Pay, Working Conditions, and Teacher Quality

Eric A. Hanushek and Steven G. Rivkin

Summary

Eric Hanushek and Steven Rivkin examine how salary and working conditions affect the quality of instruction in the classroom. The wages of teachers relative to those of other college graduates have fallen steadily since 1940. Today, average wages differ little, however, between urban and suburban districts. In some metropolitan areas urban districts pay more, while in others, suburban districts pay more. But working conditions in urban and suburban districts differ substantially, with urban teachers reporting far less administrator and parental support, worse materials, and greater student problems. Difficult working conditions may drive much of the difference in turnover of teachers and the transfer of teachers across schools.

Using rich data from Texas public schools, the authors describe in detail what happens when teachers move from school to school. They examine how salaries and student characteristics change when teachers move and also whether turnover affects teacher quality and student achievement. They note that both wages and student characteristics affect teachers' choices and result in a sorting of teachers across schools, but they find little evidence that teacher transitions are detrimental to student learning.

The extent to which variations in salaries and working conditions translate into differences in the quality of instruction depends importantly on the effectiveness of school personnel policies in hiring and retaining the most effective teachers and on constraints on both entry into the profession and the firing of low performers.

The authors conclude that overall salary increases for teachers would be both expensive and ineffective. The best way to improve the quality of instruction would be to lower barriers to becoming a teacher, such as certification, and to link compensation and career advancement more closely with teachers' ability to raise student performance.

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How best to attract and retain good teachers is perhaps the most important policy issue in education today. Few observers dispute the premise that good schools require good teachers in the classrooms. But agreement about how public policy can best facilitate the hiring and retention of effective teachers is far more elusive. In this article we examine aspects of the teacher labor market to shed light on how salaries and working conditions affect the quality of instruction.

Our underlying presumption is that the proof of high-quality instruction is in the pudding—teacher quality must be addressed in terms of how much students actually learn. In other words, teacher quality should be measured by the contribution of a teacher to student learning, typically measured by test scores, and not by characteristics such as possession of an advanced degree, experience, or even scores on licensing examinations.

Assessing how salary and working conditions affect teaching quality is complicated. Because traditionally accepted measures of teacher quality, such as experience and years of schooling, are only weakly linked with student achievement, they are not reliable proxies for effective teaching. An attractive alternative is to use student test score gains as measures of teacher effectiveness. While recent accountability systems have increased the availability of such test scores, researchers must still sort out how much measured student achievement reflects the performance of teachers and how much it reflects family and other influences.

Likewise, because objective measures of working conditions, such as administrator and parental support, safety, and ease of commuting, are lacking, researchers frequently use student demographic characteristics as proxies. As an alternative they sometimes rely on teacher self-reports, which have their own drawbacks. Teachers' perspectives, for example, may differ systematically by community type—cutting class or theft by students may not be regarded in the same way by all teachers—and views about working conditions may be influenced by their own job performance, making these measures unreliable.

Finally, certain aspects of the current market for teachers—including licensing restrictions, tenure, and various contractual requirements—play a role in how salary and working conditions affect the quality of instruction. For example, an increase in teacher salaries might have one effect on student achievement in the current market, with its significant barriers to entry, such as certification requirements, and quite a different effect in a more open market.

We begin by surveying variations in salaries and working conditions in U.S. public schools by region and community type. We also chart changes over time in how teacher salaries compare with salaries in other occupations. We then focus on teacher turnover, describing how teachers move from school to school, examining how salaries and working conditions change when teachers move and whether turnover affects teacher quality and student achievement. We move on to consider more generally how salary and working conditions affect the quality of instruction. We review research on how teacher experience and education, the primary determinants of compensation for public school teachers, affect student outcomes and then turn to direct evidence on how salary and working conditions affect student achieve-

ment. Having surveyed the evidence, we examine its implications for teacher policies. We conclude that the best way to improve the quality of instruction would be to lower barriers to becoming a teacher and to link compensation and career advancement more closely with performance.

Salaries and Working Conditions

As primary determinants of teacher supply, salaries and working conditions are potentially important in determining the quality of instruction, though the extent of their influence depends on the effectiveness of district personnel decisions. Because variations in salaries and working conditions can contribute to unequal school quality, they are the focus of much concern on the part of policymakers, legislators, and the courts.

Variations in Salaries and Working Conditions in 1999–2000

Tables 1 and 2 use information from the nationally representative Schools and Staffing Survey (SASS) for the 1999–2000 academic year to show variations in teacher salaries and working conditions, respectively, by region and community type (urban, suburban, and rural) that potentially contribute to unequal instructional quality.[1] Although we discuss differences among community types within specific regions, the tables report only average differences by community type for the nation as a whole.

