The Teachers We Need and How to Get More of Them

Overview*

U.S. schools aren't producing satisfactory results, and this problem is not likely to be solved until U.S. classrooms are filled with excellent teachers. About this, there seems to be a national consensus. How to get from here to there, however, is the subject of far less agreement. Our purpose is to suggest a more promising path than many policymakers and education reformers are presently following.

The good news is that America is beginning to adopt a powerful, commonsensical strategy for school reform. It is the same approach that almost every successful modern enterprise has adopted to boost performance and productivity: set high standards for results to be achieved, identify clear indicators to measure progress towards those results, and be flexible and pluralistic about the means for reaching those results. This strategy in education is sometimes called "standards-and-accountability." It is a fundamental aspect of the charter school movement, and it undergirds many versions of "systemic reform" as well.

The bad news is that states and policymakers have turned away from this commonsensical approach when trying to increase the pool of well-qualified teachers. Instead of encouraging a results-oriented approach, many states and policymakers are demanding ever more regulation of inputs and processes. Other modern organizations have recognized that regulation of inputs and processes is ineffectual and often destructive. There is no reason to believe that it will be anything other than ineffectual as a strategy for addressing the teacher quality problem.

We conclude that the regulatory strategy being pursued today to boost teacher quality is seriously flawed. Every additional requirement for prospective teachers—every additional pedagogical course, every new hoop or hurdle—will have a predictable and inexorable effect: it will limit the potential supply of teachers by narrowing the pipeline while having no bearing whatever on the quality or effectiveness of those in the pipeline. The regulatory approach is also bound, over time, to undermine the standards-and-accountability strategy for improving schools and raising student achievement.

A better solution to the teacher quality problem is to simplify the entry and hiring process. Get rid of most hoops and hurdles. Instead of requiring a long list of courses and degrees, test future teachers for their knowledge and skills. Allow principals to hire the teachers they need. Focus relentlessly on results, on whether students are learning. This strategy, we are confident, will produce a larger supply of able teachers

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* This statement is also available at www.edexcellence.net. For more information, call the Thomas B. Fordham Foundation at 202-223-5452.

and will tie judgments about their fitness and performance to success in the classroom, not to process or impression.

The Problem

We know that better quality teachers make a big difference. We know this from decades of research and from the experience of millions of families. Recent studies in Tennessee, Boston, and Dallas, *inter alia*, find dramatic differences between the performance of youngsters who are assigned the best teachers and those assigned the worst teachers.[1] No matter how well-intentioned it is, school reform will likely falter unless more teachers have the knowledge and skills to help all their students meet high academic standards.

Poor Preparation

Yet many teachers are unready to meet these challenges. According to a recent survey, only one in five teachers feels well prepared to teach to high standards.[2] The head of Teachers College acknowledges that "The nation has too many weak education schools, with teachers, students and curriculums that are not up to the task at hand."[3] Children who face high-stakes tests for promotion and graduation will need instructors with more knowledge and skill than ever before. As many as two million new teachers will need to be hired in the next decade. Yet our present system for recruiting, preparing and deploying them is not up to the dual challenge of quality and quantity. We are not attracting enough of the best and the brightest to teaching, and not retaining enough of the best of those we attract.[4] A third of U.S. teachers–two thirds in inner cities–report that *their* schools have difficulty keeping good teachers.[5]

Lack of Subject Matter Knowledge

Perhaps the gravest failing of our present arrangement is the many teachers who lack preparation in the subjects that they teach. While most public school teachers are certified by their states, extensive college-level study in the teaching field is not always a prerequisite for subject area certification.[6] Moreover, teachers are often assigned to courses outside their main teaching field as a cost-saving measure or administrative convenience, because of shortages in advanced subjects such as math and science, or because some schools–such as those in the inner-city—have a high turnover of teachers. "Foreign education ministers who visit me are just stumped when I try to explain this practice," notes Education Secretary Richard Riley. "Their translators simply have no words to describe it."[7]

It appears, for example, that more than half of history teachers have neither majors nor minors in history itself.[8] More than half of the youngsters studying physics have a teacher who has neither a major nor minor in physics. (Is it any wonder that U.S. high seniors trail the world when it comes to *their* knowledge of physics?) More troubling still, children attending school in poor and urban areas are least likely to find themselves studying with teachers who *did* engage in deep study of their subjects.

Today's regulatory approach to entry into teaching compounds these problems. Because it places low priority on deep subject matter mastery and heavy emphasis on the things that colleges of education specialize in, many teachers get certified without having mastered the content that they are expected to impart to their students.

The Romance of Regulation

For decades, the dominant approach to "quality control" for U.S. teachers has been state regulation of entry into the profession. Requirements vary, but almost everywhere a state license is needed to teach in public schools. To obtain such a license, one must complete a teacher education program approved by the state, which typically imposes a host of requirements on these programs.[9] Their students are commonly required to take specific courses (or a set number of courses) in pedagogy, child development, the "foundations of education", "classroom diversity", etc.[10] Some states require a minimum college grade point average for entry into the program and many require prospective teachers to pass standardized tests of reading, writing and math skills. It is also common, at some point in the process, to test for knowledge of pedagogy and, sometimes, for knowledge of the subject in which they will be certified (which, as we have seen, may or may not be the subject they end up teaching). In addition, these programs typically require supervised student teaching, which teachers often term the most valuable part of their preparation for the classroom. This approach predictably creates a teacher force that is heavily credentialed in pedagogy, but not in the subject matter they are expected to teach. The regulatory strategy will intensify these trends.

More of the Same

Today, in response to widening concern about teacher quality, most states are tightening the regulatory vise, making it harder to enter teaching by piling on new requirements for certification. On the advice of some highly visible education groups such as the National Commission on Teaching and America's Future, these states are also attempting to "professionalize" teacher preparation by raising admissions criteria for training programs and ensuring that these programs are all accredited by the National Council for the Accreditation of Teacher Education (NCATE). That organization is currently toughening its own standards

to make accredited programs longer, more demanding, and more focused on avant-garde education ideas and social and political concerns.

Such measures will centralize and standardize the licensure process even more, curbing diversity in the sources and entry paths followed by teachers and shifting authority from local school boards and state agencies to professional education organizations and standards committees. These groups base their standards and procedures for judging teacher fitness on the principle of peer review, not on proven effectiveness with respect to student learning.

It is no surprise that all this is happening. The regulatory route is public education's traditional solution. Even business groups proposing to improve the quality of teaching offer suggestions that partake of the regulatory mindset. Many vested interests are served and established routines are enhanced by more regulation.

Shortcomings of the Regulatory Strategy

The regulatory strategy that states have followed for at least the past generation has failed. The unfortunate results are obvious: able liberal arts graduates avoid teaching, those who endure the process of acquiring pedagogical degrees refer to them as "Mickey Mouse" programs, and over time the problems of supply and quality have been exacerbated. When a strategy fails, it does not make much sense to do the same thing with redoubled effort. Yet that is what many states are now doing.

The present system does not even do a good job of screening out ill-prepared candidates. While some states have exit exams that appraise the skills, knowledge and competence of fledgling teachers, in many others, "quality control" occurs only at the point of entry into a training program, and entry requirements are low. In a state with no exit exam, completing the list of prescribed courses and earning the requisite degree are all that's needed to get one's teaching certificate. Though many jurisdictions now require future *high school* instructors to have majored (or minored) in the subjects that they plan to teach, the content and rigor of their course work are left entirely to the colleges.

Where there are exit exams, these often represent a modest intellectual threshold. Tests given to teaching candidates are commonly pitched at so undemanding a level—and their passing scores are so low—that they do little to deter individuals with limited intellectual prowess and scant subject matter knowledge. In Pennsylvania, for instance, passing scores were for many years set so that about 95 percent of everyone taking the tests passed them.[11] Local school boards can then hire whomever they prefer, often for reasons other than their academic qualifications.

Standards Askew

What really makes state regulation of entry into teaching so dysfunctional is not that its standards are low but that it emphasizes the wrong things. The regulatory strategy invariably focuses on "inputs"—courses taken, requirements met, time spent and activities engaged in—rather than results, meaning actual evidence of a teacher's classroom prowess, particularly as gauged by student learning. It judges one's "performance" by the subjective opinions of other teachers and professors. This is the wrong sort of regulation.

Teachers should be evaluated based on the only measure that really matters: whether their pupils are learning. This is not pie in the sky. William Sanders of the University of Tennessee has developed a technique that uses careful statistical analysis to identify the gains that students make during a school year and then estimate the effects of individual teachers on student progress. This "value-added" technique is extremely precise and its results are statistically robust. Originally used only in Tennessee but now spreading to other locales, it allows policymakers, taxpayers, and parents to see for themselves how much teachers are helping students to learn.[12]

The technique has proven to be a powerful tool for evaluating teachers. Sanders finds, for example, that the top 20 percent of teachers boost the scores of low-achieving pupils by 53 percentile points on average, while the bottom 20 percent of teachers produce gains of only 14 percentile points. Researchers in Dallas and Boston have found the same commonsensical link: good teachers significantly boost student achievement, even for the weakest pupils.[13]

Yet few states focus their teacher quality strategies on results. The instruments that states are far likelier to use to assess teaching candidates—input measures, that is—are seriously flawed approximations of how good a teacher one will be. We are struck by the paucity of evidence linking those inputs with actual teacher effectiveness. In a meta-analysis of close to four hundred studies of the effect of various school resources on pupil achievement, very little connection was found between the degrees teachers had earned or the experience they possessed and how much their students learned.[14] Nor is there any evidence that teachers who graduate from NCATE-accredited teacher education programs are more effective than those who do not.[15] Today's regulations, and the additional regulations urged by reformers within the profession, focus on inputs that display little or no relationship to classroom success. This is not education reform. This is the illusion of reform.

Shaky Knowledge Base

The regulatory strategy assumes that good teaching rests on a solid foundation of specialized professional knowledge about pedagogy (and related matters) that is scientifically buttressed by solid research. In reality, however, much of that knowledge base is shaky and conflicted. We should not be surprised that there is no reliable link between pedagogical training and classroom success.

