PROGRESSIVE POLICY INSTITUTE

Policy Report
April 2005

Lifting Teacher Performance

By Andrew Leigh and Sara Mead

Research increasingly demonstrates what common sense has long made apparent to educators and parents: Teacher quality matters—a lot. Teachers' knowledge and skills are the most vital in-school factors influencing children's learning. And, for children from disadvantaged backgrounds or troubled home environments, quality teaching is even more important.

Unfortunately, the quality of America's public school teaching force is neither as good as it could be nor as good as it must be to prepare our children for a global economy. Certainly, the nation has thousands of highly skilled, dedicated teachers. But, since the 1960s, the quality of the teaching profession has declined. Even more troubling, there are huge teacher quality disparities between poor and affluent schools. Disadvantaged children—those who most need excellent teachers—are the least likely to have them.

It is time for policymakers to realize that the status quo methods of improving teacher quality simply do not work. Many of the old solutions favored by education groups to improve teacher quality—such as raising teacher salaries across the board, improving training, and requiring certification—have not fixed the problem. Indeed, one of the most popular education policy proposals of recent years, cutting class sizes, risks unintentionally lowering teacher quality even further, as affluent districts make up their numbers by poaching the most capable teachers from poorer areas.

The trouble is that these status quo solutions do not focus on the real problem driving declines in teacher quality: an outdated preparation and compensation scheme that demands and rewards the wrong things, and that provides too few growth opportunities to attract highly skilled individuals to teaching in sufficient numbers. Without bottom-up reform of the fundamental assumptions of our current teacher preparation and compensation regimes, neither the old policies, nor the promises of the No Child Left Behind Act (NCLB) to place a highly qualified teacher in every classroom, can have much success.

There is a better way. Policymakers can draw on the latest performance data and research to craft effective policies that reward and attract highly skilled teachers. Regular testing, as mandated by NCLB, allows researchers and policymakers to track student achievement over time and link results to teachers. By measuring test score gains from one year to the next, researchers and administrators can better determine the characteristics and conditions that lead to effective teaching. That will allow policymakers to reward teachers who do a better job in the classroom, taking into account the composition of their student body. In addition, a new stream of labor market research provides

Andrew Leigh, Ph.D., is an economist in the Research School of Social Sciences at the Australian National University. Sara Mead is a policy analyst with the Progressive Policy Institute's 21st Century Schools Project.

"One person with a belief is a social power equal to ninety-nine who have only interests."
—John Stuart Mill

The Progressive Policy Institute

The Progressive Policy Institute is a catalyst for political change and renewal. Its mission is to modernize progressive politics and governance for the 21st century. Moving beyond the left-right debates of the last century, PPI is a prolific source of the Third Way thinking that is reshaping politics both in the United States and around the world.

The PPI invents new ways to advance enduring progressive principles: equal opportunity, mutual responsibility, civic enterprise, public sector reform, national strength, and collective security. Its "progressive market strategy" embraces economic innovation, fiscal discipline, and open markets, while also equipping working families with new tools for success. Its signature policy blueprints include national service, community policing, and a social compact that requires and rewards work; new public schools based on accountability, choice, and customization; a networked government that uses information technology to break down bureaucratic barriers; pollution trading markets and other steps toward a clean energy economy; a citizen-centered approach to universal health care; and a progressive internationalism that commits America's strength to the defense of liberal democracy.

Rejecting tired dogmas, PPI brings a spirit of radical pragmatism and experimentation to the challenge of restoring our collective problem-solving capacities—and thereby reviving public confidence in what progressive governance can accomplish.

The Progressive Policy Institute is a project of the Third Way Foundation.
www.ppionline.org

PPI
PROGRESSIVE POLICY INSTITUTE

insight into how and why individuals decide to enter or leave the teaching profession and where they choose to teach.

This paper analyzes promising new research about teacher quality and the incentives for teachers to do better. We assess current teacher quality approaches and offer recommendations to help policymakers modernize how teachers are prepared, hired, evaluated, and compensated. Among the most promising solutions are:

- ❒ Carefully designing systems of performance-based teacher pay;
- ❒ Rewarding teachers who choose to work in the schools that need them most; and
- ❒ Streamlining or expediting certification requirements to expand the pool of individuals who can be hired as teachers.

While the research evidence for modernizing teacher preparation and certification is clear, the politics are more challenging. Established interests with a stake in the status quo arrangements of educating, paying, and assigning teachers oppose reforms that interfere with their established prerogatives. But unless policymakers are willing to tackle these tough politics, we will continue to condemn millions of disadvantaged children to an inadequate education and run the risk of undermining our nation's future economic competitiveness.

What Is Quality Teaching?

Researchers, policymakers, parents, and even teachers themselves agree that teacher quality matters. But defining, measuring, and identifying teacher quality is a far more controversial task. In an education environment focused on improving student achievement, the ultimate measure of teacher quality is the impact the teacher has on student learning. Yet, how can we measure teacher performance and ensure recognition for the best performers?

In assessing teacher performance, the main problem is separating out the components of student performance that are due to a child's background and non-school experiences from those that are due to teaching quality. If we observe a class in which children have high test scores, it could either indicate that they have a terrific teacher or that the student body is particularly gifted. Similarly, if we see a low-scoring class, it could be that the teacher is underperforming, or that a large fraction of the students already have educational deficits or learning difficulties when they enter the classroom.

A crude means of separating student and teacher effects is to break down average scores by categories. The NCLB requires schools, districts, and states to report not only average test scores, but also disaggregated data for different racial categories, disadvantaged students, English language learners, and students with disabilities. But this only controls for a few observable differences. Given that motivation, parental resources, and previous education experiences vary within categories, basic breakdowns—while important for equity and transparency purposes—are of limited use in measuring the effectiveness of individual teachers.

A more precise solution is not simply to look at test scores in a single year, but to follow the changes in students' scores from one test to the next. In this way, we are able to measure the *value added* by teachers. Work by William Sanders, the developer of the Tennessee Value-Added Assessment System, has shown that a value-added methodology can be applied in a simple and straightforward manner. Colorado and Tennessee are two of the states that use such methods to calculate the value added by individual teachers.[1] Observing student performance across multiple years allows us to separate teacher effectiveness from innate student characteristics as well as systemic differences between schools (such as principal quality or infrastructure).

