Teach For America: An Evaluation of Teacher Differences and Student Outcomes In Houston, Texas

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CREDO would have been unable to complete this evaluation of Teach For America without the help of several individuals. Their mention here seems a minimal tribute for what for some was a substantial investment of time and attention.

The team at Teach For America was always at hand to answer questions or provide data and other materials. Wendy Kopp brought this project into being with her commitment to a serious evaluation. Jerry Hauser and Trent Stamp worked tirelessly to gather information on Teach For America teachers for the study. At the Teach For America Houston office, Ann Best was a continual source of clarity and assistance.

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Our sincere gratitude goes to the Thomas B. Fordham Foundation, especially to Chester E. Finn, Jr. and Marci Kanstoroom, for the encouragement and resources to initiate this evaluation.

For all of the contributions to the evaluation we acknowledge here, we are thankful. Our evaluation process was aided by their efforts. We absolve all parties, however, of any responsibility for the evaluation outcome.

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Preface

As an organization that strives constantly to improve, we at Teach For America were grateful for the opportunity that CREDO provided in offering to conduct the first-ever study of our corps members' impact on their students' achievement.

Teach For America is the national service corps of outstanding recent college graduates - individuals of all academic majors who are highly sought-after by other sectors - who commit to teaching for two years in under-resourced urban and rural public schools. Our mission is to build a movement among our nation's most promising future leaders to ensure that all of our nation's children have an equal chance in life. In order to fulfill our mission we call upon young leaders to serve as excellent teachers for children in low-income communities. Through this experience the teachers have an immediate positive impact while gaining the insight and added commitment to work for systemic change in education and within every sector that impacts under-resourced communities.

Teach For America recruits recent college graduates to apply, selects those who have strong leadership characteristics, places them as regular beginning teachers in participating schools and school districts, and provides corps members with the training and support they need to ensure their students' progress academically. Beyond their two-year commitments to teach, we expect that corps members will continue working actively to expand opportunities for children, whether through teaching, school administration, education reform, or working through policy and other sectors.

To be fully successful, we must reach the point where all of our corps members produce significant gains in student achievement during their first and second years of teaching. In this pursuit, we have drawn lessons from our experience in order to continuously refine our methods of recruiting, selecting, training and supporting corps members. While much progress has been made in the five years covered by the study, and while there is still more to be done, we believe it is time for independent agencies to examine the impact our corps members have on their students' achievement. This is critical both to satisfy supporters and critics who are seeking evidence of Teach For America's impact on student achievement, and to provide our own organization with data that will inform our program development.

We want to thank CREDO for conducting this study and the Fordham Foundation for making it possible.

Wendy Kopp
President and Founder
Teach For America

Foreword

When Secretary of Education Rod Paige told a conference of education school professors and other teacher trainers in June 2001 that he thought alternative certification programs were one of the most effective solutions to teacher shortages, his comments were met with stony silence. Outside the ed school world, we find fast-growing interest in these programs, which offer recent college grads and career switchers an accelerated route into the classroom. Inside the sealed universe of the college of education, however, we still encounter unabashed hostility from those who see their monopoly threatened.

Teach For America (TFA) recruits talented liberal-arts graduates from competitive colleges, offers the graduates special training, and then places them in some of the toughest U.S. public schools. TFA is not itself an alternative certification program, but it avails itself of such programs to facilitate entrance into teaching for some of our nation's most promising young professionals. In moving these recent graduates quickly into classrooms of their own, often by funneling them into alternative certification programs, TFA has incurred the wrath of the powers that be. Linda Darling-Hammond, a professor of education at Stanford University and executive director of the National Commission on Teaching and America's Future, recently argued that, "What TFA says is that society should not try to make good on its promise to African American and Latino students that they deserve teachers who are as qualified as those that teach elsewhere. The evidence is very clear that kids who are taught by uncertified teachers perform less well. TFA perpetuates that inequality."

This path-breaking new study of the performance of TFA teachers in Houston, conducted by CREDO, calls into question Darling-Hammond's assessment of the program, and illuminates why Education Secretary Rod Paige, while Superintendent of the Houston Independent School District, welcomed TFA teachers in joining his efforts to ensure that no child was left behind in the public schools for which he was responsible. This study finds that bright college graduates who enter teaching via TFA are as good or better than other teachers hired by the Houston Independent School District, with teacher quality measured by the only thing that really matters: how much the pupils learn. Though their teachers underwent only a brief period of formal training before entering the classroom, students of Teach For America participants made gains as great as those made by students of much more experienced teachers, and sometimes greater.

This study speaks directly to today's raging debate over the best way to deal with America's simultaneous challenge of getting enough teachers in a time of shortages and getting higher-quality teachers into our classrooms even though standards for entrance into this field have traditionally been low. Many groups have ideas for raising the quality of the teaching force, but some of these threaten to *shrink* our supply of teachers. The conventional wisdom embraced by many in the education profession holds that the key to getting better teachers is regulating classroom entry ever more tightly. Following this reasoning, only those who have completed state-approved teacher training programs, generally housed in schools of education, would be certified to teach. "Alternative" programs would be minimized and regulated if not stamped out altogether. Opponents of this view find no evidence that this regulatory approach to teacher quality has worked in the past or will work in the future. They insist that opening the teaching profession to talented individuals who lack traditional credentials but possess deep knowledge of the subjects they teach will increase both the quality and quantity of teachers.

While both sides in this debate urge policymakers to reform America's teacher certification policies, actual evidence is skimpy. A federally-commissioned March 2001 review of all existing evidence on teacher preparation, *Teacher Preparation Research: Current Knowledge, Gaps, and Recommendations*, found, "There is no research that directly assesses what teachers learn in their pedagogical preparation and then evaluates the relationship of that pedagogical knowledge to student learning or teacher behavior."

This new study by CREDO is one of the first we've seen that uses a sophisticated methodology to determine whether a certain characteristic of teachers really matters, i.e. whether students with one kind of teacher outperform students with another kind of teacher. This study uses good statistical methods to isolate the differences in student performance that are truly due to teacher differences, not to differences in student background. It is our good fortune that such a well-executed study has been used to investigate a question so central to today's teaching debate: whether it's necessary to undergo extensive training in a school of education to be a good teacher.

The Teach For America program, we learn from this study, proves that it's not necessary to spend an extended period in an ed school in order to be effective in a K-12 classroom. It reinforces the view that there's no single path to excellent teaching. To us, this presents a strong argument for letting many flowers bloom when it comes to teacher preparation. Perhaps learning to be an effective teacher can best take place on the job rather than in a university classroom. Surely it is premature to impose anybody's pet regimen on the entire education system. What's needed now

is experimentation with different modes of teacher preparation, accompanied by rigorous evaluations of these experiments, evaluations exactly like the one in your hands.

Beyond the tantalizing findings of this particular study, we are excited about what it shows about the promise of serious research in distinguishing the qualities of effective teachers. American education urgently needs more research like this if our policies for recruiting, training, inducting and licensing teachers are ever to be grounded in knowledge of what works rather than in hearsay or politics.

The Thomas B. Fordham Foundation, which supports research, publications, and action projects in elementary/secondary education reform at the national level and in the Dayton area, is very pleased to have helped support this important study.

Chester E. Finn, Jr. and Marci Kanstoroom
Thomas B. Fordham Foundation
Washington, D.C.

Executive Summary

Introduction and Background

Teach For America is a program that places top graduates from selective universities into teaching positions in some of America's neediest K-12 schools. This report presents the results of the first independent evaluation of TFA teachers' affect on student performance. CREDO, a research group based at the Hoover Institution of Stanford University, conducted the evaluation in 2001 using data from the Houston Independent School District.

The Houston Independent School District, the seventh largest district in the United States, enrolls about 210,000 students annually. Houston has recruited TFA teachers since 1993.

A comparison with all other new teachers recruited during the same years revealed that TFA teachers were more likely to hold a Bachelor's degree, were placed in more difficult classes (even within the same school) and were less likely to leave after the first year. Beyond their two-year commitment, many TFA teachers elected to remain in the classroom once their commitment was fulfilled.

Study Design

This study examined teacher performance using student and teacher data for the Houston Independent School District (HISD) for the period 1996 – 2000. TFA teacher performance was compared against two groups: 1) other new teachers who did not participate in TFA, and 2) all other teachers in the district, regardless of years of experience.

The analysis examined two aspects of teaching and student achievement. First, it looked at the average performance of TFA teachers to see if these teachers affected student test scores differently than non-TFA teachers did. Second, it compared the best and worst TFA teachers against the best and worst non-TFA teachers to see if the degree of variation differed.

Summary of Findings

The evaluation has three key conclusions.

1. **On average, the impact of having a TFA teacher was always positive.**

   The size of the effect varied depending on which grades, subjects and peer groups were used for the analysis. The results look strongest in mathematics where strong comparative results were obtained in both elementary and middle school. Results in reading were also positive, but the magnitudes of impact were smaller.

2. **The differences between the average TFA teacher and the average non-TFA teacher, while always positive, are generally not statistically significant.**

   We created ten statistical models to look at the difference between TFA and other teachers' contributions to student performance (see Table A). In four models, TFA teachers, on average, produced significantly better student outcomes than non-TFA teachers. In two models, the average TFA contribution to student performance was positive but small. In four cases, the average contribution was positive and large, but the distribution around the average was not sufficiently different from the comparison group to be statistically significant.

3. **While recognizing the inevitable variations among teachers, whether TFA or non-TFA, TFA teachers as a group show less variation in quality than teachers entering from different routes.**

   The range in difference of TFA teachers' contribution to student performance is for the most part tighter than the range for non-TFA teachers, meaning TFA teachers are more consistent and less risky as a group of potential employees (see Table B). In many cases, TFA teachers are producing higher impacts for their students, with the exception of new middle school math teachers, where the gains were equivalent. Except for the comparison to new middle school math teachers, the differences in these distributions were found to be statistically significant with a high degree of confidence.

   Of course, as with any program, there have been some TFA recruits that did not perform well in the classroom, and this is likely to continue. However, the curves show clearly that the highest-performing teachers were consistently TFA teachers, and the lowest-performing teachers were consistently not TFA. This conclusion is especially meaningful in light of the differences in the numbers of teachers in each group.

Implications of the Evaluation

The evaluation shows that TFA is a viable and valuable source of teachers and that they perform as well as, and in many cases better than other teachers hired by HISD. The evaluation results demonstrate that different approaches to teacher preparation can produce effective results.

As the program continues, TFA is likely to create an enduring positive presence in the Houston Independent School District. The public school experience in Houston has parallels in many other urban communities. To the extent that other school districts are open to alternative sources of teachers to fill their classroom needs, the results of this TFA evaluation offer a balanced assessment of the merits of the program. Its findings could be replicated in other communities, with the result that regular recruitment of top college students into teaching positions could be a routine feature of American public education.

Table A

Additional Amount That TFA Teachers Improved Student Test Scores Compared to Other Teachers, in Percentage of a Standard Deviation

	Elementary Reading	Elementary Math	Middle School Reading		Middle School Math
TFA vs. other new teachers	+5.8	+12*	+13.9*	1.7	+4.4
			With one teacher	With multiple teachers	
TFA vs. all other teachers.	+.7	+2.9	+11*	+3.6	+10.9*
			With one teacher	With multiple teachers	

*Denotes statistical significance at $p < .05$.

Table B

Percentage of TFA Teachers That Produced Test Scores Higher Than the Average Test Scores Produced by Non-TFA Teachers

	Elementary Reading	Elementary Math	Middle School Reading+		Middle School Math
TFA vs. other new teachers	63.46*	64.15*	-------	-------	53.33
			With one teacher	With multiple teachers	
TFA vs. all other teachers.	60.61*	57.58*	-------	-------	64.52*
			With one teacher	With multiple teachers	

* Denotes statistical significance at $p < .05$.
+Due to methodological problems with isolating teacher effects in Middle School Reading, the Fixed Teacher Effects models were not pursued.