To be sure, the foundation has some sturdy spots. There is a scientific consensus today, for example, about the most effective methods of teaching primary reading to young children.[16] There is strong evidence about the efficacy of such pedagogies as Direct Instruction.[17] Yet much of the surest and best-documented knowledge about education is ignored, even denounced, by many approved teacher education programs, while the lore that they instead impart to new teachers (about favored methods and self-esteem enhancement, for example) has little or no basis in research.[18] Is it any wonder that people mistrust teacher education–or that to rely on it as the exclusive path into U.S. classrooms is to place the next generation of Americans at educational risk? The regulatory approach buttresses an orthodoxy that doesn't work.

The regulatory strategy's reliance on peer review assumes, of course, that good teaching can only be detected via observation by other practitioners. Thus the National Board for Professional Teaching Standards has designed an elaborate method for appraising teacher performance and certifying outstanding teachers. The process is costly and time-intensive. Yet today we have no idea whether the teachers identified as superior by the NBPTS are in fact the best teachers as judged by how much and how well their pupils learn.[19] Here as elsewhere, peer review consists mainly of judging quality by observing inputs and processes, i.e. appraising a teacher's skill in using conventional (and popular) teacher practices.

Discouraging the Best and Brightest

Insofar as there are links between teacher characteristics and classroom effectiveness, the strongest of these involve verbal ability and subject matter knowledge. This has been known since the famed Coleman Report of 1966, when teacher scores on a verbal test were the only school "input" found to have a positive relationship to student achievement.[20] In a recent study conducted in Texas, teacher literacy levels were more closely associated with student performance than other inputs.[21] In an appraisal of Alabama schools, the ACT scores of future teachers were the strongest determinant of student gains.[22] These all suggest that recruiting smarter, abler teachers will do more to improve teaching than requiring more or different pre-service training.

Yet outstanding candidates are often discouraged by the hurdles that the regulatory strategy loves to erect. Burdensome certification requirements deter well-educated and eager individuals who might make

fine teachers but are put off by the cost (in time and money) of completing a conventional preparation program. One college senior writes, "What discourages us most are the restrictive paths to the classroom and the poor reputation of schools of education--and as a result, of teaching itself....It is the certification process, then, and not a lack of interest, that steers us away from teaching."[23] The best and the brightest of young Americans have other career options and will pursue them if the costs of becoming a teacher are too high. In his February 1999 State of American Education speech, U.S. Secretary of Education Richard Riley urged state policymakers to rethink teacher licensing requirements. "Too many potential teachers", he observed, "are turned away because of the cumbersome process that requires them to jump through hoops and lots of them."[24]

Getting Hired: What You Know vs. Who You Know

What little we know about how those who have been certified actually land a teaching job is troubling. There is accumulating evidence that local school boards show little interest in hiring the most academically qualified applicants.[25] Districts often eschew professional recruiting and screening practices. Instead, they frequently prefer to hire their own high school graduates after they have become certified in a local education program, a practice which has been found to contribute to lower students scores on competency and achievement tests.[26]

Few incentives for great teaching

Once teachers have entered the classroom, the regulatory strategy–like all such regimens–prizes uniformity and conformity. Personnel decisions for public schools are made by central office bureaucrats according to strict rules. Assignments are often based on seniority. Rigid salary schedules mean that teacher pay reflects years of experience and degrees earned rather than any measure of performance, and salaries bear no relationship to marketplace conditions in the teaching field. There are few tangible rewards for good teaching. And, because quality control focuses on the point of entry, and on-the-job teachers are protected by powerful political interests, there are fewer sanctions for bad teaching. As the N.C.T.A.F. itself pointed out in *What Matters Most: Teaching for America's Future*, "hiring and tenure decisions are often disconnected from any clear vision of quality teaching."[27]

A Common Sense Proposal: Freedom in Return for Results

As Secretary Riley said in February, "We can no longer fiddle around the edges of how we recruit, prepare, retain, and reward America's teachers."[28] The time has come to consider radically different policies to boost the quality of teaching in U.S. schools. In the remainder of this paper, we advance a fresh view of how America can acquire more and better teachers in the years ahead.

Holding Schools Accountable

The teaching profession should be deregulated, entry into it should be widened, and personnel decisions should be decentralized to the school level, the teacher's actual workplace. Freeing up those decisions only makes sense, however, when schools are held accountable for their performance--truly accountable, with real consequences for success and failure. The proper incentives are created by results-based accountability systems in which states independently measure pupil achievement, issue public report cards on schools, reward successful schools, and intervene in or use sanctions against failing schools. In private schools today–and in most charter school programs--schools are held accountable by the marketplace while hiring decisions are made at the building level. Public schools, too, should be accountable in this manner.

Power to the Principals

For principals (or other education leaders) to manage their personnel in such a way as to shoulder accountability for school results, they must not only be free to select from a wide range of candidates, they must also have the flexibility to compensate those they hire according to marketplace conditions (and individual performance), and they must be able to remove those who do not produce satisfactory results. Everyone who has studied effective schools attests to the central importance of a cohesive "school team" that shares a common vision, and almost everyone who has studied current teacher personnel systems has witnessed the danger of tying that school team's hands when it comes to deciding who will join (or remain in) it.[29]

Common sense also argues that teachers of subjects in short supply should be paid more than those in fields that are amply supplied, that teachers working in hard-to-staff schools should be paid more than those working in schools with hundreds of applicants for teaching slots, and that outstanding teachers should be paid more than mediocre ones. Yet today, the typical public school salary schedule (and teachers' union contract) allows for none of these commonsensical practices.

We look forward to the day when great teachers, teachers in scarce fields, and teachers who shoulder difficult challenges, are paid six-figure salaries. But this is not apt to happen so long as mediocre practitioners and superb instructors are harnessed to the same pay scale.

As for the occasional incompetent teacher, the more freedom a school has in initial hiring, the more flexibility it needs with respect to retention. That's common sense, too. Yet today's school systems typically award tenure after a few years of service; thereafter, teachers are almost never dismissed for ineffectiveness. While teachers should be protected from abusive and capricious treatment at the hands of principals, they cannot be protected from losing their jobs for cause. Union contracts often allow veteran teachers to transfer into a school regardless of their instructional prowess, the school's actual needs, or their impact on the school team. Such policies will need to be changed so that principals can be empowered and made accountable.

School-level managers are in the best position to know who teaches well and who teaches badly. They have access to far more significant information than state licensing boards and government agencies. They should be empowered (and if need be trained) to appraise each teacher's singular package of strengths and weaknesses rather than having distant bureaucracies decide who should be on their team. Once hired, teachers should be evaluated based on the only measure that really matters: whether their pupils are learning.

A Market Test

The common sense view acknowledges that there is no "one best system" for preparing and licensing quality teachers. A review of the research on the teacher qualities that affect student outcomes is humbling; lamentably little is known for sure about what makes an effective teacher, when gauged by pupil achievement. This argues against mandating any single path into the profession; education schools certainly ought not monopolize the training of teachers. In any case, teachers regularly report that the best place to learn about good teaching practices is on the job and in the company of other good teachers.

Rather than buttressing an orthodoxy that does not work, the common sense approach embraces pluralism. In a deregulated environment, good teacher education programs will thrive and prosper. Those that do a poor job will not, once they lose the protection that the regulatory monopoly confers on them. Principals should be able to decide for themselves whether to hire teachers who have been trained in certain pedagogical methods and theories.

The popularity of such programs as Teach for America, which places liberal arts graduates without formal education course work in public school classrooms in poor rural communities and inner cities, indicates that the prospect of teaching without first being obliged to spend years in pedagogical study

appeals to some of our brightest college graduates. Over 3,000 people apply for 500 Teach for America slots each year. Since 1994, more than 3,000 veterans of the armed forces have also made the transition from military to classrooms through the Troops to Teachers program.

Alternative certification programs streamline the classroom entry of more prospective teachers. Such programs normally require a bachelor's degree, passage of a competency test, and an intensive (but compressed) regimen of specialized preparation, often undertaken while on the job. They attract talented and enthusiastic individuals into teaching who might otherwise be lost to this calling. Teachers with alternative certification are more likely to have bachelor's degrees in math and science, two fields with chronic shortages of qualified teachers. They are also more likely to be members of minority groups.[30] Yet the regulatory strategy would shut down such programs or force them to imitate conventional education programs.

Where personnel decisions have been deregulated, schools rush to hire well-educated persons whether or not they possess standard certification. Private schools routinely employ unlicensed instructors, which tends to increase the proportion of their teachers who graduated from selective colleges and gained academic training.[31] In New Jersey, the first state to implement a serious alternative certification program, from 23 to 40 percent of teachers now enter the profession through that route.[32] The few studies of alternative certification that have been done find that students of such teachers perform at least as well as students of conventionally licensed teachers.[33] In New Jersey, alternative-certification teachers also have lower attrition than traditionally certified teachers during their first year and are as likely to stay in the field over time.[34]

Not *All* Regulations Are Bad

Trading accountability for autonomy does not mean sloughing off all regulation. Every child should be able to count on having a teacher who has a solid general education, who possesses deep subject area knowledge, and who has no record of misbehavior. The state has an obligation to ensure that all prospective teachers meet this minimal standard. Thus states should perform background checks on candidates for teaching positions. To boost the likelihood that those who teach our children are themselves well educated, states should require that teaching candidates have at least a bachelor's degree in some academic subject.

States should also ensure subject matter competence. There are two ways to do this: requiring teachers to major in the subjects they teach or requiring them to pass challenging tests of subject matter knowledge. Neither method is perfect. Obliging all teachers to major in the subject they will teach may–regrettably–set the bar too low. At some universities, one can graduate as a history major without learning much of the

history we'd expect a high school history teacher to have mastered. The same is true of other academic majors. And a minor is unlikely to reflect any subject mastery. On the other hand, a prospective teacher who graduates in, say, American studies may have learned ample history or literature to be an outstanding history or English teacher, even though his diploma doesn't actually say "history" or "English".

