is very intent on ascertaining how effective TFA is at reducing the educational inequities it was founded to address. TFA employs its own internal evaluation system, which attempts to measure "significant" gains where significant is defined as growth in mastery of content above and beyond one grade level. TFA's efforts to encourage teachers to push for significant gains and measure student progress are necessary and admirable. Given the improvement in the availability of data since TFA originally devised the "significant gains" methodology, and in an effort to encourage TFA to adopt a robust methodology for measuring impact on student achievement, TBF piloted the use of such a methodology on behalf of TFA using data obtained from LAUSD.

The Data

Data for the study were obtained from the Los Angeles Unified School District (LAUSD). The sample included 119 second-year or alumni TFA teachers who taught either reading or math in grades 2-12 during both 2005 and 2006 in 27 different schools. As a control, the sample also contained 1,190 non-TFA teachers who taught the same grade levels and subjects in the same schools as the TFA teachers. Table D provides details on the distribution of observations with TFA and non-TFA teachers across test subjects and grades in 2006. Additionally, the dataset contained scores from 74,127 students in grades 2-12 who were taught by either the TFA or non-TFA teachers and were tested in the same subjects (reading or math) during both 2005 and 2006 on the California Standards Test (CST). Data related to the years of teaching experience and other teacher characteristics (detailed in Table A) were available for 109 TFA teachers and 1,097 non-TFA teachers. All 109 TFA teachers had 5 years or less of teaching experience compared to 548, or fifty percent, of non-TFA teachers.

Methodology

The Broad Foundation worked with Dr. Denise Quigley of E&R Services to identify statistical models currently in use to measure teacher effects. A search of the literature indicated that a number of researchers in the field are now exploring the use of longitudinal data on students to model teacher or school contributions to student achievement. Four possible models used in the past to model teacher or school contributions to student achievement were identified through this literature review:

1. A gain score methodology,
2 A covariate adjustment methodology,
3. A general multivariate, longitudinal mixed model that incorporates the complex grouping structures inherent to longitudinal student data linked to teachers known as value-added methodology (VAM) and used by Bill Sanders in Tennessee, and
4. A general mixed model using fixed and random effects methodology.

TBF tested two of these models for this analysis: a gain score model and a covariate adjustment model.

The gain score model, assesses program effects by examining the relationship between teachers and student achievement using data related to the change in student test scores between two points in time. The gain score model is expressed by the equation below:

$$SCORE\_GAIN = B_0 + B_1*TFA + A_1*X_1 + A_2*X_2 + \ldots A_n*X_n+\varepsilon,$$

The notation SCORE_GAIN represents $SCORE_{2006}$ - $SCORE_{2005}$ where $SCORE_{year}$ is the score of an individual student on the math or reading California Standards Test (CST) in the year indicated by the subscript. The variable TFA is a dummy variable that is designated by 1 if the student's teacher is a corps member of TFA and 0 if the teacher is not. The notations $X_1, X_2, \ldots X_n$ represent different student and teacher level variables as detailed in Table A. The notations $B_1, B_2, A_1, A_2, \ldots, A_n$, designate regression coefficients, and ε is an error term.

The covariate adjustment model, evaluates program effects by examining the relationship between teachers and student achievement using longitudinal data with prior student achievement scores as a covariate in the model of current outcomes (Rowan, Correnti, and Miller, 2002; Diggle, Liang, and Zeger, 1996; Meyer, 1997). The covariate adjustment model is expressed by the following equation with the same definition of variables as indicated in the gain score model above:

$$SCORE_{2006} = B_0 + B_1*TFA + B_2* SCORE_{2005} + A_1*X_1 + A_2*X_2 + \ldots A_n*X_n+\varepsilon,$$

TBF ran several versions of both of these models to test their effectiveness and power. For each of the models we run Ordinary Least Square (OLS) regressions with