How Big Are Differences Between Teachers?

A common assumption made by education groups is that all teachers are pretty much the

Comparing Teacher Quality Reforms and Class Size Reduction

Reform	Effect on students' test scores (in standard deviations)	Effect on students at the 50th percentile*
Switching from an average teacher to a teacher at the 90th percentile	+0.12	55th percentile
Reducing class size from 24 to 22 students (high-end estimate)	+0.06	52nd percentile

*This assumes that both teacher effects and student test scores are normally distributed.

same. What matters, according to this view, is helping each teacher perform to the best of their ability. Unfortunately, this assumption is not supported by the evidence. Research by Steven Rivkin, Eric Hanushek, and John Kain (using data from Texas), and by Jonah Rockoff (using data from New Jersey) have found large gaps between the best and worst teachers, and shown that this variation has significant consequences for student achievement.[2] Switching from an average teacher to a teacher at the 90th percentile raises test scores by about one-eighth of a standard deviation on the national distribution. To put this into perspective, the benefit from this switch is twice as large as a 10 percent cut in class size (and some studies suggest that class size cuts have even smaller benefits than this).[3]

Note that the table on page 3 assumes that a student already has a mid-range teacher. Of course, the potential gains can be even larger for those students who currently have below-average teachers. A student who swaps a teacher at the 10th percentile for a teacher at the 90th percentile, for example, would be expected to move their test scores up from the 50th percentile to the 60th percentile.

To further put these differences into perspective, we can consider how improved teacher quality might affect the large and troubling achievement gap between white and black students. On average, black 12th graders score at about the same level as white eighth graders on the National Assessment of Education Progress—a difference roughly equivalent to one standard deviation.[4] Research on teacher quality suggests that it is possible to close these gaps. If the effects of high-quality teachers persist over time, that would mean moving a black student from the classroom of a 10th percentile teacher to a 90th percentile teacher for four years would close the black-white test score gap. On a macro level, this suggests that policymakers must not simply equalize teacher quality between high-poverty, high-minority schools and more affluent schools, but also must make a concerted effort to attract the most skilled teachers to these hard-to-staff schools. Unfortunately, current teacher training, compensation, and assignment policies work as if they had been designed to do just the opposite. Union work rules have established uniform district-level teacher pay scales. Teachers are not rewarded for their performance, or the level of challenge in a teaching assignment, so they naturally seek jobs with the best working conditions—namely, those in high-performing suburban schools.

"Policymakers must not simply equalize teacher quality between poor and affluent schools, but also must make an effort to attract the most skilled teachers to needy schools."

Characteristics Linked to Teacher Quality

While impact on student achievement is clearly the most important criteria for evaluating teacher quality, research has also identified a number of directly observable teacher characteristics that are linked to teacher quality and performance.

The most compelling, consistent body of research shows that a teacher's verbal or intellectual aptitude correlates with better student achievement results. For example, Ronald Ehrenberg and Dominic Brewer observed higher test scores for students whose teachers attended selective undergraduate colleges. In addition, Ronald Ferguson and Helen Ladd found that teacher scores on licensure and aptitude exams were positively correlated with better student outcomes (though, as we discuss below, having to take these exams deters some potential teachers from entering the profession).[5]

It may seem obvious that the most academically talented teachers are the best teachers. But it is important to note that the evidence for the importance of teacher aptitude is far more compelling and clear than any existing evidence about teacher training. In other words, current research suggests that, absent any other information about the individuals involved, we would be wiser to bet on the teaching success of an individual with strong verbal and intellectual skills, or high test scores and no teacher training, than we would be to bet on the success of someone with mediocre skills and full teaching certification. Clearly, at the individual level, other personal factors are critical, but working with limited information, research provides the strongest evidence for the importance of teachers' intellectual and verbal skills.

Research also shows that teacher knowledge of specific subject matter, particularly at the secondary level, is a good predictor of student achievement. David Monk finds a strong correlation between teacher subject matter preparation in math and physical sciences and student success for both low and high-scoring students, while Daniel Goldhaber and Dominic Brewer note that students do better in math if taught by a teacher with a bachelor's or master's degree in mathematics.[6] In addition, limited evidence suggests that training in pedagogy, particularly methods of teaching in the subject area, improves teacher quality.[7] While it may seem obvious, these findings run counter to decades of state teacher certification policies that put far more emphasis on teachers' completion of teacher education coursework than mastery of academic content in their fields. Although states are beginning to shift this balance—and NCLB's highly qualified teacher provisions place emphasis on content knowledge—the continued prevalence of assigning teachers to subjects for which they have no training, known as "out-of-field" teaching, as well as state efforts to subvert NCLB's content requirements for current teachers, suggests America's public school system has not yet internalized this commonsense finding.

While impact on student achievement is the most important measure of teacher quality, the relation of these traits to student performance is also important for policymakers to keep in mind when crafting policies to boost teacher quality. Policymakers cannot evaluate the performance of prospective teachers before they enter the classroom. So state legislation and regulations for teacher preparation, certification, and licensure seek to control teacher quality by requiring individuals who want to teach to have completed certain educational requirements and tests. Unfortunately, held against the evidence of what makes for effective teachers, most state systems seem to be measuring the wrong things, focusing too heavily on teacher preparation coursework for which there is little evidence, and too little on ensuring that teachers demonstrate high verbal skill, intellectual ability, and a strong grasp of their content area. By reforming teacher certification legislation to reflect research evidence about teacher quality, policymakers can more effectively encourage individuals with traits linked to teacher effectiveness to become teachers.

"The evidence for the importance of teacher aptitude is far more compelling and clear than any existing evidence about teacher training."

Is There a Teacher Quality Problem?

Is there a teacher quality problem in America's public schools today, or are teachers

simply the scapegoat for declining families and communities, inequitable school resources, and a host of issues beyond their control that depress student achievement? Below, we assess the evidence, and conclude that teacher quality has indeed declined. If this were not troubling enough, a second stream of research shows that the problem is most acute in schools serving high proportions of minority and low-income students. Since NCLB enjoins policymakers to address both overall teacher quality and the distribution of good teachers across schools, this is troubling indeed. Realizing an equitable teacher distribution for poor and minority students will require a broader rethinking and reform of state policies about how we train, pay, assign, and evaluate teachers.