Such variation in college majors tempts us to embrace testing as a more reliable measure of preparedness to teach. The value of any test, however, hinges on its content, rigor and passing score. Our instinct is to set those cut-offs as high as possible. But since tests are an imperfect gauge of teaching ability, some applicants will fail the test yet possess superior teaching potential. We all know individuals whose other qualities would cause them to be effective with children even if they do poorly on a paper-and-pencil test of knowledge. That is why we are wary of putting all the education eggs in the testing basket or making a certain fixed score an absolute prerequisite to being hired.

Neither academic majors nor subject test scores is a faultless means of assuring that teachers possess the requisite knowledge and will be good at delivering it. But either strategy is superior to today's widespread disregard of subject-matter mastery.

Putting principles into practice

The common sense strategy for improving teacher quality is surprisingly straightforward: states should empower principals to employ teachers as they see fit, and then hold those principals to account for their schools' results. Since every regulation that restricts entry to the profession excludes some potentially good teachers from public education, regulation should be reduced to the bare minimum.

What would state policies look like if based on these assumptions? Four are key.

1) States should develop results-based accountability systems for schools and teachers as well as students.

States should have accountability systems operating at the student, classroom, and building levels. School-level accountability involves measuring pupil achievement and issuing report cards for schools. Such information should be disseminated to students, parents and the public. States should reward successful schools and should have—and use—the authority to reconstitute or otherwise intervene in failing schools. They may also institute market-based accountability via various forms of school choice.[35] States must also define the role that school districts will play in these accountability systems.

Principals need accountability, too. Their jobs and salaries ought to be tied to their schools' performance. But they need the information by which to hold their faculty and staff accountable. The state

can help by providing student achievement data, disaggregated by teacher, like those generated by the value-added system that Sanders developed for Tennessee.

2) States should empower school-level administrators with the authority to make personnel decisions.

Authority must accompany accountability. All key personnel decisions (including hiring, promotion, retention, and compensation) should be devolved to schools. Quality control should be the responsibility of school leaders, who have freedom to hire from a wide pool of teaching candidates and pay teachers based on marketplace conditions or individual performance. States should pass whatever legislation is needed to assign all these decisions to the school level.

Teacher tenure ought not be allowed to interfere. Multi-year contracts are far preferable. It must be possible to remove incompetent teachers at reasonable cost and within a reasonable period of time, without sacrificing their right to due process protection against capricious and ad hominem treatment.

States should encourage differential pay so that schools can pay outstanding teachers more. It should also be possible to adjust teacher pay for labor market conditions, subject specialty, and the challenge of working in tough schools. A flexible salary structure would allow paychecks to respond to marketplace signals while creating financial incentives for excellent teaching and practical sanctions for poor teaching.

To work well, this system obviously requires capable principals, education leaders who know how to judge good teaching and are prepared to act on the basis of such evaluations. We're not naïve about the supply of such people in management positions in public education today. But they exist in large numbers in U.S. society and can be drawn into the schools if the incentives are right. Executive training for some current principals will also help them handle this difficult evolution of their role.[36]

3) States should enforce minimal regulations to ensure that teachers do no harm.

States should perform background checks for all teaching candidates and require prospective teachers to have a bachelor's degree in an academic field. They should also ensure that new teachers are adequately grounded in the subject matter they are expected to teach, either by requiring that they major in the subject(s) that they will teach or by mandating rigorous subject matter examinations. (They may be wise to use both mechanisms and also let principals make exceptions when other compelling evidence is at hand.)

4) States should open more paths into the classroom, encourage diversity and choice among forms of preparation for teaching, and welcome into the profession a larger pool of talented and well-educated people who would like to teach.

Policymakers should take forceful action to eliminate monopoly control and challenge "one best system" attitudes toward teacher preparation. Traditional training programs should be closely scrutinized for their length, cost, burden and value. Is a two year time commitment really necessary, for example? States should publish detailed factual information about individual programs and their graduates, data that outsiders can use to evaluate their effectiveness. Information about the effectiveness of recent graduates (as measured by the value-added achievement scores of their pupils) should be made public; until this is available, institution-specific data should include the placement rate of graduates and the percentage of graduates passing state teacher tests. (Some of this information was mandated by the Higher Education Amendments of 1998.)

States should expand the pool of talented teaching candidates by allowing individuals who have not attended schools of education to teach, provided that they meet the minimum standards outlined above. States should encourage programs that provide compressed basic training for prospective teachers. States should also attract outstanding college graduates to the profession by using financial incentives such as scholarships, loan forgiveness programs and signing bonuses.

Conclusion

For too long, policymakers have focused overmuch on training teachers and not enough on recruiting them. They have tackled the quality problem by increasing regulation and expanding pedagogical requirements, even though this approach shrinks the pool of candidates while having scant effect on their quality. Forty years of experience suggests that this strategy is a failure. It cannot work. Indeed, it has compounded today's dual crisis of teacher quality and quantity.

We offer something different. States that reduce barriers to entry will find not only that their applicant pool is larger but also that it includes many more talented candidates. Turning our back on excessive and ill-conceived regulations and focussing instead on student outcomes is the key. To attract and keep the best teachers, states must also be willing to pay strong teachers well–and to muster the necessary resources to do this.

Raising the quality of the U.S. teaching force is an urgent priority today and some policymakers have begun to signal their receptivity to change. In his February 1999 State of American Education speech, for example, Secretary Riley proclaimed, "We must make sweeping efforts to make teaching a first-class profession. And, then, we must hold schools accountable for results."[37] He later added, "What else can we do? We can create rigorous alternative paths to give many more Americans the opportunity to become a teacher."[38] We agree.

[1]Sanders, William L. and Rivers, Joan C., "Cumulative and Residual Effects of Teachers on Future Student Academic Achievement," 1996; Heather Jordan, Robert Mendro, & Dash Weerasinghe, "Teacher Effects on Longitudinal Student Achievement," 1997; and Boston Public Schools, "High School Restructuring," March 9, 1998. These research studies were all cited in Kati Haycock, "Good Teaching Matters a Lot," *Thinking K-16*, A Publication of The Education Trust, 3 No. 2 (1998).

[2]National Center for Education Statistics, *Teacher Quality: A Report on the Preparation and Qualifications of Public School Teachers*, (Washington, DC: U.S. Department of Education, January 1999),iii.

[3] Arthur Levine, "Dueling Goals for Education", *The New York Times*, April 7, 1999, A23

[4] Although teacher "literacy" levels mirror those of other college graduates, that's not actually saying much; more than forty percent of teachers scored below "level 4" on the 1992 National Adult Literacy Survey (NALS), a national assessment of prose literacy, document literacy and quantitative literacy among adult Americans. For the study, a random sample of U.S. adults were surveyed and based on their performance on a set of literacy tasks, were graded as level one through level five. Individuals scoring at level 4, for example, display the ability to state in writing an argument made in a lengthy newspaper article (prose literacy), use a schedule to determine which bus to take in a given situation (document literacy) and use an eligibility pamphlet to calculate how much money a couple would receive as supplemental security income (quantitative literacy). More than forty percent of teachers (and of the general population) scored below this level on the national assessment. Barbra A. Bruschi and Richard J. Coley, *How Teachers Compare: The Prose, Document, and Quantitative Skills of America's Teachers*, (Princeton, N.J.: Educational Testing Service, 1999).

[5] Carol A. Langdon, "The Fifth Phi Delta Kappa Poll of Teachers' Attitudes Toward The Public Schools", *Phi Delta Kappan*, Vol. 80, No. 8, April 1999, p. 615.

[6]Teacher certification and teacher licensure are used interchangeably throughout this essay.

[7]Richard W. Riley, U.S. Secretary of Education, "New Challenges, A New Resolve: Moving American Education Into the 21st Century," Sixth Annual State of American Education Speech, Long Beach, California, February 16, 1999.

[8]Diane Ravitch, "Lesson Plan for Teachers," *Washington Post*, August 10, 1998. These numbers can be difficult to pin down since the NCES sometimes includes teachers who major in history education as having majored in history.

[9] To be sure, not all teachers pass through conventional teacher training programs. Some obtain temporary or emergency licenses that allow them to teach before they have completed all of the normal requirements for certification. These are normally issued when districts have urgent needs for teachers that they say they cannot meet with conventional candidates. Some states also offer alternative certification routes which allow liberal arts graduates, military retirees and others to teach without having to complete a full-length teacher education program. Often, however, the "alternative" programs simply defer the conventional requirements; the individual may begin teaching but may not continue without taking the standard courses, etc. In any case, the intensified regulatory approach outlined in the text would curb the use of alternative programs unless they conform closely to the model of conventional programs.

[10]The number of required units varies from 6 semester units in Texas to 36 in some states. C. Emily Feistritzer and David T. Chester, *Alternative Teacher Certification: A State-by-State Analysis 1998-99*, (Washington, DC: National Center for Education Information, 1998).

[11]Teaching candidates needed to answer correctly only a quarter of the questions in the reading section of the National Teacher Exam in order to pass it. For a decade, the state set no minimum scores at all in chemistry and physics; every applicant who took one of these tests passed. Robert P. Strauss, "Teacher Preparation and Selection: A Case Study of Pennsylvania," Thomas B. Fordham Foundation Volume on Teacher Quality (forthcoming).

[12] Organizing an education system on the basis of student achievement requires better measures of student achievement than most states have today (in particular, annual assessments of students in every grade), though a number of jurisdictions are moving in that direction. Implementing the principles of this "manifesto" will mean more such movement. We also recognize, of course, that student test scores can never be a full or perfect measure of teacher effectiveness; teachers add many valuable things to students that cannot be captured by any test.

[13]Kati Haycock, "Good Teaching Matters a Lot," *Thinking K-16*, A Publication of The Education Trust, 3 No. 2 (1998).

[14]Eric A. Hanushek, "Assessing the Effects of School Resources on Student Performance: An Update," *Educational Evaluation and Policy Analysis*, Summer 1997, vol. 19 no. 2, 141-164.