Chapter 1 Introduction

After ten years of operation, Teach For America (TFA) has become a nationally recognized provider of new teachers in America. The program incorporates a different mix of personnel and training than traditional teacher colleges in order to prepare and supply teachers for positions in some of America's most challenging schools. Since its inception in 1990, TFA has placed over 7000 teachers in school districts that have had extended difficulty in recruiting staff.

This evaluation by CREDO provides detailed data about the performance of TFA in Houston, one of the largest districts with which TFA has worked. Houston has a proven reputation as a district that is leading innovation and improvement in student achievement; comparisons with other Texas districts show that Houston students perform better than their peers.[1]

There is little doubt that TFA is a viable and growing source of new teachers. In fact, compared to other teacher preparation programs that offer Bachelor-level training, TFA ranks in the top ten percent, based on numbers of teachers trained[2].

Through its program design TFA addresses both the supply of teachers and their quality, primary concerns of education policy today. Recent attention has focused on the sheer numbers of teachers that will have to join the profession in order to provide an adequate supply in coming years. At the same time, questions have been raised about the quality of teaching in American classrooms, especially when U.S. student achievement is compared to international students. Solutions typically focus on either supply or quality, so a program that potentially offers gains in both dimensions is both unusual and invaluable.

Since TFA offers a different route into the teaching profession, it is one of a loose collection of options grouped together as alternative certification programs. Alternative certification has developed from a growing and consistent body of evidence about traditional teacher preparation. From economic analysis, program evaluation, and policy research, a clear picture has been revealed – training to be a teacher does not necessarily

translate into becoming or remaining a teacher and the classic training does not translate into student learning[3].

With limited defensibility of the prevailing teacher training model, two main reform movements have developed. One, championed by education researchers, focuses on redesigning teacher education in schools of education and post-certification professional development to improve teacher quality. Higher admission standards to training programs, greater emphasis on subject matter and stiffer grading requirements for college-level education courses aim to raise the caliber of graduates who enter teaching.[4] The other movement seeks to rethink preparation and entry requirements to attract more candidates – with different backgrounds – in an effort to address the supply side. Alternative certification programs are the result. (Perhaps the best known of these is the New Jersey Provisional Teacher Program begun in 1984.) These developments might be complementary in theory, but in the politicized environment of education policy, the atmosphere has been competitive and in some instances even hostile. It is in this policy context that TFA operates.

Teach For America has garnered a wide audience of attentive parties with markedly different sentiments about the program. One general perspective is that programs should be judged by the results they produce in student performance. In this vein, advocates of broader latitude in new teacher certification hail TFA for its creative response to the growing problem of teacher deficits, especially in regards to difficult schools. This group points to TFA's survival past the decade marker as proof of the organization's value. Detractors, on the other hand, point to the lack of pedagogical and child development training among TFA teachers. While the philosophical dichotomy may be overstated in order to highlight the difference, supporters and detractors alike are interested to know how well TFA teachers perform.

An independent evaluation is both timely and important. After a decade of operational growth and program refinement, TFA is to be commended for voluntarily examining its program impacts. The information gained from this evaluation will provide TFA guidance for future program decisions. The program is also an opportune exemplar of alternative teacher preparation, and thus the evaluation has important public policy implications. If proponents of alternative certification are correct, the contributions of TFA teachers to student learning should be at least as good if not better than teachers with traditional preparation. If the critics of alternative certification are correct, the impact of TFA teaching should be negative.

CREDO[5], an independent non-partisan research group at the Hoover Institution of Stanford University, conducted the evaluation in 2000 - 2001. The Thomas B. Fordham Foundation

provided funding for data development and analysis. Indirect support for this evaluation also came through the general program support of CREDO by the Smith Richardson Foundation and by the Packard Humanities Institute.

This chapter continues with a brief overview of Teach For America. Following that, the protocol for the evaluation is described in Chapter 2. Profiles of TFA teachers and their non-TFA peers are presented in Chapter 3. The empirical findings of our analyses are contained in Chapter 4. Chapter 5 concludes the report with a discussion of the results and implications for educational policy.

Program Background

Started by Wendy Kopp in 1990, Teach For America (TFA) recruits students from top colleges and universities during their senior year, provides five weeks of summer training, and then places the corps members in schools with on-going TFA-sponsored professional development. Kopp started the program to improve student achievement in schools serving low-income neighborhoods. She saw that one of these schools' challenges was recruiting good teachers. Her solution was to recruit bright college graduates who would commit to work in these schools for two years.

The TFA program approaches teaching with key differences from other teacher preparation programs. CREDO has examined the program and derived three key factors. First, students from highly selective schools will compare favorably to those who attend other institutions. A focus on the caliber of the training institution is not new; as early as 1975, research noted the positive association between the institutional selectivity of the teacher training program and gains in student performance.[6] Second, liberal arts or other university graduates will possess much-needed content knowledge that will be enhanced by intensive training in teaching techniques. Third, the rigorous screening of TFA applicants will produce more successful new teachers than the moderate grade-point-average requirements of education colleges.

TFA has developed a set of premises that influence its recruitment and training practices. TFA seeks to tap college students getting ready to graduate who may not have decided on employment or post-graduate training, or who have chosen to defer their plans and so may be willing to consider public service for two years. In this regard, TFA is similar to the Peace Corps.

TFA targets a different candidate pool than usually considers teaching. A chief tenet is that teaching, by its nature, necessitates that teachers know not only the subject matter at hand but also how to lead students[7]. Recruitment, then, is based on finding college students who have both a good academic record in a specific discipline and some type of leadership experience. Currently, the grade point average of the typical TFA recruit is 3.4 out of 4.0, and 87 percent of recruits have leadership experience.

In a departure from traditional training, TFA is structured around the idea that good teaching skill is gained through direct experience and interaction with other teachers. During summer training, recruits complete intensive pre-service coursework, covering curricular planning, lesson planning, classroom management, student assessment and literacy development. They spend the balance of the summer in classrooms as student teachers or team teachers. Once a recruit is placed in his/her own classroom in the fall, he/she will participate in more professional development activities than the typical new teacher. Some are sponsored by the district and some are sponsored by TFA. The purpose of TFA in-service training is to give their teachers the opportunity to discuss challenges and/or new teaching methods with colleagues and older teachers. TFA in-service instruction provides an added benefit by helping new teachers develop collegial relationships.

Finally, the placement policy of TFA is that recruits should be placed in schools where students have the greatest needs. Currently TFA supplies teachers to 18 districts. Assignment is done by TFA and is based on needs expressed by the district. In most cases, this means that teachers will be placed in schools where students come from poor neighborhoods. (Schools with high concentrations of students living in poverty receive special funding under Title I of the Elementary and Secondary Education Act, and are referred to as Title I schools.) TFA's goal is not only to provide teachers to districts, but to improve the quality of instruction to underserved student populations. Willingness to focus on high-needs schools increases districts' interest in working with TFA because of the running difficulties districts have had hiring and retaining teachers in their worst schools.

TFA in Houston

As uncertified teachers, new TFA teachers in Houston must enroll in the district Alternative Certification Program (ACP) at the beginning of their first year. This program helps uncredentialed teachers earn their Texas teacher certificate in one year. (Uncredentialed teachers are assessed $3,750 for

participation in the program, which is deducted from their salary). As an ACP intern, teachers are assigned a mentor at their school and attend weekly training sessions. They also meet with and are observed by an ACP specialist each month. In addition, ACP teachers receive release time every month to observe their mentor or another master teacher. A teacher must complete 12 ACP training sessions and two courses provided under contract by a local university to fulfill the requirements for certification.

In addition to ACP, all TFA teachers in Houston meet together once a month to discuss the practical aspects of teaching, as well as broader topics in education such as reform and accountability. TFA teachers also meet an additional ten times a year in grade-specific groups organized by TFA to discuss instructional issues.

Chapter 2

Evaluation Approach

The evaluation is framed around two related issues. The first addresses the public policy concerns about teacher supply, and examines the effectiveness of TFA teachers compared to teachers with other backgrounds. Does TFA provide sufficiently-qualified teachers for American schools? To answer this question, TFA teachers' impact on their students' learning must be compared with that of all teachers, even those with more years of experience.

The second issue focuses on the question districts must ask when considering whether to work with TFA: How will a TFA teacher perform compared to another new hire with a different background? The second analysis requires a direct comparison among new teachers. This second comparison offers the chance to gauge the aggregate effects of differences in backgrounds, selection, and training. These two approaches combined give both an average and marginal analysis of TFA teacher effectiveness.

To perform the analysis, the year-end learning gains of students who had a TFA teacher were measured against the outcomes of students whose teacher was not in the TFA program. Of course, many other things influence student performance, and they must be considered as well. The analysis deals with these issues both by directly measuring and incorporating other factors and by employing evaluation techniques designed to deal with multiple factors simultaneously. A full description of the analytic methods used in this evaluation is presented in Appendix A.

Participants

The evaluation was conducted using data on students and teachers in the Houston Independent School District (HISD). Texas has supported the annual testing of students in grades 3 – 8 since 1993. With multiple years of test-scores for the same student, year over year learning can be measured objectively. The analysis of the test information has been done through the

Texas Schools Project at the University of Texas at Dallas. The UTD Texas Schools Project, working with the Texas Education Agency, HISD and TFA, developed an approach for matching student and teacher records so that a Hoover Institution researcher, working at UTD, could match in a manner that protected the privacy of both students and teachers. The technique produced merged records by student by year that linked student characteristics, academic performance, teacher characteristics, and TFA status. The resulting data set supports the analysis of teacher-related student learning for elementary grades 3 – 5 (where students have a single teacher throughout the year) and middle grades 6 – 8 (where students have multiple teachers for each subject). TFA also places teachers in Houston high schools but the students are not tested annually, and therefore we cannot evaluate them.

Houston ISD currently serves approximately 210,000 students at 299 schools, making it the seventh largest school district in the United States. There are 186 elementary schools and 34 middle schools in the district – these are the schools on which we focused. The majority of the students in the district are minorities, with Latinos being the largest group (54.1 percent), followed by African Americans (33 percent). Additionally, the majority of students come from relatively poor households, with 75.4 percent receiving free or reduced-cost lunches. A profile of the student population of the HISD for 1996 – 2000 is included in Appendix B.

Student Data. The characteristics that were examined for students attending grades 3 – 8 in Houston between 1996 and 2000 included the following variables:

- The school attended.
- School year.
- Minority status.
- Eligibility for free or reduced-cost lunch (a proxy for low socio-economic status).
- Date of birth.
- Teacher.
- English language proficiency.
- Testing exemption status.
- Test scores on the annual Texas Assessment of Academic Skills (TAAS) in each year in which the student was enrolled in a Texas school. TAAS scores were recorded for Mathematics and for Reading and English Language Arts.

The student data were divided into elementary and middle school grades. Since the evaluation seeks to understand the

learning associated with being in a TFA teacher's class versus others, we must consider only the amount of learning that occurs during that particular year. This is accomplished by controlling for the TAAS score in the previous year, which effectively converts the test data into gains across specific grades. Because tests begin at the end of the third grade, our analysis begins with learning over the fourth grade. Incremental achievement for all subsequent grades through eighth can be computed yielding a total of five grades that can be analyzed.

Because the TAAS test varies by grade and by year, small changes in the average score can arise simply due to test variation. To correct this, students' scores were standardized to a mean of 0 and a standard deviation of 1 for each year. The average score for a given year is transposed to 0 and all the other scores are distributed around that point in a standard distribution. This conversion allowed us to compare the change in scores over time for a student's achievement. Thus, for example, if a student's standardized score was 1.6 in 1996 and 2.0 in 1997 we know the student learned more than the average student at the same grade level. If a student's score was 1.6 in 1996 and 1.6 in 1997, then the student learned as much as the average student at the same grade level. Finally, if a student's score was 1.6 in 1996 and 1.0 in 1997, then the student learned less than the average student in that grade level.