Teacher Aptitude Has Declined

Recent studies provide evidence of a sharp decline in teacher quality since the 1960s. Sean Corcoran, William Evans, and Robert Schwab combine data from four longitudinal surveys, spanning the early 1960s to the mid-1980s, and find that the percentage of teachers who placed in the top 20 percent on national achievement tests fell markedly during this era.[8] Marigee Bacolod uses data from the National Longitudinal Surveys of Youth, observing substantial differences between the test scores of teachers who graduated college between 1962 and 1966 and from 1984 to 1985.[9] Analyzing the results of standardized tests administered to both cohorts, she found that one-half the female teachers graduating in 1962 to 1966 scored above the 80th percentile, while only 10 percent did so if they graduated between 1984 and 1985. Among male teachers, the fraction scoring above the 80th percentile fell from 20 percent to 10 percent. These findings suggest that the intellectual aptitude of teachers fell relative to other professions during this time.

Further evidence on teacher quality may be found in the mean standardized test scores of college-goers who report that they intend to major in education. From 1970 to 1975, the composite ACT score of the average woman intending to major in education dropped from 10 percent above the female mean to 2 percent below the female mean (and has stayed below the female mean ever since). During the same period, the ACT score for the average man intending to major in education dropped from 5 percent to 12 percent below the male mean.[10]

What Are the Causes?

What might have caused the decline in teacher quality? Since we know that most of the drop occurred in the late 1960s and early 1970s, we need to look for factors that changed in this period. Could average teacher wages be to blame? This seems unlikely. From the mid-1960s to the mid-1970s, inflation-adjusted wages for the average teacher rose substantially, staying ahead of the average wages for all college graduates.[11] Although the 1990s saw the average wages of teachers converge to about the same as the average wage for all college graduates, this is well after the main drop in teacher quality took place.[12]

It also seems unlikely that teacher working conditions declined during this period. In fact, one important measure of teaching conditions—class size—fell dramatically during the 1970s (and continued to fall through the 1980s and 1990s).[13] Violent crime by youth rose in the late 1980s and early 1990s (before falling sharply through the present day). But in the 1970s, when teacher quality declined most, violent crime was relatively stable.[14]

So, why did teacher quality decline in the late 1960s and early 1970s, even as salaries rose? Research supports two explanations. First, expanded professional opportunities and more competitive salaries for women may

have pulled highly skilled women out of teaching and into other occupations, such as medicine or law. Second, collective bargaining agreements that compressed teacher pay scales and eliminated the possibility of performance-based pay for highly effective teachers might have reduced the returns to aptitude in teaching. Both of these push and pull effects occurred in the late 1960s and early 1970s, so either could potentially have been responsible.

Why might highly skilled women have been drawn away from teaching? For the first half of the twentieth century, teaching was one of the few professional occupations open to women, and as a result, talented, well-educated women gravitated toward teaching positions. As the women's movement of the 1960s and 1970s opened professional job opportunities for women and more fields began to pay women salaries commensurate with those of their male colleagues, many highly able women left the classroom to pursue professional careers where they could earn better salaries. If the gender pay gaps narrowed more for high-skill professions (such as lawyers) than for jobs requiring medium skills (such as bookkeeping), then this would have disproportionately drawn the best women out of teaching. However, it is important to note that this hypothesis requires different changes in pay gaps for high- and low-skilled professions. If all professions reduced their gender pay gaps at about the same rate, then this will not have the same adverse impact on teacher quality.

It is perhaps easier to understand why expanded professional opportunities for women might have a negative impact on overall teacher quality than it is to understand how unionization affected teacher quality. After all, unions work to secure higher salaries for employees, which we would expect to raise quality. The key factor here, however, is not how collective bargaining impacted teacher salaries on average, but rather how it impacted the *distribution* of teacher pay, and, in particular, the earnings potential of the most talented teachers. In many professions and trades there is a "skill premium." Individuals who produce particularly good work or results also command higher pay for their labors, and salaries are widely dispersed, reflecting variations in talent and effort among different workers. Collective bargaining, however, condenses the range of potential salaries.

During the late 1960s and early 1970s, the teaching profession was essentially unionized. Unionization compresses pay dramatically, so that all teachers at a certain level of education and experience earn the same salary, regardless of how well they perform on the job. As a result, less skilled teachers tend to earn more than they otherwise would, while higher skilled teachers earn less. For example, in the early 1960s, a female teacher who attended a highly selective college received about a 59 percent pay premium. In 2000, a female teacher who attended a college in the top 5 percent received essentially no pay premium. If unionization caused the skill premium to fall, this could have forced out higher-skilled teachers, who have the best opportunities to earn rewards commensurate with their abilities.

"Policymakers must modernize teacher compensation systems to reward excellence and difficult placements, so that teaching is competitive with other professional careers."

To separate the effect of changing gender pay gaps from the effect of pay compression, Caroline Hoxby and Andrew Leigh measure ability by using the average SAT score of the colleges teachers attended. They look only at females, who have comprised about three-quarters of public school teachers during recent decades. Using variation within states over time,

they find that about one-quarter of the decline in female teacher quality is due to changes in pay discrimination for women, while about three-quarters is due to wage compression driven by unionization.

Pay compression and the feminization of other professions, it seems, are the main causes of the decline in teacher quality. Yet understanding the factors that caused teacher quality to decline does not necessarily lead to a solution to the teacher quality problem. For example, while gender pay gaps in other professions during the 1950s may have pushed many talented women into teaching, no one would argue for reinstating gender pay discrimination against women as a means of improving teacher quality. Instead, policymakers must modernize teacher compensation systems to reward excellence and difficult placements, so that teaching offers salaries and opportunities that are competitive with other professional careers for high-aptitude men and women.