[15]Dale Ballou and Michael Podgursky, "The Case Against Teacher Certification," *The Public Interest*, Summer 1998, 17-29.

[16] Louisa Cook Moats and G. Reid Lyon, "Wanted: Teachers with Knowledge of Language," *Topics in Language Disorders*, February 1996.

[17] Some teachers object to "D.I." methods, but the evidence indicates that they're effective. See American Institutes for Research, *An Educators' Guide to Schoolwide Reform* (Washington, DC: Educational Research Service, 1999) 4, C12-C18 and Debra Viadero, "A Direct Challenge," *Education Week*, March 17, 1999 pp. 41-43.

[18] William Damon, *Greater Expectations* (New York: Free Press, 1995).

[19] The NBPTS reports that a study examining the effectiveness of its standards is underway.

[20]Christopher S. Jencks, "The Coleman Report and the Conventional Wisdom," in *On Equality of Educational Opportunity*, Frederick Mosteller and Daniel P. Moynihan, editors (New York: Random House, 1972) 101.
[21]Ronald F. Ferguson, "Can Schools Narrow the Black-White Test Score Gap?" in *The Black-White Test Score Gap*, Christopher Jencks and Meredith Phillips, editors (Washington, DC: Brookings Institution,1998).
[22]Ronald F. Ferguson and Helen F. Ladd, "How and Why Money Matters: An Analysis of Alabama Schools," in *Holding Schools Accountable: Performance Based Reform in Education* (Brookings Institution: Washington, DC, 1996).
[23]Elizabeth Greenspan, "No Thanks," *Teacher Magazine*, April 1999.
[24]Richard W. Riley, U.S. Secretary of Education, "New Challenges, A New Resolve: Moving American Education Into the 21st Century," Sixth Annual State of American Education Speech, Long Beach, California, February 16, 1999.
[25] See Dale Ballou, "Do Public Schools Hire the Best Applicants," *Quarterly Review of Economics*, February 1996, 97-134 and Dale Ballou and Michael Podgursky, "Recruiting Smarter Teachers," *Journal of Human Resources*, Winter 1995, 326-338.
[26] See Robert P. Strauss, Lori Bowes, Mindy Marks, and Mark Plesko, "Improving Teacher Preparation and Selection: Lessons from the Pennsylvania Experience," *Economics of Education Review*, forthcoming.
[27]National Commission on Teaching and America's Future, *What Matters Most: Teaching for America's Future*, New York: National Commission on Teaching and America's Future, September 1996) 14.
[28]Richard W. Riley, U.S. Secretary of Education, "New Challenges, A New Resolve: Moving American Education Into the 21st Century," Sixth Annual State of American Education Speech, Long Beach, California, February 16, 1999.
[29] The importance of the power to remove teachers is emphasized by the most mainstream research in the field. Gordon Cawelti, former Executive Director of the Association for Supervision and Curriculum Development, concludes in a recent study of what makes schools effective: "A school seeking a turnaround in student performance must seek out teachers who want to work in such an environment. A school must also be able to remove teachers who are unwilling to commit the energy and dedication needed to make sure that a productive and challenging education is provided to all children who attend. This policy issue must not be overlooked. Without committed teachers, you are unlikely to raise student achievement significantly." Gordon Cawelti, *Portraits of Six Benchmark Schools: Diverse Approaches to Improving Student Achievement*, (Arlington, Va.: Educational Research Service, 1999), 64-65.
[30]Jianping Shen, "Has the Alternative Certification Policy Materialized Its Promise? A Comparison Between Traditionally and Alternatively Certified Teachers in Public Schools," *Educational Evaluation and Policy Analysis*, 19 (3) 1997, 276-283.
[31]Dale Ballou and Michael Podgursky, "Teacher Training and Licensure" Thomas B. Fordham Foundation volume on Teacher Quality (forthcoming), 13.
[32]Dale Ballou and Michael Podgursky, Thomas B. Fordham Foundation volume on Teacher Quality (forthcoming), 13.
[33]Stephen D. Goebel, Karl Ronacher, and Kathryn S. Sanchez, *An Evaluation of HISD's Alternative Certification Program of the Academic Year: 1988-1989*. Houston: Houston Independent School District Department of Research and Evaluation, 1989. ERIC Document No. 322103. Susan Barnes, James Salmon, and William Wale, "Alternative Teacher Certification in Texas," presented at the annual meeting of the American Educational Research Association, March 1989. ERIC Document No. 307316.
[34]Ellen Schech, director, alternate route program, New Jersey Board of Education, in "No Thanks," *Teacher Magazine*, April 1999.
[35] How extensive a school choice policy will be is determined primarily by state laws and constitutions—and of course by politics. The more choice the better—including, where possible, private schools—is the view of most signers of this manifesto. Some signers, however, believe that publicly-funded choice should extend only to publicly-accountable schools
[36] Many signers of this manifesto are concerned that today's school administrators—at the building and central office levels alike—often lack the necessary skills and experience to make sensitive personnel decisions based on student performance and other indicators of effectiveness. A state moving in the direction mapped by this manifesto would probably be wise to include this type of in-service training for its current principals, superintendents, etc.
[37]Richard W. Riley, U.S. Secretary of Education, "New Challenges, A New Resolve: Moving American Education Into the 21st Century," Sixth Annual State of American Education Speech, Long Beach, California, February 16, 1999.
[38]Richard W. Riley, U.S. Secretary of Education, "New Challenges, A New Resolve: Moving American Education Into the 21st Century," Sixth Annual State of American Education Speech, Long Beach, California, February 16, 1999.

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Do Higher Salaries Buy Better Teachers?

by Eric A. Hanushek, John F. Kain, and Steven G. Rivkin

Do higher salaries raise the quality of teaching? Many influential reports and proposals advocate substantial salary increases as a means of attracting and retaining more talented teachers in the public schools and of encouraging harder work by current teachers. Salary policies have also been cited as important for offsetting changes in demands outside of schools and for dealing with the potentially unattractive working conditions often identified in central city schools.

The empirical evidence on the link between teacher quality and pay is, however, decidedly mixed—raising doubts that there is a strong relationship between the two. Direct analyses of student achievement, for example, provide limited evidence of any systematic relationship. Two explanations have emerged in response to this evidence. On the one hand, some argue that the true relationship between teacher quality and salaries is quite strong, but methodological and data problems have impeded the identification of salary effects. Others take a less sanguine position, arguing that the evidence captures accurately the weak performance incentives in the public schools that lead administrators to make hiring and retention decisions that are not strongly linked with teacher quality.[1] The evidence is quite strong on one point: teacher quality is an important determinant of achievement (e.g., Rivkin, Hanushek, and Kain 1998).

There are four main methodological problems that impede the estimation of the true relationship between teacher quality and salaries. Perhaps the most important is the difficulty of measuring teacher quality, because both direct measures of teacher characteristics and indirect measures based on student performance have proved problematic. Secondly, understanding the effects of salary policies requires distinguishing between shifts in salary schedules and movements along a given schedule (with, for example, increases in teacher experience), but this has proved generally difficult to do in past empirical work.

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[1]Loeb and Page (1998) emphasize the difficulty of identifying salary effects, and argue that methodological problems lead to inconsistent estimates of the relationship between quality and pay. On the other side, Ballou and Podgursky (1997) provide evidence that school administrators do not hire the best teaching candidates, thereby weakening the link between quality and pay.

schedules using both district and student fixed effects and controlling for student demographics. Importantly, we concentrate on differences among salary schedules as distinct from movements along given schedules. Overall, the results provide little support for the hypothesis that pay is an important determinant of teacher quality. This finding is consistent with previous work on Texas schools that finds the majority of variation in education quality exists within rather than between schools and therefore cannot be closely linked with pay and other district or school wide factors.

Salaries and the Supply of Teacher Quality

The standard microeconomic framework for analyzing teacher supply and salaries would began with individual labor supply decisions and aggregate these up to a market supply function. The supply of labor to district d within a geographical area j can be characterized by:

$$q_{dj}^{S} = f(w_d, WC_d, A_j, O_j)$$

where q^S is the supply of teacher quality for district d in area j; w_d and WC_d are wages and working conditions, respectively, in district d; and A_j and O_j are amenities and other employment opportunities, respectively, in area j.

The other half of the market, by simple analogy to the theory of the firm, has schools making maximizing decisions such as:

$$\max \sum_i P_{di} \text{ subject to}$$

$$P_{di} = g(q_d, X_d, F_{di}) \quad \text{[production function]}$$

$$B_d = w_d(q_d) + p_x X_d \quad \text{[budget constraint]}$$

draw inferences about supply responses from the observed pattern of teacher transitions, ultimately it is the combination of supply and demand that determines the link between quality and pay.

To fix the interpretation of the subsequent empirical work, we discuss briefly the most common issues that arise in the investigation of teacher labor markets, and outline the approach used in this analysis. Equation (1) describes the framework within which we examine these supply and demand side factors:

$$(1) \qquad q_d^* = h(w_d^*, H_d, WC_d, A_j, O_j, L_{dj})$$

where H captures district hiring and retention practices and L captures worker skills and preferences and an asterisk indicates the observed outcomes of teacher quality and wage decisions.