Table 1 reveals wide variation in both starting salaries and salary growth, including patterns that contradict some widely held beliefs about salary differences by community type, such as that suburban areas pay systematically more than urban areas. Average salaries are highest in the much more urbanized Northeast, largely because average salaries in small town and rural school districts are much lower in all regions. Among new teachers in rural districts, almost one-fourth in the Northeast, one-third in the South and West, and more than 40 percent in the Midwest earned salaries of less than $25,000 a year, roughly double the shares of urban and suburban teachers in this category. Even for teachers in their tenth year, the median salary in rural districts was less than $45,000 in the Northeast and West and less than $35,000 in the South and Midwest.

Variation in urban and suburban teacher salaries is far less—and far less systematic. In the Northeast both starting and experienced urban teachers earn more, on average, than their suburban counterparts. In the South this pattern is reversed, with suburban teachers earning more than urban teachers; and in both the Midwest and West the ordering differs for starting and experienced teachers. In other words, in some metropolitan areas urban districts pay more. In others, suburban districts pay more. In no region does the urban-suburban salary gap approach the gap between metropolitan (that is, urban and suburban) and rural salaries.

The relatively small average salary difference between urban and suburban schools does not imply that the typical urban school is able to attract as large a pool of teacher applicants as the typical suburban school. As in all occupations, teachers value working conditions as well as salary. Examining differences in working conditions gives a more complete picture of differences in the average attractiveness of different types of districts.

In table 2, which surveys school working conditions as reported by teachers, urban districts stand apart from all others in almost all respects. Be it parental or administrator support or the adequacy of materials, far higher

Table 1. Share of Teachers Earning Selected Salaries in Their Starting and Tenth Years, by Region and Community Type, School Year 1999–2000

Percent

Region and community type	Average salary (dollars)				
	<25K	25–30K	30–35K	35–45K	>45K
	Starting year				
Region					
Northeast	10.1	17.10	30.70	29.20	12.80
Midwest	27.2	34.20	15.60	14.90	8.20
South	20.1	34.20	25.30	15.90	4.50
West	17.6	22.70	24.70	24.00	11.00
Community type					
Urban	15.2	29.20	26.50	19.40	9.80
Suburban	15.4	26.30	26.60	22.50	9.20
Rural	34.6	35.00	14.70	12.90	2.80
All	19.4	28.9	24.0	19.6	8.0
	Tenth year				
Region					
Northeast	0.8	1.9	10.4	30.8	56.1
Midwest	8.5	10.3	13.5	32.6	35.2
South	4.6	14.7	24.8	38.9	17.0
West	3.8	6.0	11.6	28.4	50.2
Community type					
Urban	2.3	6.0	14.8	32.7	44.3
Suburban	3.5	6.2	13.1	32.8	44.5
Rural	9.5	20.0	26.2	36.5	7.8
All	4.5	9.3	16.5	33.6	36.1

Source: National Center for Education Statistics, Schools and Staffing Survey, 1999–2000.

shares of urban teachers report problems in all regions. Not surprisingly, urban teachers are less likely to report general satisfaction with their jobs.

Taken together, tables 1 and 2 show the complexity of variations in salary and other job characteristics and therefore suggest that any links between these factors and quality of teaching are likely to be complex. Although the similarity in average salaries may appear to suggest that urban districts should be able to attract teachers almost as well as suburban districts can, the pronounced differences in working conditions suggest otherwise. In the case of rural schools, the tables indicate that relatively better working conditions may compensate for lower salaries.

Trends over Time in Aggregate Salaries

In competitive labor markets, people will sort across occupations and industries according to their skills, the salaries being offered, and working conditions. As long as working conditions are roughly comparable, higher salaries should attract more able people. If

Table 2. Share of Teachers Reporting Strongly Negative Views of Various Working Conditions, by Region and Community Type, School Year 1999–2000

Percent

Region and community type	Administration is supportive	Parents are supportive	Adequate materials	Generally satisfied
Region				
Northeast	9.4	16.2	10.1	3.3
Midwest	7.4	12.6	6.1	2.1
South	7.2	17.7	8.6	3.3
West	7.5	15.9	9.5	2.7
Community type				
Urban	9.2	22.1	12.4	4.1
Suburban	7.2	13.7	7.6	2.5
Rural	7.4	13.1	5.7	2.4
All	7.8	15.8	8.5	2.9