Poor Schools, Poor Teachers

Before turning to possible solutions, it is necessary to discuss another aspect of teacher quality: the skewed distribution of talented teachers across schools. While average teacher quality may have declined, there are still many excellent teachers in classrooms across America, but research also makes abundantly clear that skilled teachers are not evenly distributed across the student populations. Children in high-poverty and high-minority schools are twice as likely to be taught by inexperienced or uncertified teachers, and also more likely to be taught by teachers who scored poorly on college entrance exams.[15]

"Classes in high-poverty schools are 77 percent more likely be taught by teachers without subject matter training than those in low-poverty schools."

Snapshots from urban school districts around the country show that a disturbing number of teachers in disadvantaged schools lack subject area or teacher training. A 2001 evaluation in Houston found that 35 percent of newly hired teachers (excluding those in the Teach for America program) did not even have a bachelor's degree.[16] State teacher quality reports federally mandated by Title II of the Higher Education Act also reflect significant disparities. For example, California reports that 14 percent of teachers in high-poverty schools are not fully certified, compared to only 8 percent in other school districts. Texas and Louisiana report that 14 percent and 19 percent, respectively, of teachers in high-poverty schools are not fully certified, and the vast majority do not have subject matter expertise. Although many state reports minimize the extent to which teachers lack qualifications,[17] similar discrepancies between high- and low-poverty schools emerge across the country.[18]

Poor and minority students are also much more likely to be taught by teachers who lack training in the subjects they teach. Data from the National Center for Education Statistics' Schools and Staffing Survey shows that roughly one-third of classes in high-poverty and high-minority secondary schools are taught by teachers who lack even a minor in the subject, and classes in high-poverty schools are 77 percent more likely be taught by teachers without subject matter training than those in low-poverty schools.[19]

Not only do high-poverty, ethnically diverse schools tend to have teachers with low qualifications, they also have fewer teachers who are true standouts. National Board Certification is a widely recognized credential of teacher excellence that preliminary studies have linked to improved student achievement. But studies from the Urban Institute and SRI International show that, in states with the highest concentrations of National Board Certified Teachers (NBCTs), these teachers are

underrepresented in high-poverty, high-minority, and low-performing schools, and more likely to be in schools with fewer poor or minority students.[20] (The one exception to this is California, which we discuss below.)

High-poverty, high-minority schools often serve as training grounds for new and inexperienced teachers who, after getting more experience and training under their belts, move on to more affluent communities where students are less challenging to work with, salaries are often higher, and community and classroom demographics are more similar to the teachers' own backgrounds.[21] We know from research that teachers in their first year tend to be significantly less effective, so poor schools suffer when they act as a training ground for new recruits.

Getting the best teachers into the toughest schools can sometimes seem like a Sisyphean task. While policymakers know that this is a vital way to provide real equality of opportunity, rich suburban districts often can offer more money and better conditions. But labor market research shows that more subtle factors, such as location, also play an important role. Researchers using data from New York state found that 61 percent of new teachers started teaching in schools within 15 miles of the district where they graduated high school.[22] This puts disadvantaged communities at a loss in recruiting teachers. Similarly, research on teacher mobility shows that many teachers change jobs in part to shorten their commute to work. This often means that the best teachers move away from disadvantaged urban schools to more affluent and less ethnically diverse suburban schools.[23]

School organization, budgeting, and collective bargaining also perpetuate distributional inequities. Seniority-based collective bargaining provisions base teacher pay on experience, taking no account of which school they teach in, and also allow senior teachers to choose placements in less challenging schools, rather than letting administrators assign them where their skills are most needed. Paul Hill and Marguerite Roza have shown that this results in inequities between rich and poor schools, both in terms of teacher quality and resources.[24] Richard Ingersoll has also documented that high rates of out-of-field teaching tend to be more the result of school organization and administrative convenience than actual shortages of qualified teachers in certain fields.[25]

The Old Solutions Do Not Work and May Even Make Things Worse

Across-the-Board Class Size Reductions Can Also Lower Teacher Quality

In recent decades, the most expensive education reform has been cutting class sizes. Since 1970, student-teacher ratios have fallen from 22.4 pupils per teacher to 16 pupils per teacher today. A major class size cut in California in 1996 came at a cost of more than $1 billion per year. Yet the evidence on class size suggests the benefits are small, with some studies finding that smaller classes have no effect on student performance, while others show an effect that is positive, but small relative to gains in teacher quality (see the table on page 3).[26]

While smaller classes are popular with parents, teachers, and politicians, they can have an unintended detrimental effect on teacher quality. Across-the-board class size reductions force school districts to rapidly find new teachers. For example, when California enacted its class size reduction measure in the 1990s, it found itself short by some 26,000 teachers. Researchers with the Class Size Reduction Consortium found that, as a result, the percentage of not-fully-certified teachers in elementary schools

rose from 1.8 percent in 1995-1996 to 13.3 percent in 2000-2001. While the increase in uncredentialed teachers appeared to level off after 2001, it did not decline, and schools with more than 30 percent low-income students employed the most uncertified teachers.[27] In another study of California's class-size reduction, Christopher Jepsen and Steven Rivkin found that more affluent schools tended to poach the best teachers from those serving poorer or minority schools. In one example, Jepsen and Rivkin concluded that, "high percentage black and high percentage low income schools in L.A. Unified suffered large declines in mathematics achievement in response to [the class size reduction program]."[28] They argue that rather than cutting class sizes across the board, policymakers should target any class size cuts on schools serving disadvantaged populations, rather than implementing a one-size-fits-all policy.

"Certification and education requirements are a major reason young people decide to not become teachers—55 percent would be more likely to consider teaching in the absence of these barriers."

Teacher Certification Is Not a Silver Bullet

State teacher certification mandates are highly touted as a way of ensuring teacher quality, and policymakers often propose increasing requirements for prospective teachers to improve the quality of the teaching force. Today, all 50 states require teachers to obtain some form of certification or licensure. From the 1970s through the 1990s, many states instituted or increased mandatory teacher competency tests in response to concerns about teacher quality. Many have also increased teacher training and student teaching requirements.[29] Yet research suggests this approach may be counterproductive.