Teacher quality (q). Fundamental to all discussions of teacher labor markets and teacher salary policies is the absence of clean measures of teacher quality. Available evidence indicates that direct measures of teacher quality, based on schooling, experience, college attended or even teacher test scores account for little of the variation in classroom performance (Hanushek 1997). This is not to say that these measures have no explanatory power, and Ferguson (1991) and Ehrenberg and Brewer (1994) both find that measured performance on teacher tests and college selectivity are systematically related to student achievement, with test scores having the strongest link.[2]

An alternative strategy uses information on student achievement itself as an indirect measure of teacher quality. The finding that teacher salaries have a significant impact on student achievement would imply that they have a significant effect on teacher quality. This strategy has great appeal, because it circumvents the problem of identifying the specific teacher characteristics that measure quality. However,

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[2]The evidence suggests that test scores provide more information about teacher quality than either college selectivity or highest degree earned. Test scores have been used to measure the quality of people training to be teachers (Weaver 1983; Manski 1987; Murnane et al, 1991; Hanushek and Pace 1995; Strauss 1998). Such test measures are frequently related to state requirements for teacher certification and even for entry into teacher training programs (see Strauss 1998).

involves intertemporal issues in the measurement of salaries. Rigidities in the teacher labor market mean that the history of salaries along with expectations for the future rather than just the current salary influence the existing stock of teachers. This is a particular problem for analyses that identify teacher salary effects by inter-temporal changes in salaries within states or districts, because past salaries undoubtably affect the current composition of teachers.[6]

By constructing annual salary schedules for single years of experience in each district over only teachers who do not have a graduate degree, we can isolate the effects of both cross-sectional and inter-temporal variations in overall salary levels.[7] Importantly, in the analysis of teacher test scores, we restrict the sample to new teachers thereby circumventing the difficulty of aggregating across the time path of district salary structures (cf. Murnane et al., 1991). The analysis of student achievement does use contemporaneous salaries, and the fixed effect specifications are identified on the basis of changes in salary over a short period of time. We perform a detailed sensitivity analysis in an effort to identify potential problems introduced by the use of panel data.

Hiring and Retention Policies (H_d). While the relationship between salaries and employment is observed, it is not possible to infer *a priori* that the relationship is a "supply function" for teachers. Rather district hiring and retention practices are an important element in the labor market for teachers. This issue, made forcefully in a set of recent analyses (Ballou and Podgursky 1995, 1997 and Ballou 1996), is very important because it frames the interpretation of movements observed in the market. For example, the observation that retention and salaries are negatively related (controlling for all compensating differentials)

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[6]Both Card and Krueger (1992) and Loeb and Page (1998) use state panels to identify the effects of salaries.

[7]We generally evaluate salary schedules at entry. Subsequently investigation shows that the results are not affected by considering salary differences for more experienced teachers. We have not investigated the possibility that salary increments for master's degrees vary systematically across districts.

specification of the wage and compensation comparisons. Important elements of the overall market factors are also highlighted in Flyer and Rosen (1997) and Boardman, Darling-Hammond, and Mullin (1982).

The empirical evidence supports the belief that alternative earnings opportunities affect teacher labor supply. In a series of papers, Dolton and van der Klaauw (forthcoming) and van der Klaaw (1997) investigate the impact of alternative opportunities on teacher transitions. They find evidence that opportunity wages affect the probabilities of both entry and exit. These results are consistent with earlier work by Murnane and Olsen (1989, 1990), which found that opportunity wages affected duration in teaching in both Michigan and North Carolina.

In this paper, differences in alternative wage opportunities are addressed in two different ways. First, a series of region and community type dummy variables that control for any geographic variation across Texas in the wage structure are included in the empirical specifications. Second, the inclusions of student and district fixed effects effectively removes any time invariant differences in opportunity wages.

Working Conditions (WC_d). Much has been made of the fact that there is more to a teaching job than just the overall salary or compensation levels. Some of the earliest work considered how teacher preferences might affect the selection of schools (Greenberg and McCall 1974; Murnane 1981). More generally, teachers might be willing to take lower salaries to obtain better conditions in their schools, a proposition first found in Antos and Rosen (1975) and subsequently pursued in a variety of other analyses (e.g., Baugh and Stone 1982). Some have interpreted the push for lower class sizes by teachers as reflecting an element of teacher compensation, as opposed to an educational policy designed to improve student achievement (cf. Grissmer and Kirby 1992).

If differences in working conditions are not accounted for and they are correlated with salaries, estimates of the relationship between achievement and salaries will confound salary influences with those of other factors that affect teacher labor supply. For example, if salaries are higher in urban districts and teachers prefer suburban districts, estimates of teacher salary effects on achievement confound the impacts

The Texas Database

The ability to understand the character and outcomes of teacher labor market activities derives from the unique data base developed under the UTD Texas Schools Project, an undertaking conceived of and directed by John Kain. Working with the Texas Education Agency (TEA), this project has combined different data sources to compile matched panel data sets on students and teachers. The samples contain entire cohorts of Texas students and the universe of teachers in each year. While the data do not provide linkages of individual students and specific teachers, they do allow matching of students and teachers by school and grade for each year.

The Public Education Information Management System, TEA's state-wide educational data base, reports key demographic data including race, ethnicity and gender for both students and teachers as well as student eligibility for a subsidized lunch. It also contains detailed annual information on teacher experience, salary, education, class size, grade, population served and subject. Importantly, this data base can be merged with information on both student and teacher achievement. Beginning in 1993, the Texas Assessment of Academic Skills (TAAS) was administered each spring to eligible students enrolled in grades three through eight.[9] These criterion referenced tests, which evaluate student mastery of grade-specific subject matter, are merged with the student and teacher information. We concentrate on reading and mathematics performance, subjects that are examined in all grades.[10]

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[9]Many special education students are exempted from the tests, as are other students for whom the test would not be educationally appropriate. In each year roughly 15 percent of students do not take the tests, either because of an exemption or because of repeated absences on testing days. We exclude participants in bilingual or special education programs from the achievement analysis. For an explicit analysis of the achievement of special education students, see Hanushek, Kain, and Rivkin (1998).

[10]Reading and math tests each contain approximately 50 questions, although the number of questions and average percent correctly answered varies across time and grades. We transform all test results into standardized scores with a mean of zero and variance equal to one. The bottom one percent of test scores and the top and bottom one percent of test score gains across years are trimmed from the sample in order to reduce measurement error.

Teacher Mobility, Salaries and Student Demographics

While teacher quality is known to be a primary determinant of student achievement, the leverage that a school district has to improve the stock and performance of its teachers through compensation, class size and other non-pecuniary job characteristics is surprisingly unclear. In a competitive achievement-maximizing system, the collection of compensation, resources, alternative employment opportunities and district amenities would interact to determine the allocation of teachers, and districts with the most to offer among competing schools would get the best teachers. But, available evidence raises questions about the quality of teacher selection, suggesting that the actual distribution of teacher quality reflects the variation in hiring and retention policies as well as ability to pay and to provide other amenities.[13] We begin with an analysis of the patterns of teacher moves in order to sort out the relative attractiveness of different districts.

Transitions Between and Within Districts (1993-96)

A primary goal of our mobility analyses is sorting out the separate influences of salary and other determinants of job attractiveness. Teachers are observed moving within districts, between districts, and out of Texas public schools entirely annually between 1993 and 1996. Importantly, we have information about salaries and student characteristics for both the sending and receiving schools for each transition.

Similar to job turnover patterns for the labor market as a whole, transitions differ sharply by teacher experience. Table 1 indicates that mobility is much higher among probationary teachers (0-2 years of experience), who are almost twice as likely as prime age teachers (11-30 years experience) to exit Texas public schools and over four times as likely to switch districts. As expected, mobility picks up again as teachers near retirement age, and almost one fourth of teachers with over thirty years of experience leave

[13]For example, Ballou (1996) demonstrates that schools do not systematically choose applicants with the strongest academic backgrounds or cognitive abilities. Murnane et al. (1991) describes the high variance in the information obtained about applicants and in the selection procedures of districts.

schools or outside of the state. The national patterns of mobility across experience categories do follow a similar pattern to that in Texas.

The pattern of moves tends to contradict the conventional wisdom that large urban districts are the proving ground for teachers, who move to suburban jobs when possible. Table 2, restricted to those changing districts, provides only weak support of the belief that teachers commonly leave urban districts for suburban positions. Among teachers in large urban districts, the majority of those switching

districts does relocate to suburban schools, but overall less than two percent of teachers in large urban districts move across districts in each year. The absolute number moving into urban districts is only slightly smaller than the number moving out.[15]

The bottom panel of Table 2 shows that a very similar pattern of movement holds for the subsample of probationary teachers, where again the net outflow from urban districts is small. Overall, probationary urban teachers are only one percentage point less likely to remain in the same school as probationary suburban teachers (71 versus 72 percent), and this is an identical gap to that for teachers of all experience levels. Two significant differences between new teachers starting in urban and starting in suburban districts do exist: Probationary urban teachers are roughly 3.5 percentage points more likely to exit teaching than teachers in suburban districts (not shown), while probationary suburban teachers are somewhat more likely simply to switch schools within districts.

Movement from rural districts follows a very distinct pattern. The majority of movers goes to a different rural district. Significantly fewer rural teachers move to urban districts than is the case for teachers initially in urban or suburban districts.

These aggregate transition rates among community types provide no information on the actual changes in salary and student composition. Tables 3, 4 and 5 report in increasing detail the relationship between pre-move and post-move salaries and student characteristics for teachers who switch schools and districts. Each table concentrates on how the average of specific characteristics (C) change with a move from district d to district d', calculated as

$$(2) \quad \Delta C_{d,d'} = \overline{(C_t^{d'} - C_t^{d})}$$

[15]During this period the share of Texas teachers in urban districts increased, implying that the small net outflow of teachers from urban districts is not simply a reflection of changes in the distribution of teaching positions across community types.