1. Two versions of CST test scores
    a. An original scale score, measured on a scale of 150-600.
    b. A normalized scale score whereby scores were normalized to fit a distribution with a mean of 0 and a standard deviation of 1 for each year, grade and subject. This was designed to control for variations of the test version over time and across subjects and grades.
2. Two different control group populations
    a. All non-TFA teachers affiliated with the 27 schools of interest.
    b. Only teachers with no more than 5 years of teaching experience to match the maximum teaching experience of the TFA teachers.
3. Four different sets of variables designed to test the explanatory power of different combinations or inputs in four different regressions to test the explanatory value of different variables:
    a. The first and most simple regression included just the TFA variables and, for the covariate adjustment models, student test scores for 2005.
    b. In the second set of regressions, student-level covariates were added.
    c. In the third set of regressions, dummies for grade-subject combinations were added.
    d. The final set of regressions added teacher-level variables such as years of teaching experience, credential status, and education level. Additional details related to the variables in the different models are included in Table A.

TBF also ran multilevel models with random effects for schools and teachers nested within schools. The equation used is the same as for the covariate adjustment and gain score models described above except the residual error term had the following form:

$$\varepsilon = \sum_{j=1}^{27} \gamma_j School_j + \sum_{j=1}^{27} \sum_{k=1}^{Kj} \delta_{jk} Teacher_{jk} + e_r ,$$

.

In this regression, $School_j$ and $Teacher_{jk}$ are dummies for school *j* and teacher *k* from school *j*. The terms γ_j and δ_{jk} are school and teacher random effects respectively. The random effects and residual e_r are assumed to be independent and identically distributed random normal variables - $N(0,\sigma_\gamma^2)$, $N(0,\sigma_\delta^2)$, and $N(0,\sigma_e^2)$ respectively.

For these models again, two comparison groups were examined: all other teacher in the schools and novice teachers only. We also looked at the same 4 variable combinations that were used for the OLS regressions. For these models the original CST scores were used as the OLS regressions indicated scaling had almost no effect on the outcomes.

Findings

Regarding the models

The covariate adjustment model represents a better fit than the gain score model. The R-squared values for the Covariate Adjustment models are consistently above 0.5, which indicates these models explain more than 50% of the variability in student test scores between years. In the case of the gain score models, the R-squared values are between 0.00 and 0.07, indicating that these models explain at most seven percent of the variability in student test scores between 2005 and 2006. The fact that the gain score model forces the coefficient of the $SCORE_{2005}$ to have a value of 1 greatly diminishes its explanatory power. As a result, the remaining analysis of findings will focus on the outcomes of the -covariate adjustment models.

The simplest OLS regressions including only the TFA dummy variable and the students' 2005 scores have nearly as much explanatory power as the regressions including student and teacher characteristics. This may reduce data collection requirements.

Finally, rescaling of test scores had almost no effect on the TFA coefficients and their statistical significances. Such results were expected as long as CST test scores are measured on the same scale (150-600) for all grades and both tests, and the ratio of TFA teachers among all teachers has a little variability across grades and subjects in our dataset. Since the variations in the format of the test scores did not impact the results, the remaining discussion will focus on results generated by the regressions with the original scale scores.

Regarding TFA's impact
Table B reports the results of the OLS regressions including the coefficients for the TFA dummy variable as well as p values and R-squared values, which demonstrate the goodness of fit for each equation. Table C reports the coefficients for all the variables included in the covariate adjustment models.

Based on the results of the various OLS regressions in Table B it is evident that TFA teachers outperformed both control groups in all 4 models. In the two most complex OLS regressions (3 and 4) shown in Table B, the coefficients for TFA teachers are 2.798 and 3.090 respectively, which indicates that student scaled scores on the 2006 CST tests are, on average, 2.798 to 3.090 points higher than for non-TFA teachers. These coefficients are statistically significant at the 1 percent level. An examination of the corresponding models for teachers with 5 years or less teaching experience shows that scale scores for TFA teachers are 3.782 to 4.245 higher than for non-TFA teachers respectively, which is also statistically significant at 1 percent level. Therefore, while the impact of having a TFA teacher produces statistically significant results in both cases, the impact of a TFA teacher is greater when compared to teachers with similar years of teaching experience.