Teacher Data. For each teacher in the Houston ISD, we employed standard administrative data. The data included:

- Academic degrees.
- Certification status.
- Test scores on the Examination for the Certification of Educators in Texas (ExCET).
- Years of teaching experience.
- Grade taught by year.
- School assignment.

Analysis

A number of tabulations and statistical tests were used in the analysis. For the comparison profiles of teachers and students, simple tabular summaries were prepared. Where appropriate, parametric or non-parametric statistical tests of differences were used.

To ascertain differential impacts on student performance between TFA teachers and others, more sophisticated analysis was required. Since this evaluation was conducted retrospectively, it was not possible to employ a full random

assignment experimental design to control for possible differences in student characteristics across the sites where TFA teachers were assigned. Instead, we used regression analysis to achieve as great a degree of control over variation in students, teachers and schools as possible without an experimental design.

Because we believe that the underlying process of learning is stable from year to year, we used an econometric model that allowed us to pool the data across years. The model uses information on all the teachers at a particular grade level, regardless of what year they taught. For example, when we discuss the analysis involving teachers in Grades 4 and 5, we mean those teachers who taught Grade 4 or Grade 5 in any of the five years of the study (1996 – 2000).

The purpose of the analysis is to understand the relationship between a student's academic performance and whether or not she/he had a TFA teacher, but other things in addition to having a TFA teacher affect achievement. Thus, to evaluate the effect of TFA teachers, we must take these other factors into account. The standard approach, followed here, is the use of econometric analysis. The underlying model that is used in the statistical analysis describes current performance on the TAAS test as a linear function of prior TAAS performance, characteristics of the student's background, characteristics of classmates, and characteristics of the teacher. By allowing for differences in student preparation (through inclusion of prior TAAS performance), it is possible to isolate the effects of the various inputs during the current school year. This approach is frequently called a value-added model.

The basic model considers whether or not the *average* gains are higher in classes that have TFA teachers versus those that do not, after controlling for the variety of other measurable characteristics of students and classmates. The characteristics are listed below, but one pertinent example will illustrate the importance of this statistical analysis. TFA teachers are necessarily much less experienced than the typical Houston teacher. Because prior work has shown that the first years of experience are very important for most teachers, we explicitly control for differences in teaching experience that are found across classrooms. If we did not, we would be unable to distinguish the achievement effects of TFA teachers from the effects of experience *per se*. A similar logic holds for the following additional variables that are explicitly considered in the regression analysis:

School Characteristics

- Percentage of students in a school that are African American
- Percentage of students in a school that are Latino
- Percentage of students in a school receiving free or reduced-cost lunch

Class Characteristics

- Percentage of a class receiving free or reduced-cost lunch
- Percentage of a class scoring below the state mean on the previous year's TAAS examination

Teacher Characteristics

- Whether the teacher was TFA-prepared or not[8]
- Years of teaching experience

Student Characteristics

- Race
- Eligibility to receive free or reduced-cost lunch
- Previous year's TAAS score

Separate models were developed for student achievement in Math and in Reading and English Language Arts. Students' TAAS scores were used as the outcome variables explained by the model. This analysis gives estimates of how the average TFA teacher compares to the average non-TFA teacher in Houston. The statistical test for having a TFA teacher examines the differences in average performance between the two groups of teachers. Because the TFA teachers are small in number relative to all other teachers or other new teachers, one of two patterns will have to occur to enable a finding of statistical difference. Either the measure of their average impact on student achievement will have to be much different (a difference in means) or the variation around the average will have to be much smaller than for other teachers (a difference in variance). The comparison is made directly in terms of student outcomes on the TAAS exams.

Past research has shown that there are very large differences among teachers in their ability to affect student performance. We expect that to be the case for both TFA teachers and the comparison Houston teachers that we observe. An alternative approach to that described above is to go beyond just the average effects of groups of teachers and to look at the distribution of performance across different teachers and classrooms. In other words, by estimating the value-added effect of individual teachers, both TFA and others, it is possible to see how much variation exists, whether the best and worst teachers from the TFA group and others are comparable, and so forth.

This model, called the TFA Fixed Teacher Effects model below, compares student achievement gains across all the students taught by each teacher.

Using a teacher variable introduces some statistical challenges. The models attempt to capture the systematic relationships between the variables and student performance, but several different kinds of errors can occur: random behavior, excluded factors, measurement errors and incorrect model form. The model includes an error term to represent these unobserved influences. A necessary condition for conducting tests of statistical significance is that the error terms cannot be correlated across observations. Because classes share the same teacher, which is captured in the dummy variable for TFA teachers, we must anticipate that the condition has been violated. The problem can be corrected through a weighting technique, which was applied to the model of average differences among teachers. The correction was not needed for the Fixed Teacher Effects model because the single variable for TFA was replaced by individual factors for each teacher, thereby eliminating the underlying problem.

Data Limitations and Adjustments

The data were treated differently for elementary and middle school grades. The nature of the curriculum in Houston and the policies for assigning teachers in middle school necessitated some modifications. We were able to match students exclusively with specific teachers in Grades 4 and 5, making it possible to define both teacher inputs and relevant peers for each student. Students in middle school (grades 6 – 8), though, have different teachers for each subject and often change teachers at the end of the semester. This causes two difficulties. First, we were able to link students to their teachers but could not identify their specific class peers. For example, Teacher A may teach Grade 6 Reading three times during a school day. Because we knew what class a student took but not when, we could not tell which of the three classes a student attended. Thus no unique assignment to a class was possible. Consequently, we chose to drop the class variables for the Grades 6 - 8 Reading achievement analysis.

Second, because middle school students have multiple teachers in a subject, we could not always identify a unique teacher for a given student. With mathematics, we were able to match 80 percent of the students with a unique teacher. Because of the high percentage of matches, we limited the middle school mathematics analysis to these students and their teachers. For reading, though, only 12 percent of the students had one teacher

throughout a school year. The majority of students had two or three teachers. Because of concerns that the one student-one teacher sample may be biased by teacher placement difficulties in the district, we examined all the teachers that matched with a student. In most matches, students were found to have multiple teachers in Reading and English Language Arts in a given year.

The presence of multiple teachers for a student in a subject for a given year immediately raises analytical issues: parsing student achievement on an *a priori* basis becomes impossible. In order to accommodate multiple teachers in middle school, we created an alternate specification for estimating the TFA effect. In place of the dummy variable (TFA/non-TFA) used in the other models, we substituted a TFA intensity variable. The intensity variable was constructed as the percent of teaching a student received that was provided by a TFA teacher assuming all teachers evenly divided the teaching. For example, if a student had three Reading teachers but only one was a TFA teacher, then the value of the TFA intensity variable would be 33 percent. The middle school Reading models were estimated twice: once with students who had a one-to-one match with a teacher (using the TFA/non-TFA variable), and once with all students (using the TFA intensity variable). Both modeling approaches are presented in the next chapter.

Relevant Comparison Groups

The two general questions about TFA required the use of different comparison groups. The larger policy question about TFA is whether its conception of teaching can provide good teachers in the classroom. Policy makers define "good" in terms of all teachers, not just new teachers. So, TFA must test its teacher performance against all teachers in HISD, regardless of years of experience. The relevant comparison group was all teachers in grades 3 – 8 in HISD for the period 1996 – 2000. The second research question concerns the efficacy of TFA compared to other new teachers. Since new teachers are the most likely source of applicants for Houston schools, the comparison seeks to determine if any differences emerge during the first two years of teaching. For this question, TFA teachers with one or two years of experience were compared with other teachers with similar years of service.[9] In either comparison, it should be noted that TFA teachers represented a small proportion of the total.

Model Specification

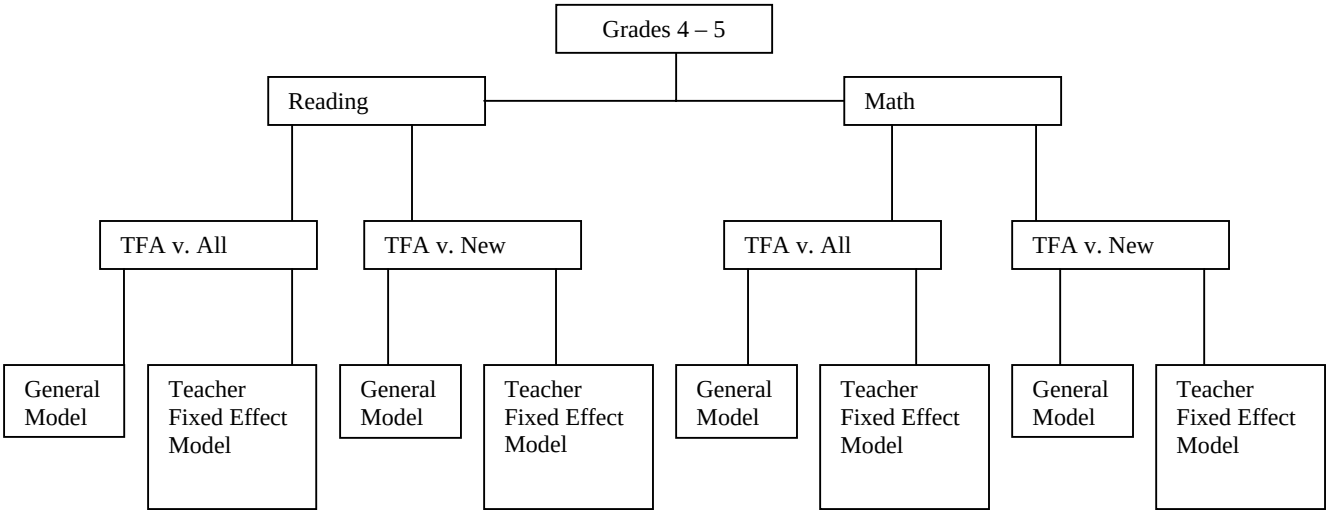
To incorporate all the considerations discussed earlier in this chapter, our analytic design called for the estimation of sixteen models. A schematic representation of the models is presented in Graphic 1. They are described below.

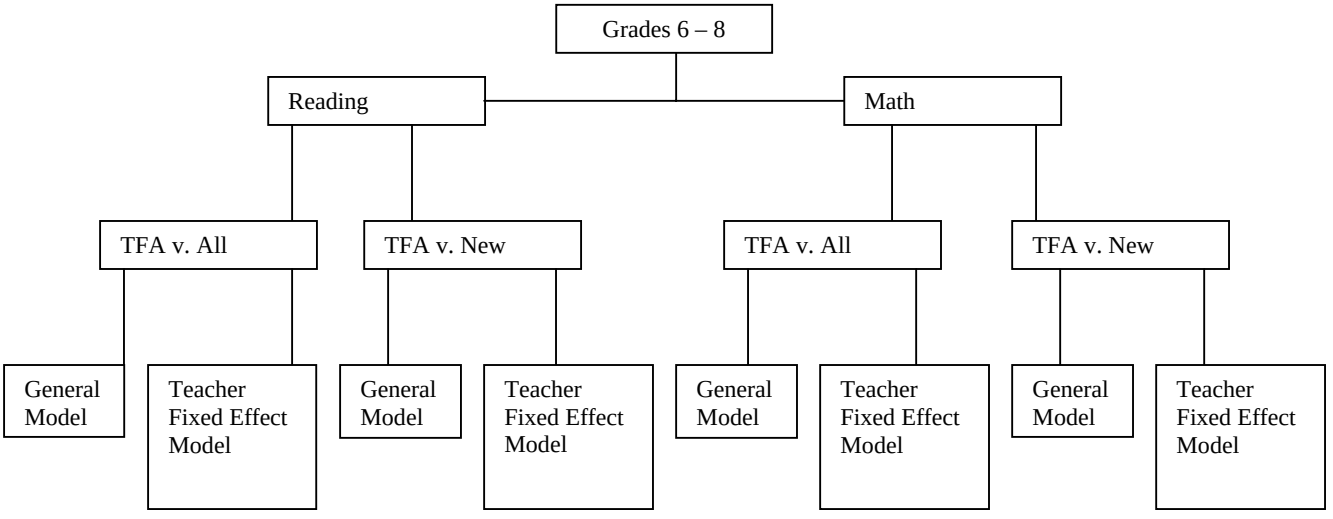
The different number of teachers per student and the difference in subject depth between elementary schools and middle schools requires students to be grouped into separate analyses; the first division is into Elementary Students and Middle School Students. Each student is tested in Reading and Mathematics, yielding four divisions. Two different comparisons groups were tested: students of TFA teachers vs. students of all other teachers and students of TFA teachers vs. students of other new teachers, resulting in eight divisions. The composition of the comparison groups and the adjustment for the proportion of reading teaching provided by a TFA teacher, discussed earlier in this chapter, become relevant at this level of the analysis.