Table 3. Average Change in Salary and Student Characteristics for Teachers Changing Districts, by Gender and Experience

	men			women			all
	0-2 years experience	3-5 years experience	6-9 years experience	0-2 years experience	3-5 years experience	6-9 years experience	0-9 years experience
log base year salary	0.014	0.009	-0.003	0.007	-0.002	-0.002	0.004
	(0.004)	(0.005)	(0.007)	(0.002)	(0.002)	(0.002)	(0.001)
Salary Residual	0.013	0.020	-0.002	0.007	0.004	-0.002	0.006
	(0.003)	(0.004)	(0.006)	(0.001)	(0.002)	(0.002)	(0.001)
District Average Student Characteristics							
Average Test Score	0.064	0.074	0.036	0.087	0.092	0.075	0.080
	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.00)
% Hispanic	-6.0	-6.2	-2.3	-5.2	-5.3	-4.2	-5.0
	(1.0)	(1.5)	(1.8)	(0.4)	(0.6)	(0.6)	(0.3)
% Black	-5.0	-2.2	0.5	-2.8	-2.9	-2.9	-2.6
	(0.6)	(0.9)	(1.1)	(0.3)	(0.4)	(0.4)	(0.2)
% Subsidized Lunch	-6.0	-5.3	-2.4	-7.3	-2.4	-6.1	-6.6
	(0.9)	(1.5)	(1.7)	(0.4)	(0.6)	(0.6)	(0.3)

Table 4. Average Change in Salary and in District and Campus Student Characteristics for Teachers with 0-9 Years of Experience who Change Districts, by Community Type of Origin and Destination District

Origin Community Type	Destination Community Type	log base salary	residual salary	Average Student Characteristics: test score	% eligible for subsidized lunch	% Black	% Hispanic
1. District Average Characteristics							
Large Urban	Suburban	-0.0065	0.014	0.35	-23.9	-15.1	-18.8
		(0.0024)	(0.002)	(0.01)	(0.9)	(0.6)	(0.9)
Suburban	Suburban	0.0021	0.006	0.12	-9.5	-4.1	-7.0
		(0.0019)	(0.002)	(0.01)	(0.6)	(0.4)	(0.6)
2. Campus Average Characteristics							
Large Urban	Suburban			0.34	-24.3	-15.5	-19.0
				(0.02)	(1.3)	(1.3)	(1.4)
Large Urban	Large Urban (same district)			0.13	-9.6	-3.4	-5.3
				(0.01)	(0.7)	(0.8)	(0.8)

Table 5. Average Change in Salary and in District and Campus Student Characteristics for Black and Hispanic Teachers with 0-9 Years of Experience who Change Campuses

Race/ethnicity of teacher	Average Student Characteristics				Number of teachers moving
	test score	% eligible for subsidized lunch	% Black	% Hispanic	
1. Between Districts Moves					
Blacks	-0.01	-1.3	5.8	-5.0	254
	(0.03)	(1.9)	(2.5)	(1.9)	
Hispanics	0.02	-4.9	0.2	-5.5	1,207
	(0.01)	(0.8)	(0.5)	(0.9)	
2. Within Districts Moves					
Blacks	0.01	-4.0	3.8	-6.0	464
	(0.02)	(1.1)	(1.6)	(1.4)	
Hispanics	0.03	-5.3	-0.7	-2.8	1,360
	(0.01)	(0.6)	(0.4)	(0.5)	

To summarize the effects on students, Table 6 reports simple school average transition rates at different points in the distribution of student and district characteristics. The table shows that teachers in schools in the top quartile of real salaries are 3 percentage points less likely to exit the public schools and almost 1 percentage point less likely to switch districts than teachers in the bottom quartile schools. Teachers in the top salary quartile are also somewhat less likely to switch schools within districts.

The most dramatic differences in school transition rates are related to student achievement. Teacher transition rates for schools in the bottom achievement quartile are much higher than those in the top quartile. Over 25 percent of teachers in the bottom quartile schools leave each year, while in the top quartile schools less than 20 percent leave. The largest difference is in the probability of exiting public schools entirely. These differences imply that the lowest achieving students are more likely to

have teachers new to the school and to the profession, and evidence from Texas strongly suggests that this will adversely affect achievement (Rivkin, Hanushek, and Kain, 1998).

Transition Regressions

The previous descriptive information on moves does not take into account the joint effects of the various influences. Table 7 presents reduced form estimates for linear models of the probability of leaving a district (either switching districts or exiting from the Texas public schools) as a function of the combined teacher and district characteristics.[21] Separate estimates are computed by experience categories in order to allow for differences in preferences, family circumstances and job security. The direct salary effects are strongest for younger teachers: a 10 percent increase in salary is associated with a 2 percent decrease in the probability of leaving the district for probationary teachers and 1 percent decrease for teachers with 3 to 5 years of experience.

The multivariate analysis roughly follows the previously presented descriptive tables. Higher average student achievement significantly reduces the probability of moving or exiting Texas public schools at all levels of experience. Non-minority teachers are more likely to move the higher are the Black and Hispanic enrollment shares, although the only significant effects are related to percent Black students for younger teachers. Exactly the opposite is true for Black and Hispanic teachers, who are less likely to move the higher are these minority enrollment shares. There is little evidence of an independent effect of percent eligible for a subsidized lunch. Finally, (not shown) there is little or no evidence that the probability of moving is systematically related to average class size in any

[21]Note that these regressions expand the focus to include teachers who exit Texas public schools in addition to those who switch schools. In each year, more teachers exit than switch schools. All specifications other than those that include district fixed effects include region, community type and year dummies, school enrollment and average class size (measured for the available grades), number of campuses in a district, and teacher gender, race/ethnicity, experience and experience squared. The district fixed effect specifications drop the region and community type dummy variables.

specification, raising doubt about the frequently hypothesized impact of smaller classes on teacher decisions.[22]

To consider unobserved district factors, we re-estimate the models with district fixed-effects that remove the influence of any time invariant district factors. Table 8 shows that the magnitudes of the coefficients on percent Black and percent Hispanic actually increase, suggesting that teachers respond more strongly to changes in student demographics. The inclusion of fixed effects also raises the magnitude and significance of the coefficient on eligibility for a subsidized lunch, but the direction of the effect is inconsistent with a labor supply story in which teachers prefer districts with higher income children. More likely, the negative relationship for subsidized lunch reflects institutional changes at schools related to Texas school finance reform efforts. Schools with less wealthy student populations experienced revenue increases during this period, money which may have been used to make teaching more attractive (in ways not measured here).

In contrast to the other variables and the findings of Murnane et al (1996), the significant salary coefficients disappear once district fixed effects are included. It could be that the true impact of salaries is quite small. Alternatively, there could be insufficient salary variations across time, or the effects of hiring and retention policies could cancel out the labor supply response to higher salaries. For example, districts that raise salaries may also introduce more rigorous hiring and retention criteria, or they may experience an unobserved worsening of working conditions. Overall, the pattern of salary changes

[22]Multinomial logit estimates (shown in Appendix Table A1) indicate that teacher salary is much more strongly related to the probability of switching districts (relative to remaining) than to the probability of exiting the Texas public schools. The pattern of transitions related to the percent of students who are Black, including the interactions with teacher race/ethnicity, are similar to those of the earlier tables, while the percent eligible for a subsidized lunch is positively related to the probability of switching districts.

suggests that salaries affect choices, though it is not possible to identify the precise size of the labor supply response.

Teacher Salaries, Mobility and Student Achievement

From a policy point of view, the most important question remains: Given district hiring practices, would an increase in salaries raise achievement?

Salaries may affect teacher quality in a number of ways. First, an increase in salaries likely enlarges the pool of applicants, but, even an expansion that raises average quality does not guarantee a positive relationship between teacher quality and salaries. The resulting change in quality depends crucially on both the hiring practices of districts and the decisions of teachers about retirement and exiting. Second, higher salaries might raise achievement by raising the effort of current teachers. For example, salary negotiations may explicitly link higher salaries with an expansion of responsibilities, or teachers may simply work harder in order to raise the likelihood of retaining their now more desirable job (in an efficiency wage sense). In the latter case, one would expect untenured teachers to have the strongest response in terms of effort. Tenure is not as prevalent or as strong in Texas as in other states, and there is substantial variation across districts in the degree of job security. However, teachers with less than three years of experience unambiguously enjoy the least amount of job security, and any effects on effort should be strongest on this group.

Two approaches used to estimate the link between teacher quality and pay are presented in turn. First, we consider the effects of starting salary on explicit measures of quality, the district average certification test scores for new teachers. Second, we examine the direct effects of salary on student achievement, controlling for student and other school characteristics.

of three community types (large city, small city and suburban); Y is a vector of three year dummies; β, λ, and the α's are parameters to be estimated; and ϵ is a random error.

Table 9 presents eight specifications of the estimated effects of starting salary on the two test scores. The specifications differ along three dimensions: 1) whether student demographic characteristics are included; 2) whether district fixed effects are included; and 3) whether the regressions are weighted by the number of teachers in each district. The largest district is dropped because its inclusion dramatically altered the coefficients in the weighted regressions.

The results show little relationship between salary and either test score. None of the sixteen coefficients are statistically significant at any conventional level, and the same pattern (not shown) is produced if the percent who fail the test is used in place of average score. Perhaps the most striking aspect of Table 9 is the dramatic difference between weighted and unweighted results. Specifications that weight observations on the basis of the number of new teachers with valid tests in a district tend at least to produce positive point estimates, although none are statistically different from zero.

The different patterns for weighted and unweighted estimates suggest that the link between test score and salary differs by district size. This conjecture is confirmed by Table 10, which reports estimated effects of teacher salary by district size. Average teacher test scores are positively related to starting salaries only in districts that hire at least seven new teachers (the top quartile on the basis of new teachers hired), and the relationship is quite significant for the professional development test. The coefficient magnitude of 46.1 suggests that a ten percent increase in starting salary increases district average test score by 5 percentiles. It should be noted that the professional development test appears to be far more difficult than the comprehensive test, as the failure rate is almost three times as high.