Table C, which includes the results for the multilevel regressions using the covariate adjustment models, shows a similar picture. Students of TFA teachers outperformed students of all non-TFA teachers by 2.835 points in 2006 when 2005 test results and student characteristics were controlled. (sub-model 3). Additionally, students of TFA teachers outperformed students of non-TFA teachers with 5 years or less teaching experience by 3.673 points in 2006 under the above conditions. When teacher characteristics were also controlled for (submodel 4), students of TFA teachers outperformed students of non-TFA teachers by 2.897 points. The extent of outperformance increased to 4.453 points when comparing TFA teachers to Non-TFA teachers with 5 or less years of experience.

These results are consistent with those of previous studies regarding TFA's impact on student achievement which are summarized in Appendix 1.

Conclusions
Similar to previous studies of the TFA effect, our study demonstrates that TFA teachers produce statistically significant gains for students when compared to non-TFA teachers regardless of years of experience. Specifically, gains produced by TFA teachers were most significant when TFA teachers were compared with teachers having 5 years or less experience. The results of this study reinforce the findings of earlier studies and support the efficacy of the TFA program. TFA teachers produced student achievement that was 3 scale score points higher than all non-TFA teachers (including those with tenure) and 4 scale score points higher than all novice non-TFA teachers (those with five or less years of teaching experience). Urban schools generally have unacceptable rates of proficiency, so reform strategies that produce student gains should be bolstered.

With respect to the various models that were tested in this study, it can be concluded that the best fit model for the data was the covariate adjustment model. In terms of the submodel, there were minimal differences between conditions where the CST scores were in their original format versus those where they were rescaled. Similarly, there was no major distinction between the results of sub-models 1-4. The addition of variables did not produce significant changes to the results; therefore, the simplest variation of the covariate adjustment model could be used for future research on this topic.

As a next step we are planning to run another iteration of the analysis to examine the effects of TFA teachers on student achievement at different grade levels, on different subjects (ie reading and math) and vis-à-vis non-TFA teachers within the same school.

We hope that the successful implementation of this pilot study will encourage Teach For America to work with districts to collect student achievement data on a yearly basis and monitor the program's impact on student achievement.

Appendix Tables

Table A. Variables Included in Different Models

Variable Description	Variable Name	Model Number 1	2	3	4
Dummy variable for being a TFA Teacher	tfa_teacher	x	x	x	x
Student Level Variables					
Scaled Score at CST test in 2005	cst_ss_original2005*	x	x	x	x
Rescaled Score at CST test in 2005	cst_ss_rescaled2005**	x	x	x	x
Dummy variable for male	male		x	x	x
Dummy variable for Black	black		x	x	x
Dummy variable for Hispanic	hisp		x	x	x
Dummy variable for disadvantaged	disadvantaged		x	x	x
Dummy variable for limited English proficiency	lang_lep		x	x	x
Dummy variable for redesignated-fluent English proficient	lang_rfep		x	x	x
Dummy variable for unknown English proficient	lang_unknown		x	x	x
Dummy variable for special education status	sped		x	x	x
Dummy variable for older than corresponding grade	old_for_grade		x	x	x
1 if difference between 2006 and 2005 grades is equal to -1, 0 otherwise	grd_dif_negative1		x	x	x
1 if difference between 2006 and 2005 grades is equal to 0, 0 otherwise	grd_dif0		x	x	x
1 if difference between 2006 and 2005 grades is equal to 2, 0 otherwise	grd_dif2		x	x	x
1 if difference between 2006 and 2005 grades is equal to 3, 0 otherwise	grd_dif3		x	x	x
1 if difference between 2006 and 2005 grades is equal to 4, 0 otherwise	grd_dif4		x	x	x
Grade2006*subject dummies	grade_2_math, grade_2_read, …, grade_12_math			x	x
Teacher Level Variables					
Years of teaching experience	yrs_teach				x
Dummy variable for having full credentials	full_cred				x
1 if info on full credential status is missing, 0 otherwise	full_cred_missing				x
1 if education level is "Master's degree plus 30 or more semester hours", 0 otherwise	ed_level2				x
1 if education level is "Master's degree", 0	ed_level3				x