First, there is limited evidence that the coursework, testing, and student teaching requirements that states demand for teacher certification ensure teacher quality. Research shows that teachers who possess higher levels of verbal aptitude, intellectual ability, and knowledge in the content area they teach are more effective than those who do not. But this research does not evaluate the value of specific requirements for teacher certification applied in different states. According to an analysis of the body of research conducted by Michael Allen for the Education Commission of the States, existing research is not sufficiently detailed to reach beyond general conclusions or give policymakers specific guidance on the level of content knowledge, pedagogy, or test scores teachers need to be effective.[30]

There is even less evidence about certification itself, since state requirements that teachers be certified leave little opportunity to compare student results for certified versus uncertified teachers. Of the limited number of studies comparing student achievement impacts of teacher certification, many are plagued by methodological flaws, and the remainder offer, at best, conflicting findings.[31] For example, Dan Goldhaber and Dominic Brewer found that teacher coursework or certification in math or science had a positive impact on student math and science achievement, but they found no difference in student outcomes between certified teachers and emergency certified teachers (those who had not yet completed all the education requirements for teacher certification before taking a teaching job).[32]

On the other hand, there is substantial evidence that certification barriers prevent some individuals from entering the profession. Obtaining teacher certification, even through an alternative route, typically requires prospective

teachers to make significant investments of time and money in completing coursework requirements for teacher certification. Public Agenda found certification and education requirements are a major reason young people decide not to become teachers, and that 55 percent would be "a lot" more likely to consider teaching in the absence of these barriers.[33] Since those with the most attractive non-teaching options are most likely be deterred by administrative impediments, high barriers likely lower teacher professional quality. If teacher training requirements have relatively high pass rates or are lacking in rigor, but are administratively burdensome, the net effect can lower teacher quality. That is what researchers Joshua Angrist and Jonathan Guryan found to be the case. Also, while teacher testing increased pay, they found it did not result in an increase in the proportion of teachers drawn from high-quality colleges, nor did it boost the fraction of teachers who taught in their field of specialty.[34] Since education coursework requirements for certification are time consuming and expensive, but often lack rigor, they likely have a similar impact.

While we would not necessarily urge states to abandon teacher certification altogether, we disagree with those who argue that more rigorous teacher certification requirements would improve the quality of the teaching profession. Policymakers must remember that teacher certification is not only a quality filter, but a barrier to entry into the teaching profession.

Raising Pay Across the Board Is Expensive and Inefficient

What about an across-the-board increase in teacher pay? Boosting all teachers' salaries would doubtless increase the number of applicants for each teaching job, but its impact on student outcomes would depend crucially on districts' ability to identify and hire the best teachers from the available pool, and to encourage those teachers who are underperforming to find a different occupation.

Analyzing the impact of average salaries on student performance in Texas, Eric Hanushek, John Kain, and Steven Rivkin found mixed evidence.[35] Although districts with higher salaries have teachers who perform better on the Professional Development Test and the Elementary School Comprehensive Test, these scores are only weakly predictive of how well teachers will perform in the classroom. They conclude that raising average salaries does not offer much promise for improving student performance, particularly given that much of the variation in teacher quality is within schools, rather than between them.

"Raising average teacher salaries does not offer much promise for improving student performance."

Further, even if wholesale pay raises could also improve the quality of individuals entering teaching, raises not linked to job performance would not change the incentives for teacher excellence or satisfy the desire for greater professional and earnings growth opportunities throughout one's career, as found in other occupations. Nor could they change the distribution of teachers, and as a result could not correct for the significant inequities in teacher quality between poor and affluent school districts. Correcting these inequities requires targeted financial and other incentives to make high-poverty schools as attractive as affluent ones.

Beyond this, raising average teacher pay would be prohibitively expensive, since it would mean a pay raise for both high performers and underperformers. A much better system would provide incentives for great teachers to stay, while encouraging underperforming teachers to leave the profession.

Research Points to Promising Alternatives

Performance-Based Pay

Implementing a system of performance-based teacher pay, in which teachers are rewarded for better performance, is a highly promising approach to raising teacher quality. Evidence shows that a well-designed system of teacher pay serves students better than a simplistic seniority-based system. A good example of an effective performance-based pay system was the scheme implemented in Tennessee from the mid-1980s until the mid-1990s. According to Thomas Dee and Benjamin Keys, it was successful in boosting student math scores.[36] More recently, schools in Denver, in cooperation with the local teacher unions, have adopted a merit-pay plan. And the Milken Teacher Advancement Program, based on the principle that teacher pay should be driven by results, not seniority, is currently operating in selected schools in eight states.[37]

" A well-designed performance-based system of teacher pay serves students better than a simplistic seniority-based system."

Experimental evidence has shown that teacher performance-based pay can have a substantial benefit for students. In his analysis of an Israeli scheme that paid bonuses to teachers who most improved students' performance, Victor Lavy found that the program boosted matriculation rates by about 4 percentage points, at a cost of around $170 per student. He found no evidence that the bonus led teachers to manipulate students' test scores. Lavy also studied a scheme that used school-level bonuses and concluded that it too was effective in raising student performance, albeit at a somewhat higher cost.[38]

Teachers unions have traditionally opposed performance-based pay systems, but a few progressive unions—such as the Denver Classroom Teachers Association—are leading the way with innovation in this field. In the past, many teachers have been skeptical of performance-based pay schemes because it relied entirely on test scores or put too much power into the hands of administrators. It is true that poorly designed performance-based pay programs can be arbitrary, unfair, or ineffective. But designing a smart performance-based pay system should be eminently achievable for policymakers throughout the nation.

To be effective, the performance-based pay scheme should be structured so that the measures of teacher quality create the right set of incentives for teachers. Administrators should focus not at the *levels* of students' test scores, but on the *change* in scores from one year to the next year. Other measures of performance might include classroom observation by independent experts; interviews with the teacher; separate questionnaires from students, peers, and principals; and annual knowledge exams. Likewise, rewards for high performance should not be restricted to pay alone, and may also include increased professional responsibility, financial assistance for further study, and recognition by state government.

Paying Teachers More to Work in Hard-to-Staff Schools

While paying teachers based on their performance can provide greater incentives to attract talented individuals to the profession, performance-based pay in itself does not address the inequitable distribution of quality teachers. Creating a more equitable distribution of teachers requires higher salaries for teachers willing to work in hard-to-staff schools.

As we discuss above, labor market research shows that pay plays a role in where teachers decide to teach, but is only one of many factors. In particular, teachers seem to prefer to work in schools closer to home or the communities in which they were raised, and where students are more similar to them racially and socio-economically.