Finally, the two model specifications discussed earlier in this chapter - the general regression model and the fixed teacher effects model - were used for a total of sixteen models.

Graphic 1

Schematic Layout of Regression Models Used to Evaluate TFA Impact





Chapter 3

Profiles of Newly-Hired Teachers

Houston ISD has approximately 12,000 teachers. This generates substantial demand for replacement teachers each year. Table 1 presents the number of TFA and non-TFA teachers hired between 1996 and 2000 to work in Grades 4 through 8. New hires represent about 4 - 5 percent of the total teaching staff.

All of the TFA teachers were enrolled in the Alternative Certification Program (ACP). We do not know, however, how many of the non-TFA teachers participated in the ACP. As indicated previously, the ACP is for uncertified teachers only, and we do not have the data on how many non-TFA teachers had received certification when they started in Houston ISD.

Table 1

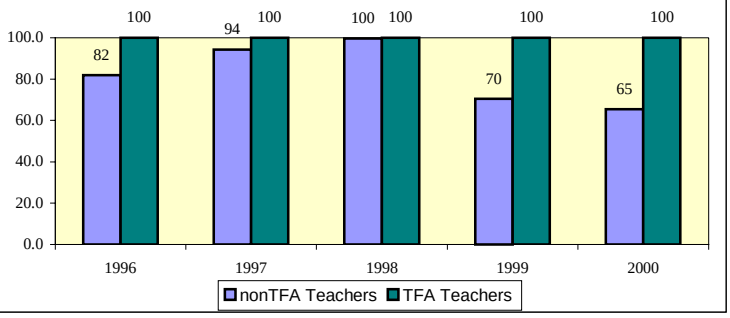
Number of New Teachers in Houston ISD Grades 4 - 8 by Year

	TFA Teachers	Non-TFA Teachers	Total New Teachers
1996	36	330	366
1997	20	293	313
1998	21	334	355
1999	19	395	414
2000	21	333	354

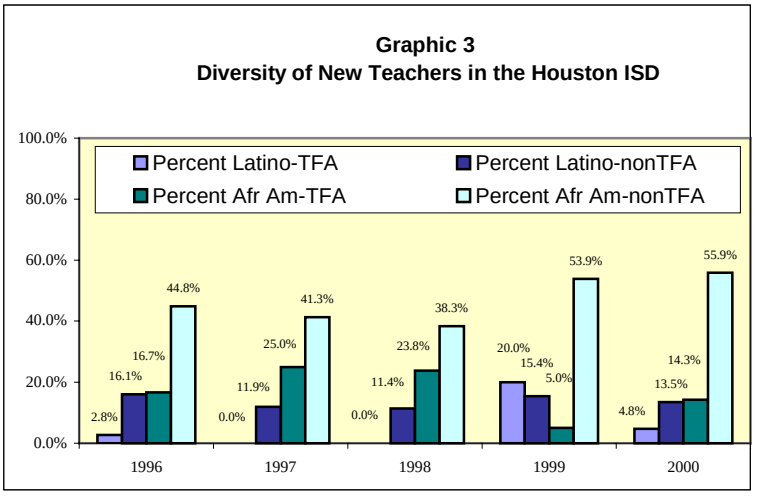
The educational profile of the new TFA teachers differs from their peers. Graphic 2 shows the percentage of TFA and non-TFA teachers starting to teach in each year of the study with at least a Bachelor's degree in hand. The data indicate that from 1996 - 2000, all TFA teachers hired by the Houston ISD had at least a Bachelor's degree. For non-TFA hires, the percentage of new teachers with a Bachelor's degree was lower in all years

except 1998.[10] The dramatic difference in the percentages in the last two years was due to the large number of emergency credentials awarded to non-certified teachers and illustrates the urgency of the teacher shortage. At a minimum, TFA provides an alternate supply of college graduates who are willing to teach in Houston ISD. We presume that it is likely that Houston ISD would have had to hire more teachers without Bachelor's degrees had TFA not met a portion of the demand for new teachers.

Graphic 2
Percentage of New Teachers in Houston ISD with at Least a Bachelor's Degree



The racial profile of TFA teachers is significantly different from other new teachers. Graphic 3 shows the comparisons. The majority of the new TFA teachers hired from 1996 to 2000 were Caucasian. Among minority TFA teachers, African Americans were the largest group. These proportions are larger than the percentage of African American students at the top 20 universities in the country, where TFA has strong recruitment efforts. At top universities, the share of African Americans among the student body is less than 10 percent. Granted, some of the difference may be attributed to district needs and requirements for new teachers, but the figures reflect TFA's efforts to attract an ethnically diverse group of recruits. Even so, the group of new non-TFA teachers was more diverse, with substantially greater proportions of Latino and African American teachers.



School Profiles

The characteristics of the schools to which new teachers were assigned were compared to ascertain whether TFA teachers and others were assigned to similar schools. For example, if TFA teachers received preferential consideration during placement, the student outcomes for TFA teachers might be influenced in part by having better-educated students to teach. Of course, some schools receive both TFA and non-TFA teachers in the same year: in such cases, the school profile is included in both groups. We compared school assignments using two measures. The first was the percentage of students in a school that was Latino, the predominant minority group in the Houston district. The second measure was the percentage of students receiving free or reduced-cost lunches, an indicator of the level of poverty in the school and the neighborhoods from which the students were drawn. (As a reference, the district average is also presented for 2001.) As indicated in Table 2, from 1996 to 2000 the percentage of Latino students in a school where TFA teachers were assigned ranged from a low of 52 percent to a high of 76 percent. For non-TFA teachers, the percent of Latino students in a school ranged from 51 to 80 percent.

Table 2

Average Proportions of Latino Students in Schools by Teacher Assignment

	1996	1997	1998	1999	2000	2001
Schools with New TFA Teachers	66.0	65.7	75.6	51.8	53.4	
Schools with Other New Teachers	51.2	55.1	52.4	80.0	75.5	
All Houston Schools	51.8	52.4	52.9	54.1		52.5

TFA teachers were assigned to higher-poverty schools than their new non-TFA teacher peers. As shown in Table 3, higher concentrations of students receiving free or reduced-cost lunch were found in schools where TFA teachers were assigned than in schools where other new teachers taught. The difference was ten percentage points for every year of the study. This information is not surprising because TFA teachers are assigned to Title 1 schools, which have a higher incidence of students receiving free/reduced-cost lunches than other schools.

Table 3

Average Proportions of Students Receiving Free or Reduced-Cost Lunch by Teacher Assignment

	1996	1997	1998	1999	2000	2001
Schools with New TFA Teachers	83.1	83.7	93.2	88.5	93.1	
Schools with Other New Teachers	70.7	72.3	82.1	79.6	83.3	
Houston District Average						73.0

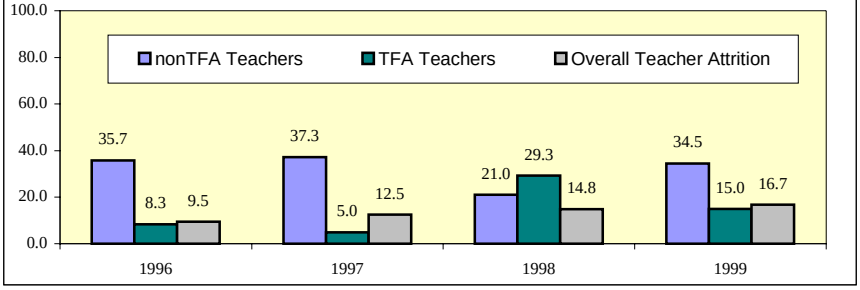
The findings remove the initial concern about “creaming” students and in fact point to the converse – to the extent that these variables capture differences in learning readiness, new TFA teachers on average found themselves in more challenging classrooms than their peers. We return to this point in later sections.

Teacher Retention

When college students join TFA, they agree to teach for two years. Most other new teachers can be assumed to have longer planning horizons, so differences in commitment to teaching are a possibility. Difference in teacher preparation may also affect commitment. Given the challenge of being a new

teacher, these differences might affect attrition. Graphic 4 shows the percentage of new teachers no longer teaching in Houston ISD after their first year. (It was necessary to use a shorter interval because of the special arrangement of the TFA program; comparable statistics typically use a five-year window.) As indicated, the percentage of new TFA teachers leaving the profession after the first year is generally less than 10 percent between 1996 and 1999, with the exception of 1998 when 29 percent left. These proportions are higher than was found for a similar program, the Provisional Teacher Program in New Jersey, where less than 5 percent of the alternatively certified teachers left. For non-TFA teachers, the attrition rate is generally 35 percent, with 1998 being the exception when only 21 percent left. All these proportions are also higher than those found in the previously cited New Jersey analysis, where 18 percent left.[11] These figures indicate that a smaller percentage of TFA teachers leave the profession after one year than non-TFA teachers. A Chi Squared statistic of 8.6 shows this result to be significant at $p<.05$.

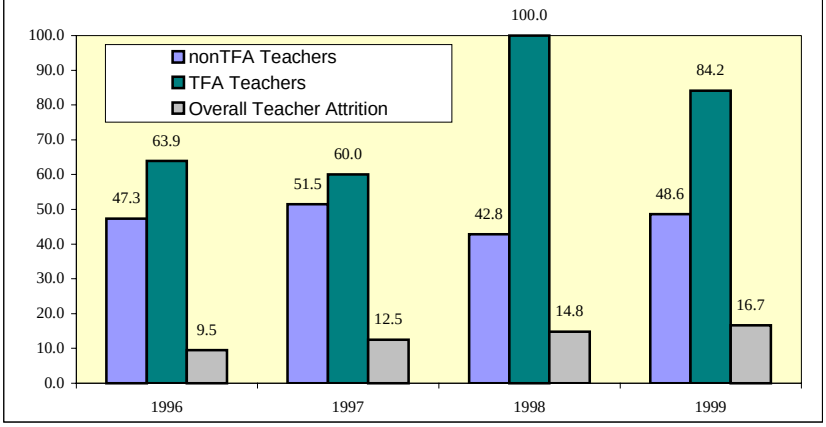
Graphic 4
Percentage of New Teachers Who Leave Houston ISD After One Year



Graphic 5 summarizes the attrition rate from Houston ISD of new TFA and non-TFA teachers after two years of teaching for the period 1996 - 1999. We included two groups in the figures: 1) Those persons no longer teaching in the state of Texas, and 2) Those persons teaching in Texas but not in Houston ISD. The composite is a measure of teachers leaving the Houston district. Given the difficulty Houston has in hiring teachers, the rate of attrition for the district is an important consideration. For non-TFA teachers the attrition rate varies from a low of 43 percent in 1998 to a high of 51 percent in 1997. For TFA teachers, the attrition rate varies from 60 percent in 1997 to 100 percent in 1998. Although the attrition rate is interesting, the inverse may be just as important. Specifically, TFA teachers commit to teach for two years, but the data in Graphic 5 indicate that, with the exception of 1998, significant proportions have stayed beyond two years. This

result yields a Chi Squared statistic of 17.4, which was significant at p<.005.