otherwise		
1 if education level is "Bachelor's degree plus 30 or more semester hours", 0 otherwise	ed_level4	x
1 if education level is "Bachelor's degree", 0 otherwise	ed_level5	x

Table B. OLS Regression Results

Model No	Independent Variable	Coefficient for TFA Teacher	P Value	Number of Observations	R-squared
	All Teachers				
	Covariate Adjustment Models with Original Scaled Scores				
(1)	Scaled Score in 2006	4.178***	(0.000)	74127	0.54
(2)	Scaled Score in 2006	4.169***	(0.000)	74127	0.55
(3)	Scaled Score in 2006	2.798***	(0.000)	74127	0.59
(4)	Scaled Score in 2006	3.090***	(0.000)	68721	0.59
	Covariate Adjustment Models with Rescaled Scores				
(1)	Rescaled Score in 2006	0.0630***	(0.000)	74127	0.53
(2)	Rescaled Score in 2006	0.0597***	(0.000)	74127	0.55
(3)	Rescaled Score in 2006	0.0528***	(0.000)	74127	0.55
(4)	Rescaled Score in 2006	0.0596***	(0.000)	68721	0.56
	Gain Score Models with Original Scaled Scores				
(1)	Difference between Scaled Scores in 2006 and 2005	2.118***	(0.000)	74127	0.00
(2)	Difference between Scaled Scores in 2006 and 2005	2.511***	(0.000)	74127	0.01
(3)	Difference between Scaled Scores in 2006 and 2005	2.610***	(0.000)	74127	0.07
(4)	Difference between Scaled Scores in 2006 and 2005	1.378***	(0.006)	68721	0.07
	Gain Score Models with Rescaled Scores				
(1)	Difference between Rescaled Scores in 2006 and 2005	0.0417***	(0.000)	74127	0.00
(2)	Difference between Rescaled Scores in 2006 and 2005	0.0471***	(0.000)	74127	0.01
(3)	Difference between Rescaled Scores in 2006 and 2005	0.0425***	(0.000)	74127	0.01
(4)	Difference between Rescaled Scores in 2006 and 2005	0.0209**	(0.048)	68721	0.02
	Teachers with 5 Years or Less Experience				

	Covariate Adjustment Models with Original Scaled Scores				
(1)	Scaled Score in 2006	4.735***	(0.000)	40374	0.52
(2)	Scaled Score in 2006	4.737***	(0.000)	40374	0.53
(3)	Scaled Score in 2006	3.782***	(0.000)	40374	0.58
(4)	Scaled Score in 2006	4.245***	(0.000)	40374	0.58
	Covariate Adjustment Models with Rescaled Scores				
(1)	Rescaled Score in 2006	0.0815***	(0.000)	40374	0.51
(2)	Rescaled Score in 2006	0.0773***	(0.000)	40374	0.53
(3)	Rescaled Score in 2006	0.0778***	(0.000)	40374	0.54
(4)	Rescaled Score in 2006	0.0858***	(0.000)	40374	0.54
	Gain Score Models with Original Scaled Scores				
(1)	Difference between Scaled Scores in 2006 and 2005	1.154**	(0.014)	40374	0.00
(2)	Difference between Scaled Scores in 2006 and 2005	1.552***	(0.001)	40374	0.01
(3)	Difference between Scaled Scores in 2006 and 2005	2.396***	(0.000)	40374	0.07
(4)	Difference between Scaled Scores in 2006 and 2005	2.049***	(0.000)	40374	0.07
	Gain Score Models with Rescaled Scores				
(1)	Difference between Rescaled Scores in 2006 and 2005	0.0374***	(0.000)	40374	0.00
(2)	Difference between Rescaled Scores in 2006 and 2005	0.0432***	(0.000)	40374	0.01
(3)	Difference between Rescaled Scores in 2006 and 2005	0.0458***	(0.000)	40374	0.02
(4)	Difference between Rescaled Scores in 2006 and 2005	0.0363***	(0.001)	40374	0.02