This combination of influences suggests that offering teachers more money to work in challenging communities can attract them to hard-to-staff schools, but also that the pay differentials between these and other communities need to be substantial. For example, we noted above that NBCTs were over-concentrated in affluent communities in every state except California. The explanation? California offers a stipend of $20,000 paid out in $5,000 increments over four years, to NBCTs who choose to teach in high-poverty, low-performing schools.[39]

"Alternative routes to certification are more successful at drawing underrepresented groups into the teaching profession."

Alternative Certification

More competitive teacher pay must also be accompanied by efforts to broaden the talent pool and raise the quality of potential teachers by reducing barriers to teaching. High numbers of applicants for expedited entry programs like Teach for America, which draws applicants with strong academic records from top-tier schools and accepts only a small fraction of them, suggest that a substantial number of talented individuals are eager to teach if given an expedited route to enter the profession.[40] Teach for America and other alternative certification programs that streamline formal requirements take into account potential teachers' existing knowledge and skills, provide on-the-job training, and allow trainees to complete certification requirements while working as teachers. This is one promising way to attract more highly capable individuals into teaching.

How do teachers who follow an alternative route to certification fare in the classroom? Research shows that participants in programs where teachers bypass some traditional licensure requirements have produced student results at least comparable to their traditionally prepared peers.[41] For example, a national study released this year by Mathematica Policy Research compared test score growth of Teach for America teachers with test score growth of students taught by other teachers in the same school. For reading, there was no difference between Teach for America teachers and regular teachers. But in math, the scores of Teach for America students were three percentage points higher—the equivalent of an extra month's worth of math instruction.[42]

These positive results suggest that we should look at ways of providing alternate routes to certification, such as Teach for America. Moreover, alternative routes to certification are more successful at drawing underrepresented groups—men and minorities, as well as individuals with strong content training in the sciences—into the teaching profession.

Research-Based Policy Recommendations to Improve Teacher Quality

Pay for Performance

Experimental and observational research of programs that link teachers' pay to their

students' achievement shows that such approaches can be effective at boosting teacher quality and student learning. Policymakers should work to make teacher pay more competitive and performance based, creating opportunities for teachers to earn higher salaries while also holding them financially accountable for outcomes.

Based on research with merit pay and other competitive plans, policymakers considering linking teacher pay with student test scores should ensure the following:

- ❒ Teachers' salaries should not be based on the level of student test scores, but on student gains from one year to the next (i.e., the value added). One option is to use the same fixed-effects model outlined above in order to estimate the average value added by each teacher. Knowing the value added, we can reward teachers directly for the gains that their students make, taking into account the innate aptitude of their student body. Estimating a fixed-effects model may sound complex, but in fact all the necessary information already resides in the computer databases of most state education departments.

- ❒ Performance-based pay should also take account of other measures of teacher performance, including classroom observation by an independent expert; an interview with the teacher; separate questionnaires from students, peers, and the principal; and perhaps even an annual knowledge exam.

- ❒ Higher salaries are not the only way to reward the most talented teachers. Professional recognition, greater responsibilities, and official acknowledgement by education officials are all important ways states and districts should encourage the best teachers to remain in the profession.

Use Teacher Pay to Encourage More Equitable Distribution of Teachers

Research on teacher labor markets and distribution suggests that higher, more competitive pay is essential to attract and keep high-quality teachers in the schools and positions that need them most. Teaching struggling students is hard work and thus requires not merely school finance equalization, but the resources for disadvantaged districts to pay teachers in hard-to-staff schools more than those in affluent schools. Just as in other occupations, those teachers who are working in disadvantaged schools that are hard to staff should be rewarded for their efforts. Policymakers offering salary differentials to recruit teachers for hard-to-staff schools should ensure the following:

- ❒ Salary differentials for teachers working in challenging situations must be substantial. Many teacher incentive programs offer only token bonuses or salary increases to teachers taking on additional or more difficult assignments. But research shows that the non-salary factors pushing quality teachers toward more affluent districts are many and powerful, requiring sizable financial incentives to work in needy schools to counter them.

- ❒ Not all communities and schools have the same needs, and not all hard-to-staff schools look alike. Rather than establishing a one-size-fits-all policy to pay teachers more to work in schools with certain characteristics, policymakers should give states and school districts the flexibility to craft financial incentives that focus closely on attracting the right kinds of teachers to the schools and positions where they are most needed.

- ❒ Simply adding incentives to an existing flawed budgeting system is not enough. District budgeting practices that charge schools the same rate per teacher, regardless of actual salary or skills, prevent poor schools from attracting high-quality teachers and result in lower per-pupil spending on poor students. By adopting student-based budgeting systems that ensure equitable per-pupil spending for all children, and moving more teacher hiring and pay authority to the school level, policymakers can give schools serving disadvantaged students the tools and resources they need to attract and competitively compensate high-quality teachers.

Make Teacher Certification Smarter and More Streamlined

Alternative certification is proving to be a promising way to attract qualified individuals to the teaching profession who would not otherwise become teachers. Alternative certification programs have been successful in attracting men, members of minority groups, graduates of competitive colleges, and individuals with backgrounds in sought-after subjects. While individual alternative certification programs vary considerably, research on high-quality programs, such as Teach for America, shows that their graduates are at least as effective, and in some cases more effective, than their conventionally certified peers. Policymakers should protect and encourage the expansion of alternative routes to teacher certification, particularly those specifically designed to attract teachers to disadvantaged schools.

So far, there is little good research to suggest that traditional teacher certification really improves the quality of new recruits, as distinct from merely dissuading potential teachers. Equally troubling, research by David Steiner and Susan Rozen finds that the quality of curricula in schools of education is deeply flawed. Steiner and Rozen suggest that much of this coursework is of limited rigor, does not cover essential topics, and incorporates extraneous or ideologically biased material unrelated to teacher performance in the classroom.[43] In addition to promoting alternative routes to certification, state policymakers should reevaluate existing teacher licensure requirements to eliminate and consolidate bureaucratic barriers while also ensuring that prospective teachers cover truly essential content.