Graphic 5
Percentage of New Teachers Who Leave Houston ISD After Two Years



Across all new teachers in the Houston ISD, we also examined intra-district migration over time. At issue is whether teachers look for "easier" students as a benefit of seniority. Our analysis suggests they do. Tables 4 and 5 present the school average TAAS score for the schools in which TFA and non-TFA teachers work, shown by years of teaching experience and subject matter. To avoid confusion that might arise by using standardized numbers, we converted the averages to Normal Curve Equivalents, which run from 1 (low) to 99 (high). The increase of the average school score suggests non-TFA teachers are moving from lower-achieving schools to higher-achieving schools as seniority and opportunity permit. TFA teachers do not change schools during their two years and their associated scores reflect this policy. Those who remain beyond two years tend to leave their initial school at the end of the two year commitment and transfer to higher achieving schools within the district. Because teaching positions at higher-achieving schools are relatively few, even in a district as large as Houston ISD, it is likely there is competition for the staff positions. The fact that the school average for TFA teachers changes faster in the third and fourth years than the school average for non-TFA teachers points to the attractiveness of TFA teachers who continue teaching in the district after their two year commitment is completed.

Table 4

Average Elementary School TAAS Scores, by TFA Status and Years of Experience (Units are in Normal Curve Equivalents)

	Mathematics		Reading	
	TFA Teachers	Non-TFA Teachers	TFA Teachers	Non-TFA Teachers
Years of Teaching				
First	45.5	46.8	42.8	47.6
Second	44.9	48.1	42.8	48.7
Third	50.1	49.5	47.6	49.3
Fourth	52.7	49.5	51.2	49.4

The same pattern was discernable for teachers in middle schools, as shown by Table 5.

Table 5

Average Middle School TAAS Scores, by TFA Status and Years of Experience (Units are in Normal Curve Equivalents)

	Mathematics		Reading	
	TFA Teachers	Non-TFA Teachers	TFA Teachers	Non-TFA Teachers
Years of Teaching				
First	46.6	49.8	50.7	46.0
Second	44.2	50.8	46.5	50.4
Third	42.6	52.0	46.5	43.2
Fourth	49.1	51.7	61.2	50.0

Taken together, the data illustrated in the tables and the charts above indicate that, when compared to new non-TFA teachers in the Houston ISD, new TFA teachers are less ethnically diverse, serve in more challenging schools, and are less likely to leave after one year. Also, building on Graphic 5 and Tables 4 and 5, TFA teachers can be a source of teaching staff for not only

two years but even longer, though not always in the same schools in which they began working.

Chapter

4 Findings

This chapter presents the results of the econometric models for student achievement in Houston elementary and middle schools. All differences were in a positive direction; in no cases were TFA teachers found to do worse than other teachers. The analyses were affected by the small number of TFA teachers relative to other teachers in elementary and middle schools, so the ability to establish statistical significance for average differences in the performance of teachers was limited. However, the small numbers of TFA teachers did not hamper our examination of the differences in variation in teacher impacts between TFA teachers and their peers. The results show that TFA teachers not only generally produce more positive learning gains in their students than their peers, they do so with greater regularity.

The full set of results appears in Appendix D.[12] The overall explanatory power of the models is strong, with R-squared values between .4 and .6.[13] A majority of the explanatory power resides in a student's prior academic performance. Still, the other variables in the model were found not only to be statistically significant but also to make important contributions to the overall power of the models. Even though the intent of the models is to illuminate the relative contributions of TFA teachers versus other teachers, the models offer a few additional insights that are worth mentioning.

The models show that three sets of factors – student background characteristics, peer effects and teaching – influence student academic performance. Student background, defined in terms of a student's ethnicity, poverty status and prior academic performance, was a significant predictor of student outcomes in most of the models. Interestingly, we found exceptions with the models for both elementary and middle school Mathematics, where student background was not found to be significant. Across the models, peer group characteristics such as school ethnic make-up, school-level concentrations of poverty, or prior class average performance played a mixed role in affecting student performance. They were significant in some grade levels and subjects but no consistent pattern emerged. Where they

influenced student scores, the effect was negative. The higher the concentration of minority students, the smaller was the gain in student scores. When a student was in a class with high concentrations of peers who did relatively poorly on last year's test, his or her own performance gain was smaller than if among higher-performing peers. Where significant, the effect of higher concentrations of poor students in the school had a similar effect. As for teaching, all the models suggest that years of teaching experience significantly affect student performance. The course of the effect over time is noteworthy: the experience curve rises sharply in the first few years but tapers off after a time and becomes flat. The shape of the curve indicates that after a point, around 8 years for teaching Math and around 11 years for teaching Reading, there is no additional gain in student performance from additional experience.

The remainder of this chapter focuses on the analytic results for TFA teacher impact. While the influence of other factors is pertinent, their inclusion in the model is intended to clarify the relationship between TFA teachers and the learning that occurs among their students compared to the performance of students with non-TFA teachers. The statistical analysis isolates the "TFA effect" into a single coefficient. It represents the weight that having a TFA teacher gives to student achievement.

To critically evaluate the modeling results, it is necessary to examine three features of the coefficient. The first is the sign of the coefficient. If positive, TFA teachers contribute positively compared to other teachers; if negative the effect is reversed. Second, the magnitude of the coefficient informs how large an effect exists on average. Third, the level of statistical significance of the coefficient tells us how confident we can be generalizing from the samples used here to the population at large.

TFA in Elementary Schools

The analysis of the comparative effect of TFA teachers on student achievement in elementary school grades showed positive impacts overall. Table 6 presents the results of the elementary school student models.[14] The estimated coefficients for the TFA variable are included, along with their level of significance. The model performed well in specifying the factors that contributed to student performance. Across all the models, having a TFA teacher was found to positively influence student test scores. For the analysis of average teacher performance, new TFA teachers produced greater improvements in their students than other new teachers, and the effect was statistically significant for Math. In comparison to all teachers, the effect on a student having a TFA teacher was also positive, but far weaker than in comparison to

new teachers and not statistically significant for either Reading or Math.

Table 6

Elementary School Model Results

	Grades 4 - 5							
	Reading				Math			
	TFA v. All		TFA v. New		TFA v. All		TFA v. New	
	General Model	Teacher Fixed Effect Model	General Model	Teacher Fixed Effect Model	General Model	Teacher Fixed Effect Model	General Model	Teacher Fixed Effect Model
TFA Coefficient	.007		.058		.029		.120	
Significant at p <	.823	.0382	.158	.0153	.408	.0129	.006	.0175
R^2	.4134		.4028		.4621		.4474	
N	80,608	80,608	11,107	11,107	81,814	81,814	11,321	11,321

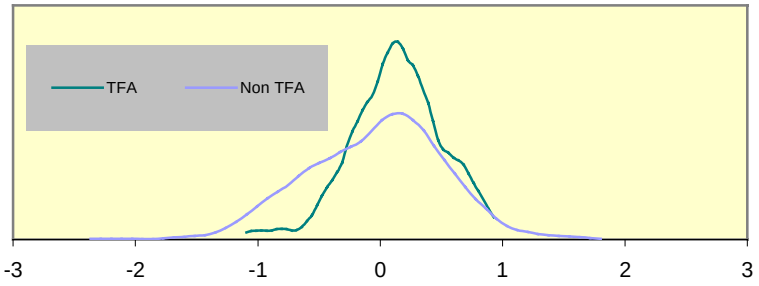
Reading. In elementary Reading, students with TFA teachers scored higher on the TAAS than students with other new teachers. The difference in teacher coefficients means that on average, a student having a TFA teacher for one year gained 5.8 percent of a standard distribution of test scores more than a student with a new non-TFA teacher.[15]

Compared with all teachers, TFA teachers were not found to produce different Reading achievement results. The positive coefficient is very small, indicating that on average the teachers are not distinguishable, after controlling for experience.

To gain insight beyond the average case, the Fixed Teacher Effects model highlights the distributional characteristics of the comparison groups of teachers and their impacts on student achievement. Those results for elementary Reading are presented numerically in Table 6 and visually in Graphics 6 and 7. The positive TFA coefficients from the average models show that against both new teachers and all teacher groups, the average TFA teacher was found to produce higher gains in students than the average peer teacher. In these models we examine how closely clustered the teacher groups are around their group average and how the two distribution curves differ from each other. Over 63 percent of TFA teachers produced student Reading achievement gains above the median of the distribution for new non-TFA teachers. Over 60 percent of TFA teachers did better than the median performance for all teachers. Moreover, TFA teachers also are more closely distributed around that point than their peers. These distributions point to a greater

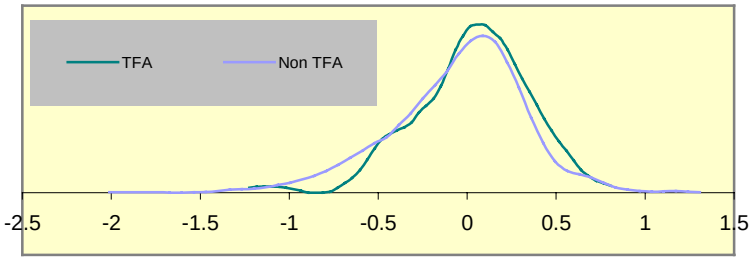
consistency of results with TFA teachers than their referent groups, and the distributions were found to be statistically significant in both cases.

Graphic 6
New TFA and non-TFA Fixed Teacher Effects
Grades 4-5 Reading



Percentage of the TFA Teacher Distribution above the median for the Non-TFA Teacher Distribution: 63.46

Graphic 7
All TFA and non-TFA Fixed Teacher Effects
Grades 4-5 Reading



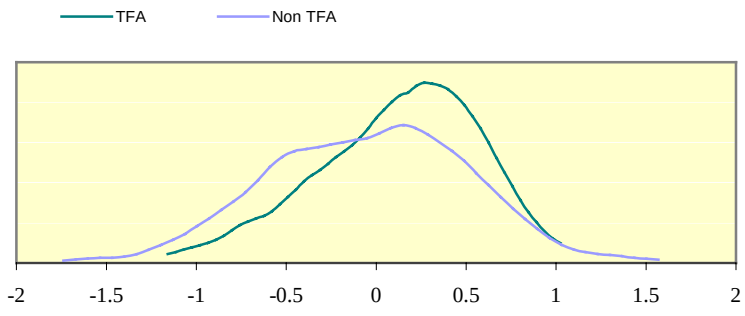
Percentage of the TFA Teacher Distribution above the median for the Non-TFA Teacher Distribution: 60.61

Mathematics. In the elementary grades, students benefited from having a TFA teacher instructing them in Math. Compared to other new teachers, having a TFA teacher created

an average gain of 12 percent of a standard deviation, all other things being equal, significant at the p <.006 level. Against all teachers, TFA instruction produced a smaller gain, around 3 percent of a standard deviation.