*** p<0.01, ** p<0.05, * p<0.1

Table C. Regression Results for Covariate Adjustment Models

	All Teachers				5 Years or Less		
	(1)	(2)	(3)	(4)	(1)	(2)	(3)
tfa_teacher	3.830***	3.624***	2.835**	2.897**	3.945***	3.575**	3.673***
	(0.006)	(0.007)	(0.014)	(0.033)	(0.009)	(0.015)	(0.002)
cst_ss_original2005	0.608***	0.563***	0.563***	0.562***	0.615***	0.564***	0.567***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
		-	-	-		-	-
male		1.332***	1.357***	1.432***		2.064***	2.085***
		(0.000)	(0.000)	(0.000)		0.000	0.000
		-	-	-		-	-
black		10.13***	10.48***	10.18***		8.225***	8.494***
		(0.000)	(0.000)	(0.000)		(0.000)	(0.000)
		-	-	-		-	-
hisp		5.059***	5.302***	5.150***		3.538***	3.693***
		(0.000)	(0.000)	(0.000)		(0.006)	(0.004)
disadvantaged		1.251***	1.221***	1.192***		1.568***	1.561***
		(0.000)	(0.001)	(0.001)		(0.001)	(0.001)
		-	-	-		-	-
lang_lep		7.055***	7.385***	7.422***		6.500***	6.805***
		(0.000)	(0.000)	(0.000)		(0.000)	(0.000)
lang_rfep		3.726***	3.843***	3.981***		4.461***	4.495***
		(0.000)	(0.000)	(0.000)		(0.000)	(0.000)
lang_unknown		-10.97*	-10.52*	-9.995*		-9.914	-9.136
		(0.058)	(0.067)	(0.088)		(0.220)	(0.250)
		-	-	-		-	-
sped		7.858***	8.017***	7.926***		7.078***	7.214***
		(0.000)	(0.000)	(0.000)		(0.000)	(0.000)
						-	-
old_for_grade		-1.588*	-1.578*	-1.807*		3.190***	3.338***
		(0.079)	(0.078)	(0.051)		(0.007)	(0.004)
grd_dif_negative1		16.69***	14.72**	17.26***		14.13	11.77
		(0.006)	(0.014)	(0.009)		(0.120)	(0.200)
			-	-			-
grd_dif0		0.562	2.589***	3.819***		-1.848	4.461***
		(0.560)	(0.009)	(0.000)		(0.140)	(0.001)
		-	-	-			
grd_dif2		6.730***	7.108***	7.189***		-6.419**	-5.664*
		(0.002)	(0.001)	(0.001)		(0.038)	(0.067)
grd_dif3		-14.15*	-16.60**	-15.36*		-15.87*	-18.05*
		(0.073)	(0.046)	(0.081)		(0.070)	(0.058)
grd_dif4		18.08	9.973	9.969			
		(0.380)	(0.630)	(0.630)			
grade_2_math			48.61**	53.89***			52.53**
			(0.010)	(0.005)			(0.017)