Table 10. Estimated effects of starting salary on the quality of first year teachers as measured by the district average score on the Professional Development Test and the Elementary School Comprehensive Test, by quartile of district number of teachers hired (unweighted estimates with district fixed effects and student demographics; t-statistics in parentheses)

	Number of first year teachers hired			
	1	2-3	4-6	> 7
Professional Development	-90.5	-28.4	-27.7	46.1
	(-1.16)	(-0.74)	(-0.48)	(3.34)
Comprehensive	-70.2	-6.6	-16.9	15.9
	(-0.95)	(-0.18)	(-0.37)	(1.22)
Observations				
Professional Development	525	780	372	679
Comprehensive	525	786	371	695

One interpretation of these results is that larger districts make better use of the enlarged applicant pool generated by higher salaries. The interpretation is clouded, however, because preliminary regressions show no evidence that these Excet scores are positively related to mathematics or reading achievement for students in the Texas public schools.[26] Large districts appear to use more objective criteria in their hiring practices despite the fact that these tests do not seem to be very informative about quality. In any event, the fact that other districts do not exhibit a preference for higher scores does

[26]This preliminary work did not, for example, explore the possibility that test scores have different meanings for Black and White teachers, as suggested by Murnane et al. (1991). Future work will consider such possibilities. Ferguson(1991) found that district aggregate TECAT scores were positively related to district average student achievement in Texas during the late 1980s. TECAT tested subject matter knowledge, while EXCET tests mainly pedagogy. It may be possible in this analysis to explore different subsets of EXCET data to obtain measures more content related.

characteristics include information on race, ethnicity, gender, and eligibility for free or reduced price lunches. Teacher and school characteristics other than salary are computed separately for each grade and subject, and they include the average class size for regular students, the percentage of teachers grouped into seven experience categories, the percentage of teachers in five transition categories determined by status in the previous year,[29] and three measures of student demographic composition (percentage Black, percentage Hispanic, and percentage eligible for a subsidized lunch). The analysis focuses on the effects of the level of a district's salary schedule, as measured by the log of starting teacher salary. Individual teacher movements along the district's salary schedule are separately analyzed through inclusion of teacher experience and teacher graduate training, the primary determinants of position within the district's salary structure. Descriptive characteristics are reported in Appendix Table A2.

In the case of teacher salaries, communities that opt for higher pay scales may have other unobserved attributes that are positively related to achievement. For example, higher paying communities may have better computer facilities, better school administrators, better public services outside of education, or a community environment more conducive to learning. Each of these factors could introduce a positive bias to the estimate of teacher salary effects on achievement. On the other hand, communities with higher pay scales may have other, unobserved characteristics that tend to reduce teacher quality. Differences in housing or transportation costs, alternative job opportunities, and poorer working conditions are three types of factors that could introduce a negative bias on the estimate of teacher salary effects. We include twenty region dummies, three community type dummies, and the various school characteristics to account for the influence of such other factors on teacher labor markets, although it remains possible that important factors might not be captured by these variables.

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[29] Included categories are: same campus but different grade, new campus but same district, different district and not in Texas public schools (with same campus and grade as the omitted category).

Table 11. Effects of District Base Salary and Teacher Characteristics on 4th and 5th Grade Achievement Gains
(Huber-White adjusted t-statistics in parentheses)

	4th Grade			5th Grade			4th and 5th Grade		
Math									
base year salary	-0.18	-0.19	-.0.20	-0.03	-0.04	-0.04	0.68	0.66	0.62
	[-2.07]	[-2.15]	[-2.35]	[-0.44]	[-0.58]	[-0.65]	[2.17]	[2.09]	[1.96]
% 0 yr experience		-0.08	0.00		-0.11	-0.11		-0.02	0.04
		[-2.15]	[-0.08]		[-5.13]	[-4.33]		[-0.32]	[0.59]
% 1 yr experience		0.01	0.02		-0.05	-0.05		0.02	0.03
		[0.19]	[0.62]		[-2.14]	[-2.12]		[0.46]	[0.55]
% in another district			-0.06			0.03			0.02
previous year			[-1.06]			[0.97]			[0.26]
% did not teach			-0.11			0.00			-0.08
previous year			[-2.82]			[-0.25]			[-1.57]
Reading									
base year salary	0.07	0.06	0.05	0.00	0.00	0.00	0.79	0.79	0.80
	[1.03]	[0.90]	[0.85]	[0.12]	[0.09]	[-0.09]	[3.23]	[3.24]	[3.22]
% 0 yr experience		-0.08	0.00		-0.04	-0.04		0.00	0.02
		[-2.15]	[-0.08]		[-2.96]	[-1.96]		[-0.02]	[0.45]
% 1 year experience		0.01	0.02		-0.03	-0.02		0.00	0.00
		[0.19]	[0.62]		[-1.66]	[-1.52]		[0.00]	[-0.03]
% in another dist.			-0.06			-0.01			0.07
previous year			[-1.06]			[-0.60]			[1.50]
% did not teach previous			-0.11			-0.02			-0.02
year			[-2.82]			[-1.28]			[-0.62]
student fixed effects	no	no	no	no	no	no	yes	yes	yes
school nonmovers	no	no	no	no	no	no	yes	yes	yes
observations - math		156,924			472,142			92,526	
observations - reading		156,391			470,846			92,452	

Results of Achievement Estimation

Table 12. IV Estimated Effects of Starting Teacher Salary on 4th and 5th Grade Math and Reading Test Score Gains (no controls for experience or turnover, Huber-White adjusted t-statistics in parentheses)

	4th Grade	5th Grade	4th and 5th Grade
Math	-0.21	0	1.71
	[-2.02]	[0.07]	[4.26]
Reading	-0.01	-0.01	1.11
	[-0.18]	[-0.26]	[3.54]
student fixed effects	no	no	yes
school nonmovers	no	no	yes

Note: District salary for second year teachers is used as an instrument for salary of first year teachers. Estimates based on 88,372 students for math and 88,287 for reading.

The IV results in Table 12 provide evidence consistent with the notion that changes in starting salaries are a noisy measure of changes in the overall salary structure. The math coefficient in the fixed effect model increases by a factor of 2.5, while the reading coefficient increases by roughly 50 percent. The coefficients imply that a 10 percent increase in starting salaries would raise math achievement by .17 standard deviations and reading achievement by .11 standard deviations. These magnitudes are somewhat larger than the estimated class size effects (per dollar of expenditure) obtained with the same data (Rivkin, Hanushek and Kain 1998).

The IV results strengthen the finding that changes in achievement are positively related to changes in salaries, but the question remains whether this relationship captures a causal effect. Evidence that the reduction of teacher turnover makes little or no contribution to the link between salaries and achievement raises some doubts about the underpinnings of the salary/achievement relationship, because it is the reduction of turnover that is thought to be the most likely path through which high salaries improve teacher quality.

Table 13. IV Estimated Effects of District Salary on 4th and 5th Grade Math and Reading Achievement, by Presence of Probationary Teachers and Existence of Teacher Turnover and by Controls for Region by Year Interactions (no controls for experience or turnover, Huber-White adjusted t-statistics in parentheses)

	All	years with at least one probationary teacher			years with teacher turnover		
		0	1	2	0	1	2
1. No Region/Year Interactions							
Math	1.71	2.44	0.50	0.82	2.26	1.64	1.11
	[4.26]	[4.87]	[0.48]	[1.02]	[3.53]	[2.49]	[1.34]
Reading	1.11	1.29	0.48	1.12	1.60	1.10	0.76
	[3.54]	[2.99]	[0.67]	[1.95]	[3.23]	[2.10]	[1.24]
2. Includes Region/Year Interactions							
Math	1.24	1.73	1.73	-0.16	2.30	0.87	0.73
	[2.39]	[2.56]	[1.44]	[-0.16]	[3.33]	[0.96]	[0.70]
Reading	0.76	0.75	1.14	0.80	1.57	0.73	0.04
	[1.91]	[1.33]	[1.35]	[1.13]	[2.55]	[1.08]	[0.05]
Individual fixed effects		yes	yes	yes	yes	yes	yes
School nonmovers		yes	yes	yes	yes	yes	yes
Observations							
Math		44,492	15,130	28,750	26,807	35,693	25,872
Reading		42,767	14,687	30,833	26,848	35,608	25,831

virtually unchanged by the inclusion of measures of experience and turnover in the regressions, implying they are not driven by differences in turnover rates. The results are also very similar if starting salaries are not instrumented by 2nd year salaries. Overall, these estimates suggest that if teacher salary raises achievement, it does so primarily by causing existing teachers to improve their performance *following* a salary increase. The explanations that are consistent with the estimates are very different than those that normally dominate

Conclusions

There is no question that teachers exert a tremendous impact on academic performance, but the question of how to ensure high quality teaching remains largely unanswered. Our previous analysis of achievement (Rivkin, Hanushek, and Kain 1998) indicated that teacher quality explained a substantial portion of the variation in student achievement. However, it also showed that observable teacher characteristics including education and experience explained little of the variation in teacher quality. More importantly, that analysis provides strong evidence that most if not virtually all of the variation in teacher quality occurred within schools (and thus within school districts), suggesting that school and district-wide factors such as compensation could play a minor role at most.

Nevertheless, the question of whether schools effectively buy better teachers is an important question for education policy. It is also a difficult question to answer. Interpreting the observed reactions of teachers to variations in salaries is complicated, because the outcomes combine the influences of teacher supply, teacher demand, and teacher hiring and retention policies of districts. Moreover, because of variations in the attractiveness of different teaching jobs and the complexity of the relationship between current and past salaries and the current composition of teachers, contemporaneous salaries are unlikely to capture fully variations across districts in their attractiveness. Finally, it is very difficult to measure teacher quality directly. For all of these reasons, we used a number of different approaches to gain a greater understanding of the link between pay, teacher quality and student performance.

The first component of this analysis looks at mobility across schools and districts and at exiting from Texas public schools. Though it is not possible to identify structural supply elasticities, the evidence strongly suggests that teachers prefer certain types of students over others. Except for Black teachers, the typical Texas teacher appears to favor higher achieving, nonminority students. Black teachers on the other hand, while favoring higher achievement students, systematically move toward schools with higher concentrations of Black

of region dummies into the fixed effect specifications substantially reduced the magnitude of the salary coefficients, suggesting that the coefficients capture the influences of unobserved factors that change along with salaries.

The pattern of results is perplexing, but the overall analysis suggests that as currently employed, salary policies do not appear to offer much promise for improvement in student performance. Factors other than salaries appear to play a much more important role in determining the desirability of specific districts. More importantly, the earlier finding that the variation in teacher quality within schools appears to be much larger than any between school variation suggests that districts should focus on other ways to improve the quality of teaching and academic achievement.

References

Antos, Joseph R., and Sherwin Rosen. "Discrimination in the market for teachers." *Journal of Econometrics* 2 (May 1975): 123-50.

Ballou, Dale. "Do public schools hire the best applicants?" *Quarterly Journal of Economics* 111, no. 1 (February 1996): 97-133.