Conclusion

The NCLB requirements place a strong emphasis on using research-based approaches to improve student achievement. Yet, while educators work to base their work in research, policymakers continue to ignore research that shows that popular initiatives and strategies to boost teacher quality—reducing class sizes, raising teacher salaries across the board, and teacher certification—are ineffective or even counterproductive. On the other hand, research has uncovered promising findings about the potential of teacher performance-based pay and alternative certification to raise teacher quality and outcomes for students in hard-to-staff schools. But policymakers are often still slow to implement these approaches because they challenge the status quo of public education and are thus controversial. Research has proven what steps must be taken by policymakers improve teacher quality. It is time for them to live up to the same standards they have set for educators and exercise the political will to put research-based teacher quality policies—performance-based pay, incentives to teach in hard-to-staff schools, and alternative certification routes—into action.

Endnotes

[1] See, for example: Sanders, William, "Value-Added Assessment: A Method for Measuring the Effects of the System, School and Teacher on the Rate of Student Academic Progress," *The School Administrator*, 55(11), 1998; Izumi, Lance T., and William M. Evers, eds., "Teacher Quality," Hoover Institution Press, Pacific Research Institute, 2002.

[2] Rivkin, Steven G., Eric A. Hanushek, and Kain, John F., "Teachers, Schools, And Academic Achievement," *Econometrica* (forthcoming), 2005; Rockoff, Jonah E., "The Impact of Individual Teachers on Student Achievement: Evidence from Panel Data," *American Economic Review*, 94(2): 247-252, 2004.

[3] This estimate comes from analysis of Project Star: Krueger, Alan, "Experimental Evidence of Education Production Functions," *The Quarterly Journal of Economics,* 114(2): 497-532, 1999. Other researchers find that class size reductions of this magnitude have no effect on student performance: Hoxby, Caroline M., "The effects of class size on student achievement: New evidence from population variation," *The Quarterly Journal of Economics,* 115(4) 1239-1285, 2000; Hanushek, Eric, "The Evidence on Class Size," Occasional Paper Number 98-1, University of Rochester, 1998; Woessmann, Ludger, and Martin R. West, "Class-Size Effects in School Systems Around the World: Evidence from Between-Grade Variation in TIMSS," IZA Discussion Papers 485, Institute for the Study of Labor (IZA), 2002.

[4] See, for example: Peterson, Paul E., "Ticket to Nowhere," *Education Next*, March 22, 2003; Fryer Jr., Roland G., and Steven D. Levitt, "Understanding the Black-White Test Score Gap in the First Two Years of School," National Bureau of Economic Research, NBER Working Paper 8975, 2002.

[5] Walsh, Kate, *Teacher Certification Reconsidered: Stumbling Towards Quality,* Abell Foundation, October 2001; Ehrenberg, Ronald G., and Dominic J. Brewer, "Do School and Teacher Characteristics Matter? Evidence from High School and Beyond," *Economics of Education Review,* vol. 13, no.1 (1994): 1-17; Ferguson, Ronald F., and Helen F. Ladd, "How and Why Money Matters: An Analysis of Alabama Schools," chapter in Ladd, Helen F., ed., *Holding Schools Accountable: Performance-Based Reform in Education,* The Brookings Institute, 1996.

[6] Allen, Michael B., "Eight Questions on Teacher Preparation: What Does the Research Say?," Education Commission of the States, July 2003; Goldhaber, D. D., and D. J. Brewer, "Why Don't Schools and Teachers Seem to Matter? Assessing the impact of unobservables on educational productivity," *Journal of Human Resources*, 32 (3), 505-523, 1997; Goldhaber, D.D., and D. J. Brewer, "Does teacher certification matter? High School teacher certification status and student achievement," Educational Evaluation and Policy Analysis, 22, 129-145, 2002; Monk, D.H., "Subject-area preparation of secondary mathematics and science teachers and student achievement," *Economics of Education Review*, 13, 125-145, 1994. It is worth noting that evidence and research in this area is largely focused on secondary school teachers in the areas of math and science. There is less evidence about the specific content knowledge that is important for other subject areas or for elementary school teachers.

[7] Allen, Michael B., "Eight Questions," *op. cit.*; Monk, D.H., "Subject-area preparation," *op. cit.*

[8] Corcoran, Sean P., William N. Evans, and Robert M. Schwab, "Changing Labor Market Opportunities for Women and the Quality of Teachers, 1957-2000," *American Economic Review,* 94(2), 2004.

[9] Bacolod, Marigee P., "The Role of Alternative Opportunities in the Female Labor Market in Teacher Supply and Quality: 1940-1990," UCLA Department of Economics, 2001.

[10] It is not possible to perform a similar analysis of SAT scores over this period, since the SAT board did not begin publishing statistics by intended major until 1977.

[11] Hoxby, Caroline M., "Reforms for Whom?," *Education Next*, Spring 2003.

[12] There is also a debate about how teacher pay currently compares with compensation in other professions. To a large extent, this depends on whether one uses data from surveys of employers (e.g., the National Compensation Survey) or employees (e.g., the Current Population Survey). See: Vedder, Richard, "Comparable Worth," *Education Next*, Summer 2003; Podgursky, Michael, "Fringe Benefits," *Education Next*, Summer 2003; Allegretto, Sylvia, Sean Corcoran, and Lawrence Mishel, "How Does Teacher Pay Compare?: Methodological Challenges and Answers," *Economic Policy Institute*, 2004.

[13] Hoxby, "Reforms for Whom?," *op. cit.*

[14] Average annual arrest rates for all violent offences among juveniles aged 10 through 17 were 263 per 100,000 in the years 1970 to1974, and 297 per 100,000 from 1975 to 1979. This figure rose to 480 per 100,000 from 1990 to1994, before falling to 276 per 100,000 in 2002. "Uniform Crime Reports 1970-2002," Federal Bureau of Investigation, Table 38, 2002.