grade_2_read	5.873	10.51	13.21
	(0.760)	(0.580)	(0.550)
grade_3_math	2.969	3.29	-2.51
	(0.870)	(0.860)	(0.890)
grade_3_read	-17.61	-16.83	-20.53
	(0.330)	(0.360)	(0.260)
grade_4_math	1.359	2.497	4.487
	(0.940)	(0.890)	(0.810)
grade_4_read	14.41	14.66	12.92
	(0.430)	(0.420)	(0.480)
grade_5_math	-9.23	-7.949	-16.42
	(0.610)	(0.660)	(0.370)
grade_5_read	-10.31	-9.169	-10.98
	(0.570)	(0.620)	(0.550)

p values in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table C (Continued)

grade_6_math			-22.34	-21.43			-22.8
			(0.210)	(0.240)			(0.210)
grade_6_read			-17.98	-17			-16.97
			(0.320)	(0.350)			(0.350)
grade_7_math			-14.41	-13.38			-11.3
			(0.420)	(0.460)			(0.530)
grade_7_read			-9.856	-8.96			-9.693
			(0.580)	(0.620)			(0.590)
grade_8_math			-31.76*	-30.97*			-27.93
			(0.078)	(0.088)			(0.120)
grade_8_read			-11.43	-10.4			-10.41
			(0.520)	(0.570)			(0.560)
grade_9_math			-30.98*	-31.22*			-28.95
			(0.083)	(0.084)			(0.110)
grade_9_read			-15.28	-14.21			-15.55
			(0.390)	(0.430)			(0.380)
grade_10_math			-41.14**	-41.35**			-39.31**
			(0.022)	(0.022)			(0.029)
grade_10_read			-21.36	-20.62			-21.78
			(0.230)	(0.250)			(0.220)
grade_11_math			-39.61**	-39.02**			-37.09**
			(0.027)	(0.031)			(0.039)
grade_11_read			-15.47	-14.58			-15.83
			(0.390)	(0.420)			(0.380)
grade_12_math			-48.34**	-60.07**			-57.19**
			(0.033)	(0.025)			(0.030)
yrs_teach				-0.0182			
				(0.720)			
full_cred				-0.069			
				(0.950)			
ed_level2				-0.547			
				(0.850)			
ed_level3				0.945			
				(0.740)			
ed_level4				0.93			
				(0.740)			
ed_level5				-0.504			
				(0.860)			
Constant	110.4***	132.1***	148.3***	147.9***	108.2***	129.5***	144.3***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	74127	74127	74127	68721	40374	40374	40374
Number of groups	27	27	27	27	27	27	27

p values in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table D. Distribution of Observations with TFA and non-TFA Teachers Across Test Subjects and Grades in 2006.

Subject-Grade in 2006	TFA Teachers	Non-TFA Teachers	Total Teachers	Percent TFA Teachers
Reading grade 02	2	32	34	5.88
Reading grade 03	84	1,091	1,175	7.15
Reading grade 04	161	1,010	1,171	13.75
Reading grade 05	138	1,093	1,231	11.21
Reading grade 06	1,408	7,607	9,015	15.62
Reading grade 07	1,047	7,600	8,647	12.11
Reading grade 08	731	7,732	8,463	8.64
Reading grade 09	478	4,518	4,996	9.57
Reading grade 10	190	2,678	2,868	6.62
Reading grade 11	62	1,073	1,135	5.46
Reading grade 12	2	1	3	66.67
Math grade 02	2	32	34	5.88
Math grade 03	84	1,099	1,183	7.10
Math grade 04	160	1,014	1,174	13.63
Math grade 05	137	1,108	1,245	11.00
Math grade 06	1,255	7,524	8,779	14.30
Math grade 07	455	7,918	8,373	5.43
Math grade 08	501	5,868	6,369	7.87
Math grade 09	162	3,920	4,082	3.97
Math grade 10	120	2,349	2,469	4.86
Math grade 11	77	1,600	1,677	4.59
Math grade 12	0	4	4	0.00
Total	7,256	66,871	74,127	9.79

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