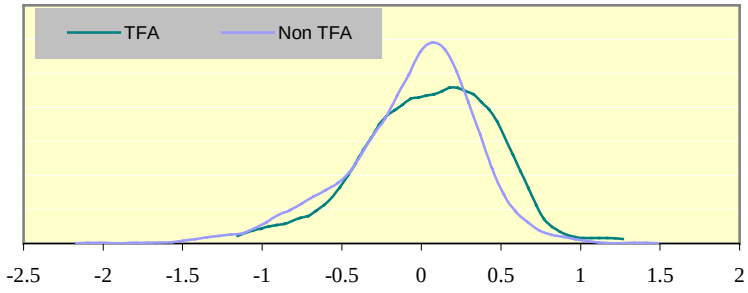
The positive influence of having a TFA teacher in elementary classes is given additional support with the Fixed Teacher Effects models appearing in Graphics 8 and 9. The distributions of TFA teachers and the gains they produce are significantly more positive than both new non-TFA teachers and all teachers. Against new teachers, 64 percent of TFA teachers were above the median new non-TFA teacher, and 58 percent of TFA teachers were above the median for all teachers. Both distributions were significant at p < .02.

Graphic 8
New TFA and non-TFA Fixed Teacher Effects
Grades 4-5 Mathematics



Percentage of the TFA Teacher Distribution above the median for the Non-TFA Teacher Distribution: 64.15

Graphic 9
All TFA and non-TFA Fixed Teacher Effects
Grades 4-5 Mathematics



Percentage of the TFA Teacher Distribution above the median for the Non-TFA Teacher Distribution: 57.58

TFA in Middle School

The analysis of student achievement in Houston middle schools was both more difficult to estimate and more difficult to interpret. We present the results in Table 7.

Table 7

Middle School Model Results

	Grades 6 - 8							
	Reading				Math			
	TFA v. All		TFA v. New		TFA v. All		TFA v. New	
	General Model*	Teacher Fixed Effect Model	General Model*	Teacher Fixed Effect Model	General Model	Teacher Fixed Effect Model	General Model	Teacher Fixed Effect Model
TFA Coefficient =	.036/ .110	NA	.017/ .139	NA	.109		.044	
Significant at p <	.33/ .08	NA	.772/ .08	NA	.025	.0078	.637	.2823
R^2 =	.5427/ .5850	NA	.4906/ .4824	NA	.6224		.6114	
N =	132,021/ 15,838	NA	11,347/ 2992	NA	96,276	96,276	19,494	19,494

*The first value is for the model estimated with the TFA intensity variable; the second value is for the model estimated with the TFA dummy variable.

As mentioned earlier, having multiple teachers during a year is common practice in Houston in Reading and English Language Arts, and sometimes occurs in Math as well. In Table 8 below, we present a brief overview of the situation. Most students in Grades 6 – 8 had two reading teachers in the course of a year, but the variation around that trend is noteworthy. A third of students had more than two teachers in a year for Reading and English Language Arts and a few had as many as five teachers in a year.

Table 8

Percentage Distribution of Middle School Students by Number of Teachers in a Year By Subject 1996 – 2000

Number of Teachers	Reading		Mathematics	
	All Teachers	*New Teachers*	*All Teachers*	*New Teachers*
1	12	11.4	80	80
2	66.7	67.4	18	17.6
3	15.7	15.7	2	2.1
4	4.4	4.4	.2	.1
5 or more	1.9	1.1	.01	0

Some of this pattern is structural since the curriculum is designed to change at the beginning of the semester. However, other factors may contribute to the data we observe: students changing schools or classes, teacher job-sharing, or new teachers who leave during the year. Whatever the causes, there were only two choices for estimating student achievement models: decide to limit the modeling to those cases where students were taught by only one teacher, or try to incorporate a composite measure of teachers into the model. Neither approach is completely satisfactory - the results reflect this tradeoff.

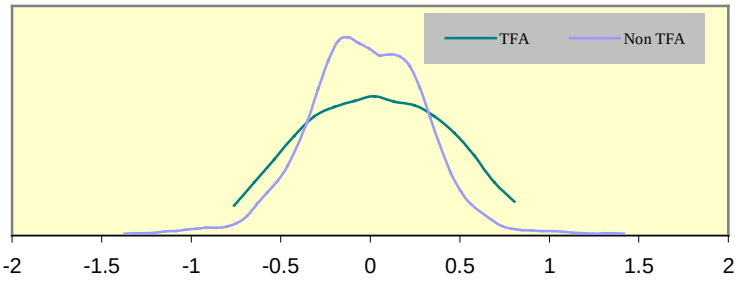
Mathematics. In 80 percent of the cases, middle school students were found to have a single teacher for the entire year. With such a high proportion of exclusive assignment, we estimated the model excluding students with multiple teachers. The comparison of TFA contributions to those of new teachers in mathematics was closer for middle school students than was the case for elementary students. The model showed that all other things being equal, students of TFA teachers scored on average 4.4 percent of a standard distribution higher than students with other new teachers. The positive sign of the TFA variable suggests good impacts for student learning, but the coefficient

was not statistically significant, which reduces our ability to be confident about the finding.

The comparison with all teachers in middle school Math was more distinct. The improvement in student achievement that was gained by having a TFA teacher was 11 percent of a standard deviation compared to all middle school Math teachers. This finding was significant at $p < .025$.

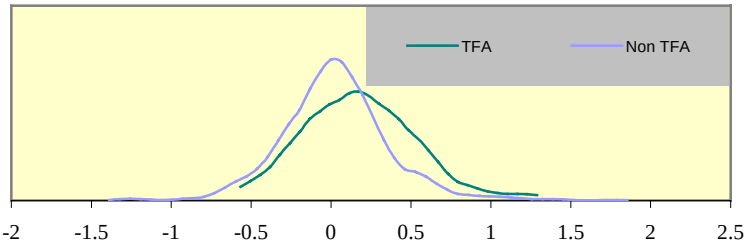
The analysis of Fixed Teacher Effects that appears in Graphics 10 and 11 parallel the findings of the general model. The distributions of TFA and other new teachers' average student achievement are very close: 53 percent of TFA teachers exceeded the median new non-TFA teacher student scores, and the variances were highly alike. Like the general model, the differences in the distributions were not statistically significant.[16] Examining the distributions of TFA teachers against all teachers, the result was clearer. Nearly 65 percent of TFA teachers outperformed the mean student score achieved by all middle school Math teachers in Houston, a strongly significant result.

Graphic 10
New TFA and non-TFA Fixed Teacher Effects
Grades 6-8 Mathematics



Percentage of the TFA Teacher Distribution above the median for the Non-TFA Teacher Distribution: 53.33

Graphic 11
All TFA and non-TFA Fixed Teacher Effects
Grades 6-8 Mathematics



Percentage of the TFA Teacher Distribution above the median for the Non-TFA Teacher Distribution: 64.52

Reading. Middle school Reading achievement was the most difficult analysis to perform. Recall that the choice was between a very small subset of the relevant sample (those students who had only one teacher for English in a year) or a substitute measure for TFA contribution that is the proportion of Reading instruction done by TFA teachers. For the TFA-other new teacher comparison, the subset of the sample with only one teacher was 11 percent; for the TFA–all teacher analysis the proportion was 12 percent. We present both approaches.

The new teacher models produced mixed results. With the number of observations restricted to those students with a single teacher with less than two years experience, the models produced a very strong coefficient for TFA teachers. The marginal effect of a student with a single new TFA teacher was a 13.9 percent rise in the standard distribution, all other factors held constant. These models had statistical significance at the $p < .08$ level. However, when we use the TFA teaching proportion variable with the full set of students who received instruction exclusively from new teachers with less than two years experience, the coefficient for the proportion variable was less than 2 percent and was not significant.

The comparison of TFA teachers to all non-TFA teachers yielded similarly mixed results from the two estimation approaches. When a one-teacher-per-student model was calculated, the marginal improvement of having a TFA teacher on student achievement was 11 percent of a standard deviation, significant at $p < .08$. As might be expected, where a TFA teacher was one of several teachers a student had, the impact was less, 3.6 percent of a standard deviation. The coefficient for the TFA proportion-of-teaching variable was not significant.

The results differ from the other general models in two ways. The first is the use of the TFA intensity variable. We would expect the instructional effect to be more diffuse for students with multiple teachers. Second, since we used the composite TFA variable, we could not include class-level variables; and that could further contribute to the insignificance.

The results present an ambiguous picture of the role of TFA teachers in middle school Reading achievement. The limited subset of cases where a student had a single teacher throughout the year raises concerns about how representative the cases are, in spite of the positive results obtained. If the HISD policy is to switch teachers during the year or use multiple teachers at once, one must question the circumstances that led this subset of students to have only one. Alternatively, if the cases are truly incidental, then the ability to extrapolate to the more probable case of a student with multiple teachers is debatable. Likewise, our attempts to blend the teacher influence in the majority of cases where a student had multiple teachers create a measure of TFA instructional impact that was influenced by the contributions of other teachers a student had.

Given the complexity in teacher deployment and the modeling limitations, our insight is slightly cloudy. We would expect smaller coefficients where TFA teachers share the teaching of reading with other teachers, and that is what we observed. In this respect the proportion-of-teaching variable has at least surface validity as a measure of TFA effect. Consistent with all the other general modeling results, we find all of the coefficients for TFA teaching were positive, even if some were not statistically significant. The consistency across models strengthens the case that TFA teachers create positive gains in their students. We can certainly say that students of TFA teachers did no worse than other students in Reading achievement. However, we cannot be as confident of the estimates of TFA contribution in middle school Reading as in the other analyses.

Chapter 5

Discussion and Conclusions

Summary of Findings

In the introduction of this report, we described the TFA model as possibly offering a dual advantage for dealing with the teacher shortage in America: providing an additional source of teachers while attracting high-quality college graduates to teaching who might not otherwise consider it. This evaluation of the TFA teachers in Houston shows that TFA appears successful in both dimensions.

The evaluation can be summarized with three key conclusions.

1) **On average, Teach For America teachers produced a positive effect on their students' achievement levels relative to Houston teachers recruited in other ways.**

In all the models we tested, even those with diluted TFA involvement due to students having several teachers in a subject, the average impact of having a TFA teacher was always positive. The positive sign on the TFA interaction term dispels the notion that the program is inferior to other sources of teachers. The size of the effect varied from less than 2 percent of a standard deviation to over ten percent, depending on which grades, subjects and peer groups were used for the analysis. The results look strongest in Mathematics where strong comparative results were obtained in both elementary and middle school. Results in Reading were also positive, but the magnitudes of impact were smaller.

2) **The differences between the average TFA teacher and the average teacher in the comparison groups, while always positive, were generally not statistically significant.**

In six out of the eight models (defined by subject, grade level, and comparison group), the estimated effect of TFA teachers was not statistically significant, but this lack of significance for the TFA teacher variable in the average model is not surprising. As revealed in the overall power of the models, they start out with a considerable amount of randomness, arising

from differences in individual students and teachers. The randomness is compounded by the dramatically different sample sizes of the TFA and other classrooms. Relative to the total number of new teachers, TFA teachers are a small proportion. Having a much smaller number of teachers in the TFA group makes the group more vulnerable to variation across students. (A student with an extreme score will have a greater impact in a group of 30 students than in a group of hundreds.)

It should be stressed that "no difference" is different from "the same." The statistical techniques used in this evaluation provide unbiased estimates of the magnitude of the effect of having a TFA teacher. However, due to the high degree of randomness in the models, our ability to be statistically confident about the differences between average teachers is limited. Despite the sample imbalance, two of the models yielded significant coefficients for the TFA teacher variable in the average teacher analysis.

3) While recognizing the inevitable variations among teachers, whether TFA or non-TFA, the distribution of TFA teachers as a group is superior to that of peers entering from different routes.

A powerful benefit provided by the TFA program can be found in the Teacher Fixed Effects models, which showed the distributions of teacher contributions to student learning for TFA teachers compared to their peers. The clearest observation from the distributions is that TFA teachers are more alike (i.e., show less variation in quality) than any of the peer groups we compared them to, with the exception of new middle school Math teachers, which were equivalent. The graphs show the TFA distributions for the most part are tighter than the comparison groups, meaning they are more consistent and therefore a lower risk as a group of potential employees. In addition, in several models the TFA distributions lie to the right of the comparison curve, meaning they are producing higher impacts for their students. (Except for the comparison to new middle school Math teachers, the differences in these distributions were found to be statistically significant with a high degree of confidence).