[15] Jerald, Craig, with Richard Ingersoll, *All Talk, No Action: Putting an End to Out of Field Teaching*, Education Trust, August 2002.
[16] Raymond, Margaret E., Stephen Fletcher, and Javier Luque, "Teach for America: An Examination of Teacher Differences and Student Outcomes in Houston, Texas," CREDO, July 2001.
[17] Huang, Sandra, Yun Yi, and Kati Haycock, *Interpret with Caution: The First State Title II Reports on the Quality of Teacher Preparation,* Education Trust, June 2002.
[18] "Title II—State Report 2003," Title II Technical Assistance, U.S. Department of Education, October 7, 2003, *http://www.title2.org*.
[19] Jerald, *All Talk, op. cit.* Thirty-four percent of classes in high-poverty schools and 29 percent in high-minority schools were taught by teachers without a subject minor. Classes in high-minority schools were 40 percent more likely than those in low-minority schools to be taught by a teacher without a minor.
[20] Humphrey, Daniel, Julia E. Koppich, and Heather Hough, *Sharing the Wealth: National Board certified Teachers and the Schools that Need Them Most*, SRI International, April 2004; Goldhaber, Dan, Emily Anthony, and David Perry, *Making the Grade: Who Applies for and Earns Advanced Teacher Certification?*, Urban Institute, September 30, 2003.
[21] Hanushek, Eric, John F. Kain, and Stephen J. Rivkin, "Why Public Schools Lose Teachers," *Journal of Human Resources*, 39(2), Spring 2004, pp 326-354.
[22] Boyd, Donald, Hamilton Lankford, Susanna Loeb, and James Wyckoff, "The Preparation and Recruitment of Teachers: A Labor-Market Framework," chapter in Hess, Frederick M., Andrew J. Rotherham, and Kate Walsh, eds., *A Qualified Teacher in Every Classroom*, Harvard Education Press, 2004.
[23] Hanushek, "Why Public Schools Lose Teachers," *op. cit.*
[24] Roza, Marguerite, and Paul T. Hill, "How Within District Spending Inequities Help Some Schools Fail," in Ravitch, Diane, ed., *Brookings Papers in Education Policy 2004,* Brookings Institution Press, 2004.
[25] Ingersoll, R. M., *Out-of-Field teaching, Educational Inequality, and the Organization of Schools: An Exploratory Analysis*, Center for the Study of Teaching and Policy, University of Washington, 2002.
[26] For studies finding little or no impact of class size cuts on student performance, see: Hoxby, Caroline M., "The Effects of Class Size on Student Achievement: New Evidence From Population Variation," *The Quarterly Journal of Economics,* 115(4) 1239-1285, 2000; Hanushek, "The Evidence on Class Size," *op. cit.* Woessmann, "Class-Size Effects," *op. cit.*
[27] *Class Size Reduction in California: Findings from 1999-2000 and 2000-2001,* CSR Research Consortium, California Department of Education, 2002.
[28] Jepsen, Christopher and Steven Rivkin, "What is The Tradeoff Between Smaller Classes and Teacher Quality?," National Bureau of Economic Research, NBER Working Paper 9205, 2002.
[29] Darling-Hammond, L. and Barnett Berry, *The Evolution of Teacher Policy*, RAND, 1988.
[30] Allen, "Eight Questions," *op. cit.*
[31] Walsh, Kate, *Fumbling For Quality*, Abell Foundation, 2001.
[32] Goldhaber and Brewer, "Why Don't Schools and Teachers Seem to Matter?," *op. cit*.
[33] Farkas, Steve, Jean Johnson, and Tony Folena, "A Sense of Calling: Who Teaches and Why," *Public Agenda*, 2000.
[34] Angrist, Joshua D., and Jonathan Guryan, "Does Teacher Testing Raise Teacher Quality? Evidence from State Certification Requirements," National Bureau of Economic Research, Inc., NBER Working Papers 9545, 2003.
[35] Hanushek, Eric, Kain, John, and Steven Rivkin, "Do Higher Salaries Buy Better Teachers?," National Bureau of Economic Research, NBER Working Paper 7082, 1999.
[36] For a discussion of how the Tennessee system operated, see: Furtwengler, C., "Tennessee's Career Ladder Plan: They Said It Couldn't Be Done!," *Educational Leadership,* 43(3): 50-55, 1985. For an analysis of its effects on student performance, see: Dee, Thomas S. and Benjamin J. Keys, "Does Merit Pay Reward Good Teachers?: Evidence from a Randomized Experiment," Swarthmore College Working Paper, 2003. Unfortunately, the scheme met with considerable resistance from teacher unions, and was eventually disbanded.
[37] For more information on the Milken Teacher Assessment Program, see: *http://www.mff.org/tap/tap.taf.*
[38] Lavy, Victor, "Performance Pay and Teachers' Effort, Productivity and Grading Ethics," NBER, Working Paper 10622, National Bureau of Economic Research, 2004. See also: Lavy, Victor, "Evaluating the Effect of Teachers' Group Performance Incentives on Students Achievements," *Journal of Political Economy*, 10(6), 1286–1318, December 2002.
[39] Humphrey, Daniel, Julia E. Koppich, and Heather Hough, *Sharing the Wealth: National Board Certified Teachers and the Schools that Need Them Most*, SRI International, April 2004.

[40] For example, in 2003, Teach for America received 15,700 applications for roughly 2,000 slots. These statistics suggest that admission to Teach for America is comparable to, or more competitive than, graduate professional programs at many Ivy League and other top-ranked institutions.

[41] Allen, "Eight Questions," *op. cit.;* Goldhaber and Brewer, "Why Don't Schools and Teachers Seem to Matter?," *op. cit.*; Raymond, Fletcher, and Luque, *op. cit.*; Betts, Julian R., Andrew C. Zau, and Lorien A. Rice, *Determinants of Student Achievement: New Evidence from San Diego,* Public Policy Institute of California, August 2003.

[42] Decker, Paul T., Daniel P. Mayer, and Steven Glazerman, *The Effects of Teach for America on Students: Findings from a National Evaluation*, Mathematica Policy Research, June 9, 2004.

[43] Steiner, David, and Susan Rozen, "Preparing Tomorrow's Teachers; An Analysis of Syllabi from a Sample of America's Schools of Education" chapter in Hess, *A Qualified Teacher, op. cit.* For an alternative view, see: Butin, Dan, "The Foundations of Preparing Teachers: Are Education Schools Really 'Intellectually Barren' and Ideological?," *Teachers College Record*, 2004.