Ballou, Dale, and Michael Podgursky. "Recruiting smarter teachers." *Journal of Human Resources* 30, no. 2 (Spring 1995): 326-38.

---. *Teacher pay and teacher quality.* Kalamazoo, MI: W.E. Upjohn Institute for Employment Research, 1997.

Baugh, William H., and Joe A. Stone. "Mobility and wage equibration in the educator labor market." *Economics of Education Review* 2, no. 3 (Summer 1982): 253-74. N.

Betts, Julian R. "Is there a link between school inputs and earnings? Fresh scrutiny of an old literature." In *Does money matter? The effect of school resources on student achievement and adult success*, edited by Gary Burtless, 141-91. Washington, DC: Brookings, 1996.

Blais, André, and Stéphane Dion, eds. *The budget-maximizing bureaucrat: Appraisals and evidence.* Pittsburgh: University of Pittsburgh Press, 1991.

Goertz, Margaret E., Ruth B. Ekstrom, and Richard J. Coley. *The impact of state policy on entrance into the teaching procession: Final report.* : Educational Testing Service, 1984.

Greenberg, David, and John McCall. "Teacher mobility and allocation." *Journal of Human Resources* 9, no. 4 (Fall 1974): 480-502.

Grissmer, David W., and Sheila Nataraj Kirby. *Patterns of attrition among indiana teachers, 1965-1987.* Santa Monica: RAND, 1992.

Gritz, R. Mark, and Neil D. Theobald. "The effects of school district spending priorities on length of stay in teaching." *Journal of Human Resources* 31, no. 3 (Summer 1996): 477-512.

Grogger, Jeffrey T. "Does school quality explain the recent black/white wage trend?" *Journal of Labor Economics* 14, no. 2 (April 1996): 231-53.

Hanushek, Eric A. "Assessing the effects of school resources on student performance: An update." *Educational Evaluation and Policy Analysis* 19, no. 2 (Summer 1997): 141-64.

Hanushek, Eric A., John F. Kain, and Steven G. Rivkin. "Does special education raise academic achievement for students with disabilities?". National Bureau of Economic Research, Working Paper No. 6690, 1998.

Hanushek, Eric A., and Richard R. Pace. "Who chooses to teach (and why)?" *Economics of Education Review* 14, no. 2 (June 1995): 101-17.

Hanushek, Eric A., Steven G. Rivkin, and Lori L. Taylor. "Aggregation and the estimated effects of school resources." *Review of Economics and Statistics* 78, no. 4 (November 1996): 611-27.

Hanushek, Eric A. with others. *Making schools work: Improving performance and controlling costs.* Washington, DC: Brookings Institution, 1994.

Hoxby, Caroline Minter. "How teachers' unions affect education production." *Quarterly Journal of Economics* 111, no. 3 (August 1996): 671-718.

Kain, John F., and Daniel M. O'Brien. "A longitudinal assessment of reading achievement evidence from the Harvard/UTD Texas schools project". Paper presented at the Green Center Conference, "Achieving Universal Literacy," University of Texas at Dallas, April 2-4, 1998.

Kain, John F., and Kraig Singleton. "Equality of Educational Opportunity revisited." *New England Economic Review* (May/June 1996): 87-111.

Kershaw, Joseph A., and Roland N. McKean. *Teacher shortages and salary schedules.* NY: McGraw-Hill, 1962.

Kirby, Sheila Nataraj, David W. Grissmer, and Lisa Hudson. *New and returning teachers in Indiana: sources of supply.* Santa Monica: RAND, 1991.

Loeb, Susanna, and Marianne Page. "Examining the link between wages and quality in the teacher workforce". (mimeo), Department of Economics, University of California, Davis, 1998.

Appendix Table A1. Multinomial Logit Estimated Effects of Teacher Salary and Student Demographic Characteristics on the Probabilities that Teachers switch School Districts or Exit Teaching (t statistics in parentheses, remaining in the same district is the numeraire)

	teacher experience				
	0-2 yrs	3-5 yrs	6-10 yrs	11-30 yrs	>30 years
Switch Districts					
log base year salary	-1.80 [-5.26]	-2.00 [-4.32]	-1.70 [-3.52]	-1.48 [-3.26]	-2.96 [-0.66]
Campus Average Student Characteristics					
Test Score	-0.07 [-0.92]	-0.40 [-3.84]	-0.11 [-0.97]	-0.16 [-1.43]	-1.68 [-2.05]
% elig. for subs lunch	0.46 [2.87]	-0.08 [-0.38]	0.27 [1.15]	0.39 [1.81]	0.49 [0.29]
% Black	1.05 [6.51]	0.86 [3.78]	0.86 [3.47]	0.91 [3.69]	-1.01 [-0.49]
% Hispanic	0.13 [0.76]	0.50 [2.17]	0.29 [1.14]	0.22 [0.91]	-0.77 [-0.37]
Interactions with Race/ethnicity of Teacher					
Black * % Black	-2.81 [-7.02]	-1.58 [-2.77]	-2.01 [-3.87]	-2.22 [-5.25]	4.22 [0.59]
Black * % Hispanic	-1.32 [-2.94]	-0.06 [-0.11]	-0.49 [-0.96]	-1.59 [-3.58]	3.04 [0.38]
Hispanic * % Black	-1.35 [-3.20]	-1.04 [-1.78]	-0.87 [-1.22]	0.01 [0.02]	-1.22 [-0.22]
Hispanic * % Hispanic	-1.15 [-5.40]	-1.10 [-4.17]	-0.71 [-2.15]	-0.80 [-2.66]	-1.77 [-0.76]

Appendix Table A2. Descriptive Statistics — Means and Standard Deviations

	4th Grade	5th Grade
Achievement Gains		
Math	-0.02	0.01
	(0.65)	(0.59)
Reading	-0.03	0.01
	(0.67)	(0.63)
Log District Salary		
0 yrs experience	10.00	10.00
	(0.11)	(0.10)
Teacher Experience Distribution		
% 0 years	6.2	5.7
%1 year	5.8	5.8
% 2 years	5.1	5.6
% 3-4 years	11.7	10.8
% 5-9 years	21.4	19.7
% 10-19 years	30.9	31.0
% 21-30 years	16.4	18.6
% > 30 years	2.5	2.8
Teacher Transition Distribution from Prior Year		
% same campus & grade	67.6	66.8
% same campus, different grade	12.8	11.6
% different campus, same district	4.2	5.6
% different district	3.6	3.3
% not in Texas public schools	11.7	12.7
Student Demographic Characteristics		
% Black	14.1	14.0
	(20.4)	(20.4)
% Hispanic	31.0	31.0
	(30.0)	(30.2)
% Eligible for subsidized lunch	46.8	46.7
	(27.1)	(27.0)

DRAFT November 30, 1997

TAKING INEFFECTIVE TEACHERS OUT OF THE CLASSROOM

Premise: The pivotal role in raising children's achievement in elementary and secondary schools is played by the teacher. High standards, supportive curriculum, student assessment, parental involvement, excellent administration -- all are frustrated by ineffective teachers. Schools know who the ineffective teachers are and many are addressing the problem directly, but others may need incentives to do so. The Federal government can provide such an incentive without intruding into local school decisions, union-school relationships, or State direction of the school system.

Initiative design:

- Conditioning Education grants. The major Federal statutes providing grants to States and schools -- Title I, IDEA, Vocational Education, Indian Education, Bilingual Education -- would be amended to make a condition of annual grant receipt the presence in each District of a system of evaluating teachers and dealing with the results of the evaluations as described below.

- The teacher evaluation system would be devised to meet the unique needs of each State and school system, but would have to have these components:

  -- It would involve teachers and administrators in its design and implementation. Where a union contract is in effect, the union would have to be a full partner in, and endorse, the system.

  -- Effective input from parents would have to be solicited.

  -- It would assess every teacher on a regular cycle, but at least once every three years. The teachers assessed first in the early years would be those for whom there is some evidence of questionable abilities, including the presence of multiple complaints about teaching effectiveness from parents.

  -- The assessment could take various forms but would rely primarily on multiple in-the-class observations, over a period of time, by a senior teacher of proven teaching ability. No system that relied primarily on written tests or oral interviews would be acceptable.

- Dealing responsibly with questionable teachers. The teacher assessments could not be cause for automatic dismissal. The system would have to provide, as appropriate, for corrective actions tied to the observed faults: training, mentoring, assignment to more appropriate classes, periods of observation of or team teaching with more effective teachers, etc. Dismissal would be an option in situations of documented extreme incompetence.

- Ensuring fair treatment for teachers. The results of the evaluation would have to be open to challenge by the teacher in an impartial hearing setting before experienced teachers and administrators.

- Measuring system impact. Districts receiving Federal education funds would have to report publicly on the effectiveness of their systems. Systems that did not find any, or only a minuscule number of ineffective teachers in the first two years would be presumed to have ineffective systems (no "Lake Woebegone" effect allowed) and be subject to the "show cause" hearing process below.

- Real sanctions for failure to deal with ineffective teachers. Districts could maintain eligibility for Education grant funds for one year after the laws are amended as above on the basis of having a design for a system that meets the above conditions, if they currently do not have one that meets these principles. If by the second year after enactment the system is not in place and operating effectively, the district would lose 3% of its funds the next year (which would be reallocated to other eligible districts in the State). The district would lose an additional 3% for each successive year, up to 9% of total funding.

  If no progress had been made for 2 successive years after implementation (or 3 years form enactment if the district had what appeared to be a satisfactory system in place), the district would face a hearing before the Education Department and a panel of representatives from school districts of comparable size and demographic composition, to show cause why it should not lose eligibility for all its Federal funding. In the event a district loses funding, the Secretary of Education, in cooperation with the State, would designate an alternative deliverer of the educational services to children in that district.

- Technical assistance and dissemination. The Education Department, in coordination with national teacher and administrator and State organizations, and parent groups, would issue materials on alternative methods of teacher assessment and remediation. Education would, with these groups, identify and disseminate best practices.