Of course, as with any program, there were some TFA recruits that did not perform well in the classroom, and this is likely to continue. However, the curves show clearly that the highest-performing teachers were consistently TFA teachers, and the lowest-performing teachers were consistently not TFA.[17] This conclusion is especially meaningful in light of the differences in numbers of teachers between the two groups.

Implications and Further Questions

This evaluation was based on data from a highly dynamic time in the HISD - and in public education more generally. It is necessary to acknowledge that schools and teachers in Houston were subject to a wide variety of other programs, constraints and opportunities that no model could possible capture[18]. For example, during the years of this study, Texas and other states moved to strengthen certification requirements for secondary school educators by requiring more content expertise. This development cannot be overlooked as a possible explanation for why the marginal effect of TFA teachers over other new Math teachers was small – the entry requirements shifted to look more like a liberal arts preparation and so the profiles of the two groups may be becoming more alike.[19]

Of course, many questions remain, and it would be imprudent to extrapolate too generally from this analysis. We cannot say, for example, what aspects of TFA and other teachers account for differences in the performance of their students. The evaluation focused on TFA as a whole, so we do not know if the effectiveness of TFA teachers is due to the type of people being recruited, the difference in academic background, the support provided by TFA including the ACP training, or a combination of factors. We encourage further study of this question.

It is also not possible to extrapolate the findings here to other specific alternative certification programs. This evaluation was intended to assess TFA relative to other sources of teacher recruitment, and the design accomplished that comparison. Since the design is not structured to tease out additional information about teachers' preparation, we did not attempt to classify any of the non-TFA teachers by whether they came to teaching via traditional teacher preparation programs or some alternate route. We do not have the ability, for example, to isolate the contributions of the Alternative Certification Program in Houston, since all non-certified teachers are enrolled mandatorily.[20]

While the findings cannot speak to the effectiveness of other specific programs, they do lend themselves to a few general comments about the viability of alternative certification policies. This analysis provides direct empirical evidence on the substitutability of differing sets of qualifications for one another. As a threshold issue, the evaluation dispels the notion that only traditional routes of preparation can produce good teachers. Based on the findings of this study, attention to issues of teacher quality could focus more usefully on understanding better the dimensions on which substitution or tradeoffs between academic preparation and pedagogy can productively occur.

Earlier research has identified strong returns to investments in the early years of teachers' careers.[21] The year to year growth in teacher effectiveness, as measured by student achievement, is largest in the early years and then quickly tapers off. These findings indicate that the return may not be uniform. One possible reason may be that TFA teachers (and those who share their profiles) do not start out at the same level of performance as other new teachers. Differences in teachers' responsiveness to additional professional development may also be at play. These questions cannot be answered without further study. The point is raised here, however, as a reminder that policy decisions concerning teacher training and certification cannot assume that a fixed set of requirements will make all teachers perform the same.

While there is no argument that expanding the supply of high-quality teachers should be a high priority, there is less consensus about the best means to attain the goal. Based on the findings of this evaluation, strictly regulating the process of becoming a teacher along the lines of traditional certification requirements seems less beneficial than specifying the expected performance levels that teachers must meet. It then becomes the challenge and the opportunity for institutions of higher education to devise the blend of content knowledge, psychology, philosophy of education and teaching skill (in whatever combinations they consider best) to produce teacher candidates. The final merit of a teacher preparation program lies in the effectiveness of its teachers in creating student learning. The utility of alternative methods should be evaluated on student learning and not unsubstantiated assertions about what is needed to ensure high levels of learning.

The evaluation results presented here demonstrate that different approaches to teacher preparation are feasible. Certainly continued evaluation of the Teach For America program would be worthwhile, for both internal and external uses. Assuming other states develop the rich data resources found in Texas, it would be advisable to expand the evaluation over time to include other TFA districts. Corroborating and expanding the results obtained here would contribute to both the TFA program itself and the larger policy world in which TFA continues to grow.

TFA has been shown to be a viable source of new teachers for Houston, both in number and in quality. With continuing attention to teacher retention during their two years of service and with many TFA teachers choosing to remain after their commitment has been fulfilled, TFA is likely to create an enduring positive presence in the Houston Independent School District.

The public school experience in Houston has parallels in many other urban communities. To the extent that other school districts are open to alternative sources of teachers to fill their classroom needs, the results of this TFA evaluation offer a balanced assessment of the merits of the program. Its findings could be replicated in other communities, with the result that regular recruitment of top college students into teaching positions could be a routine feature of American public education.

ENDNOTES

[1] Information about the performance of Texas students comes from unpublished tables provided by Daniel M. O'Brien, Associate Director of the Texas Schools Project at University of Texas at Dallas, July 2001.
[2] American Association of Colleges for Teacher Education, 2000 Directory of Members.
[3] Murnane, Richard J., Judith D. Singer, John B. Willet, James J. Kemple, and Randall J. Olsen. *Who Will Teach?: Policies That Matter*. Cambridge, MA: Harvard University Press, 1991, p.91.
[4] Ballou, Dale and Michael Podgurski. *Teacher Pay and Teacher Quality*. Kalamazoo, MI: W.E.Upjohn Institute for Employment Research, 1997.
[5] CREDO was formally called the Center for Research on Education Outcomes. The name was shortened in 2000.
[6] Winkler, Donald R. "Educational Achievement and School Peer Group Composition," *Journal of Human Resources*, vol. 10, no. 3, 1975, pp. 189-204.
[7] "Ten Years of Teach For America." *Education Week*, June 21, 2000.
[8] For most of the models, a binary variable (also called a dummy variable) was coded '1' if a student's teacher for a given year was part of Teach For America and '0' otherwise. We used a different construction for TFA when a student had multiple teachers per subject in a year.
[9] It should be noted that the comparison groups include teachers with other forms of alternative certification. Since the evaluation is intended to test TFA teachers against the pool of teachers the district would otherwise have at their hiring disposal, their inclusion is appropriate.
[10] Due to changes in reporting formats, HISD was unable to verify these numbers. An independent analysis of the PEIMS data done by personnel at the Texas Schools Project, at the University of Texas at Dallas, as well as information from the Academic Excellence Indicator System reports on the Texas Education Agency Web site, confirmed the figures for 2000. We assume similar validity for 1999.
[11] Murnane, Richard J., Judith D. Singer, John B. Willet, James J. Kemple, and Randall J. Olsen. *Who Will Teach?: Policies That Matter*. Cambridge, MA: Harvard University Press, 1991, p. 97.
12 When reviewing the models, please recall that the test scores have been standardized in each year at a mean of zero and a standard deviation of one. This means that the average performance every year is equated to zero, and other scores are arrayed around that point in a normal distribution. Thus the coefficients for each variable represent the change in standard deviations created by each variable, holding all other factors constant.
[13] The R-Squared value measures the amount of variation in the outcome that can be systematically explained by the models – the values we obtained are consistent with similar models found in the literature.
[14] Since the numbers of all non-TFA teachers and new non-TFA teachers differ, the numbers of observations used in each model is presented. The number of cases differs slightly between reading and math for each comparison group due to missing values of some students' reading scores.
[15] The use of standard deviations in this discussion is useful, even if a bit confusing at first. Because the raw test scores are not standardized, the percentile shifts are not equal across all ranges of scores: a gain of one percentile at the top of the distribution equates to a larger gain in raw score than at the median. Consequently, the impact of any of the model factors on actual scores will differ according to where in the range one starts. Standardizing the scores eliminates that difficulty.

[16] When the Fixed Teacher Effects model was run substituting the average poverty status of the student cohort in lieu of the average of previous test scores, the distribution was not significant.

[17] While this finding could be consistent with claims that some TFA teachers admit to being unprepared (Darling-Hammond, Linda [1994]. "Who Will Speak for the Children? How Teach For America Hurts Urban Schools and Students," *Phi Delta Kappan*, 21 – 34), it puts the discussion in more relevant terms – student achievement. The claim fails to assess whether equivalent admissions would come from other new teachers and whether or not such admissions provide reliable indications of performance. The Fixed Teacher Effects model clearly portrays the dimensions of both groups' performance, with TFA having fewer teachers doing poorly than other new teachers.

[18] The model's explanatory power – between 40 and 60 percent of the variation in the observed outcomes – is strong, but illustrates that a considerable amount of the variation was outside the model parameters.

[19] Even critics of Teach For America acknowledge that strong content knowledge has traditionally been lacking in teacher preparation and applaud the trend to create a "Bachelor's plus teaching credential" program for beginning teachers. See Darling-Hammond, Linda, Arthur E. Wise and Stephen P. Klein. *A License to Teach*: *Raising Standards for Teaching.* San Francisco, CA: Jossey-Bass, 1999, p. 22-23.

[20] The problems associated with the small numbers of teachers that we found with the TFA sample would likely have been compounded had analysis for other alternative certification programs been attempted as well.

[21] Rivkin, Steven G., Eric A. Hanushek and John F. Kain. *Teachers, Schools and Academic Achievement.* National Bureau of Economic Research Working Paper 6691, July 1998, revised April 2001.

Appendices

Appendix A

Appendix A
Description of Methodology

The general model used in the analysis was:

Newscore= $C + b_1$(last year's score) + b_2(TFA) + b_3(experience) + b_4(experience)^2 + b_5(student race/ethnicity) + b_6(student poverty) + b_7(%African Americans in a school) + b_8(%Latinos in a school) + b_9(%Poverty in a school) + error.

The variables are defined as:

Newscore:	The standardized TAAS score from the current year's assessment,
Last Year's score:	The standardized TAAS score from the previous year's assessment,
TFA:	Defined as 1 if a teacher is a TFA teacher, and 0 if a non-TFA teacher,
Experience/(Experience)^2:	Teacher experience, in years. Both terms are included in the all teacher analysis because we believe that learning to teach should be nonlinear. In the new teacher analysis we only included the experience term because we were only looking at teachers with 0-1 year of experience,
Student race/ethnicity:	Student level variable indicating if a student is Asian American, African American, Latino, or Caucasian,
Student poverty:	Student level variable indicating if a student receives free lunches, reduced-cost lunches, or no assistance,
% African Americans in a school:	The percentage of the students in a school that are African Americans,
%Latinos in a school:	The percentage of the students in a school that are Latinos, and
%Poverty in a school:	The percentage of students in a school that receive free/reduced lunches.

To check the stability of the model we added two class variables, one at a time. The class variables are:

ClassPoverty:	The percentage of students in a class that are receiving free/reduced lunches,
ClassLast:	The average score on the previous year's TAAS test for a group of students that are in the same class during the current school year.

The class variables were used in Grades 4-5 when we were able to match at least 5 students with their teacher. We also used the variables in Grades 6-8 Mathematics analyses as a teacher level variable, rather than a class variable because we could match students with a specific teacher but not a specific class period. We did not use these variables in the Grades 6-8 Reading analyses because we could only match 20 percent of the students with a unique teacher.

Appendix B

Appendix B
Student Profile Information

The following table provides a general overview of Houston ISD enrollment information for school years1996-97 to 1999-2000. The data was obtained from the Academic Excellence Indicator System (AEIS) reports on the TEA website.

	1995-96	**1996-97**	**1997-98**	**1998-99**	**1999-2000**
Enrollment	206,704	209,375	210,998	210,179	209,716
%Latino	50.8	51.8	52.4	52.9	54.1
%African American	34.9	34.3	34.0	33.8	33.0
%Economically Disadvantaged	65.1	65.0	73.1	71.3	75.4
%Limited English Proficiency	27.2	28.2	27.6	25.1	26.5
#Elementary Schools	NA	187	192	198	NA
# Middle Schools	NA	46	52	46	NA

Appendix C

Appendix C: Univariate Statistics of Independent Variables

		Grades 4-5				Grades 6-8			
		Reading		Mathematics		Reading		Mathematics	
		All	New	All	New	All	New	All	New
TFA	Mean	.0259	.109	.026	.108	.030	.144	.021	.039
	Min.	0	0	0	0	0	0	0	0
	Max.	1	1	1	1	1	1	1	1
	s.d.	.159	.311	.159	.311	.140	.316	.143	.193
Last Year's Score	Mean	.024	-.120	.018	-.141	.026	-.033	.078	.002
	Min.	-5.696	-5.068	-5.219	-4.878	-6.164	-5.168	-5.41	-4.257
	Max.	1.460	1.460	1.411	1.410	1.951	1.951	2.00	1.985
	s.d.	.987	1.039	.989	1.040	1.000	.992	.986	1.006
Experience	Mean.	12.912	.411	12.908	.412	11.123	.479	11.607	.431
	Min.	0	0	0	0	0	0	0	0
	Max.	47	1	47	1	50	1	41	1
	s.d.	10.014	.492	10.018	.492	8.029	.467	10.381	.495
(Experience)^2	Mean	267.008	.411	266.985	.412	220.839	.479	242.485	.431
	Min.	0	0	0	0	0	0	0	0
	Max.	2209	1	2209	1	2500	1	1681	1
	s.d.	324.519	.492	324.698	.492	245.877	.467	311.474	.495
Student Ethnicity	Mean	3.650	3.614	3.648	3.612	3.715	3.627	3.747	3.709
	Min.	1	1	1	1	1	1	1	1
	Max.	5	5	5	5	5	5	5	5
	s.d.	.802	.721	.802	.722	.721	.693	.728	.687
Student Poverty	Mean	.658	.745	.660	.745	.619	.683	.611	.660
	Min.	0	0	0	0	0	0	0	0
	Max.	1	1	1	1	1	1	1	1
	s.d.	.474	.436	.474	.436	.486	.465	.488	.474
%Afr Amer in School	Mean	38.787	37.441	38.987	37.754	33.687	39.954	31.848	34.360
	Min.	0	0	0	0	0	0	0	0
	Max.	100	99.5	100	99.5	100	100	100	99.1
	s.d.	33.310	34.414	33.348	34.511	28.584	31.935	27.895	30.892
%Latino in School	Mean	44.487	50.659	44.353	50.424	51.350	49.093	52.661	52.862
	Min.	0	.5	0	.5	0	0	0	.7
	Max.	99.8	99.8	99.8	99.8	100	100	100	100
	s.d.	32.089	33.960	32.054	34.011	29.010	30.722	29.231	30.863
%Poverty in School	Mean	75.398	81.824	75.472	81.888	68.249	73.628	67.848	71.181
	Min.	4.8	4.8	4.8	4.8	5.7	19.5	5.7	10.8
	Max.	100	100	100	100	100	100	100	100
	s.d.	26.628	23.396	26.582	23.409	22.241	20.323	22.975	21.659
ClassLast	Mean	.024	-.120	.0179	-.1410			.078	.002
	Min.	-4.071	-3.328	-3.933	-3.182			-3.686	-3.359
	Max.	1.355	1.170	1.325	1.133			1.628	1.514
	s.d.	.536	.533	.560	.5790			.527	.529
ClassPoverty	Mean	.658	.745	.660	.745			.611	.660
	Min.	0	0	0	0			0	0
	Max.	1	1	1	1			1	1
	s.d.	.300	.262	.299	.261			.273	.254

Appendix D

Appendix D
Regression Analysis Results

The coefficients and the probabilities of occurrence are shown in the following tables.

Grades 4-5, Reading, All Teachers

	Basic Model + Class Average on Previous TAAS Test		
	Coefficient	**Stand. Error**	**Prob.**
TFA	.007	.032	.83
Last Year's Score	.557	.005	.00
Teacher Experience	.010	.002	.00
(Teacher Experience)^2	.000	.000	.00
Student Ethnicity: Asian	.096	.054	.08
Student Ethnicity: Afr Amer	-.164	.053	.00
Student Ethnicity: Latino	-.061	.053	.25
Student Ethnicity: Caucasian	.020	.053	.71
Student Poverty	-.112	.008	.00
%Afr Amer in School	.001	.001	.04
%Latino in School	.002	.001	.06
%Poverty in School	-.001	.001	.03
ClassLast	.130	.013	.00
Constant	.101	.059	.09
N	80,608		
R^2	.4130		

Grades 4-5, Reading, Teachers with 0-1 year of experience

	Basic Model + Class Average on Previous TAAS Test		
	Coefficient	**Stand. Error**	**Prob.**
TFA	.058	.041	.16
Last Year's Score	.575	.012	.00
Teacher Experience	.114	.032	.00
Student Ethnicity: Asian	-.050	.134	.71
Student Ethnicity: Afr Amer	-.411	.133	.00
Student Ethnicity: Latino	-.291	.132	.03
Student Ethnicity: Caucasian	-.171	.134	.20
Student Poverty	-.125	.022	.00
%Afr Amer in School	.007	.002	.01
%Latino in School	.008	.003	.00
%Poverty in School	-.007	.002	.00
ClassLast	.116	.037	.00
Constant	.175	.150	.25
N	11,107		
R^2	.4023		

Grades 4-5, Mathematics, All Teachers

	Basic Model + Class Average on Previous TAAS Test		
	Coefficient	**Stand. Error**	**Prob.**
TFA	.029	.036	.42
Last Year's Score	.615	.004	.00
Teacher Experience	.008	.002	.00
(Teacher Experience)^2	.000	.000	.00
Student Ethnicity: Asian	.174	.057	.00
Student Ethnicity: Afr Amer	-.160	.056	.00
Student Ethnicity: Latino	.005	.056	.93
Student Ethnicity: Caucasian	.038	.056	.50
Student Poverty	-.086	.008	.00
%Afr Amer in School	.001	.001	.37
%Latino in School	.001	.001	.31
%Poverty in School	-.0005	.001	.50
ClassLast	.068	.013	.00
Constant	.068	.063	.28
N	81,814		
R^2	.4617		

Grades 4-5, Mathematics, Teachers with 0-1 Year of Experience

	Basic Model + Class Average on Previous TAAS Test		
	Coefficient	**Stand. Error**	**Prob.**
TFA	.120	.044	.01
Last Year's TAAS Score	.628	.011	.00
Teacher Experience	.222	.034	.00
Student Ethnicity: Asian	.381	.153	.01
Student Ethnicity: Afr Amer	-.044	.151	.77
Student Ethnicity: Latino	.180	.150	.23
Student Ethnicity: Caucasian	.214	.152	.16
Student Poverty	-.093	.021	.00
%Afr Amer in School	.006	.003	.03
%Latino in School	.006	.003	.03
%Poverty in School	-.006	.003	.02
ClassLast	-.019	.037	.60
Constant	-.267	.168	.11
N	11,321		
R^2	.4468		

Grades 6-8, Reading, All Teachers (1 to 1 Match)

	Basic Model		
	Coefficient	**Stand. Error**	**Prob.**
TFA	.110	.064	.08
Last Year's TAAS Score	.596	.010	.00
Teacher Experience	.015	.004	.00
(Teacher Experience)^2	.000	.000	.00
Student Ethnicity: Native American	-.159	.272	.56
Student Ethnicity: Afr Amer	-.185	.027	.00
Student Ethnicity: Latino	-.169	.026	.00
Student Ethnicity: Caucasian	-.017	.023	.47
Student Poverty	-.077	.015	.00
%Afr Amer in School	-.007	.002	.00
%Latino in School	-.009	.002	.00
%Poverty in School	.006	.001	.00
ClassLast	.222	.020	.00
Constant	.397	.074	.00
N	15,838		
R^2	.5846		

Grades 6-8, Reading, All Teachers (1 Student, Multiple Teachers)

	Basic Model		
	Coefficient	**Stand. Error**	**Prob.**
TFA Intensity	.036	.036	.33
Last Year's TAAS Score	.681	.009	.00
Teacher Experience	.009	.003	.00
(Teacher Experience)^2	.000	.000	.01
Student Ethnicity: Native American	-.105	.094	.27
Student Ethnicity: Afr Amer	-.193	.017	.00
Student Ethnicity: Latino	-.164	.014	.00
Student Ethnicity: Caucasian	-.037	.012	.00
Student Poverty	-.083	.008	.00
%Afr Amer in School	-.007	.001	.00
%Latino in School	-.008	.001	.00
%Poverty in School	.004	.001	.00
Constant	.578	.060	.00
N	132,021		
R^2	.5427		

Grades 6-8, Reading, New Teachers (1 to 1 Match)

	Basic Model		
	Coefficient	**Stand. Error**	**Prob.**
TFA	.140	.079	.08
Last Year's Score	.609	.022	.00
Teacher Experience	.107	.059	.07
Student Ethnicity: Native American	-.549	.348	.12
Student Ethnicity: Afr Amer	-.325	.069	.00
Student Ethnicity: Latino	-.299	.063	.00
Student Ethnicity: Caucasian	-.081	.064	.21
Student Poverty	-.017	.032	.60
%Afr Amer in School	-.002	.004	.59
%Latino in School	-.003	.005	.48
%Poverty in School	.001	.002	.72
ClassLast	.167	.050	.00
Constant	.348	.201	.08
N	2,992		
R^2	.4824		

Grades 6-8, Reading, New Teachers (1 Student, Multiple Teachers)

	Basic Model		
	Coefficient	**Stand. Error**	**Prob.**
TFA Intensity	.018	.060	.77
Last Year's Score	.663	.018	.00
Teacher Experience	.077	.034	.02
Student Ethnicity: Native American	-.363	.329	.28
Student Ethnicity: Afr Amer	-.245	.039	.00
Student Ethnicity: Latino	-.226	.033	.00
Student Ethnicity: Caucasian	-.077	.034	.02
Student Poverty	-.085	.016	.00
%Afr Amer in School	-.0002	.003	.95
%Latino in School	-.0002	.004	.97
%Poverty in School	-.002	.002	.43
Constant	.341	.149	.03
N	11,347		
R^2	.4911		

Grades 6-8, Mathematics, All Teachers

	Basic Model + Class Average on Previous TAAS Test		
	Coefficient	**Stand. Error**	**Prob.**
TFA	.108	.048	.03
Last Year's TAAS Score	.727	.004	.00
Teacher Experience	.008	.002	.00
(Teacher Experience)^2	.000	.000	.00
Student Ethnicity: Native American	-.221	.079	.01
Student Ethnicity: Afr Amer	-.263	.011	.00
Student Ethnicity: Latino	-.190	.010	.00
Student Ethnicity: Caucasian	-.108	.010	.00
Student Poverty	-.030	.006	.00
%Afr Amer in School	-.004	.001	.00
%Latino in School	-.006	.001	.00
%Poverty in School	.004	.001	.00
ClassLast	.116	.014	.00
Constant	.363	.041	.00
N	96,276		
R^2	.6224		

Grades 6-8, Mathematics, Teachers with 0-1 Year of Experience

	Basic Model + Class Average on Previous TAAS Test		
	Coefficient	**Stand. Error**	**Prob.**
TFA	.045	.093	.63
Last Year's TAAS Score	.730	.008	.00
Teacher Experience	.063	.027	.02
Student Ethnicity: Asian	.258	.161	.11
Student Ethnicity: Afr Amer	-.033	.161	.84
Student Ethnicity: Latino	.044	.161	.78
Student Ethnicity: Caucasian	.114	.162	.48
Student Poverty	-.028	.013	.03
%Afr Amer in School	-.002	.002	.30
%Latino in School	-.003	.002	.17
%Poverty in School	.002	.002	.15
ClassLast	.137	.032	.00
Constant	-.009	.198	.97
N	19,521		
R^2	.6113		