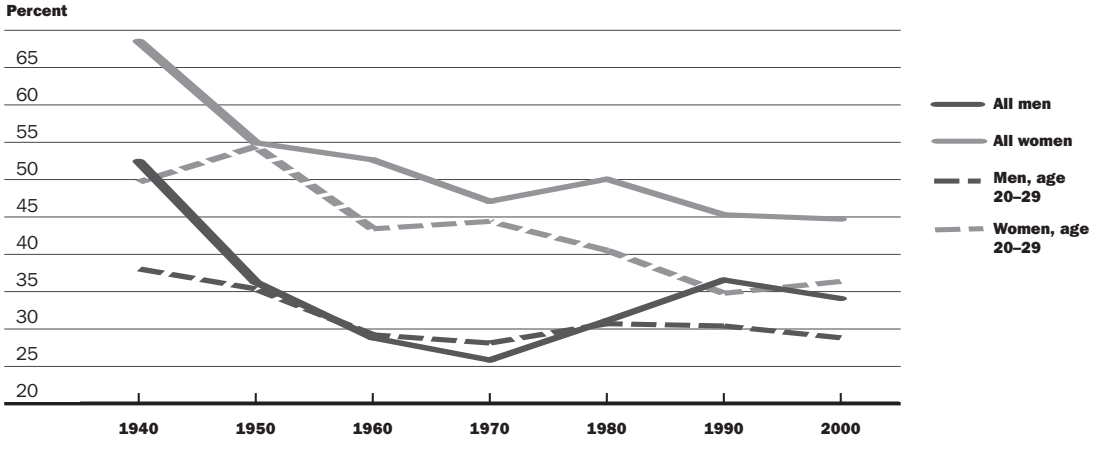
Source: See table 1.

the relative attractiveness of working conditions in teaching and in other occupations changes little over time, salary changes in teaching should provide a good measure of changes in average teacher quality and should therefore provide an important benchmark for considering policies related to teacher quality.

Figure 1 shows changes in the share of nonteachers with at least a bachelor's degree who earned less than the average teacher between 1940 and 2000.[2] Over the period, the salaries of all young teachers relative to those of college-educated nonteachers fell, though gender differences were substantial. For men, relative salaries fell between 1940 and 1960 but then remained roughly constant. For women, relative salaries began high—above the median for college-educated women—but fell continuously. The changes are easiest to see for young teachers, but they hold for teachers of all ages, meaning that growth in late-career salaries did not offset the decline in salaries for younger teachers. Among the explanations for the relative salary decline are technological change, expanded opportunities for women, and growth in international trade—all of which increased the demand for and earnings of highly skilled workers outside of teaching.[3]

The long decline in teachers' relative earnings has likely led to a drop-off in average teacher quality. As professional opportunities for women increased between 1960 and 1990, for example, measured achievement declined noticeably for those entering teaching.[4] But the extent of any decline in teacher quality is unclear and depends in large part on the correlation between teaching skills and the skills rewarded in the nonteacher labor market. In a simple one-dimensional skill framework in which nonpecuniary factors play no role and districts hire the best available teachers, the substantial decline in relative salary would be expected to lead to a large drop in teacher quality. But in a more complex and realistic framework, in which the skills of teachers differ from those of other professionals and in which district personnel policies lead to suboptimal hiring and

Figure 1. Percent of College-Educated Non-Teachers Earning Less than the Average Teacher, by Gender and Age, 1940–2000



Source: Authors' calculation from U.S. Census data for 1940–2000.

retention decisions, the quality response to salary changes could be more muted. For example, if teaching places greater emphasis on a particular set of communication and interpersonal relation skills than the general labor market does, relative teacher salaries may not be a particularly good index of teacher quality. In addition, the link between relative salaries and quality may be different today than it was during the 1960s and 1970s, when the rapidly expanding opportunities for women and dramatic social changes may have greatly altered perceptions of a career in teaching.

Teacher Turnover

So far, we have shown substantial variation in salaries across districts and over time, as well as perhaps even greater variation in working conditions. The extent to which these differences affect teacher quality depends on, among other things, how much teachers care about salaries and working conditions when making career decisions. Some of the best research assessing the importance of these factors examines teachers' turnover decisions. In this section we describe in some detail the relationships among turnover, salary, and working conditions using unusually rich data from Texas public schools.

Teacher Turnover in Texas

Each year many teachers in Texas move within or between school districts or leave public schools entirely. As table 3 shows, overall 82 percent remain in the same school, while 7 percent exit the public schools, 6.5 percent change schools within districts, and 5 percent switch districts. This turnover is remarkably close to national averages: between 1994 and 1995, 86 percent of all teachers remained in the same school, while 6.6 percent left teaching.[5]

Transitions differ sharply by number of years of teaching.[6] As the table shows, new teachers (zero to two years of experience) are almost twice as likely as prime-age teachers (eleven to thirty years' experience) to exit Texas public schools and almost four times as likely to switch districts. As would be expected, mobility picks up again as teachers near retirement age: almost one-fifth of teachers with more than thirty years of expe-

Table 3. Year-to-Year Transitions of Texas Public Elementary and Middle School Teachers, by Experience, 1993–96

Percent, except as indicated

	Teachers who				
Teacher experience	Remain in same school	Change schools within district	Switch districts	Exit Texas public schools	Number of teachers
0–2 years	73.6	7.5	9.3	9.6	73,962
3–5 years	77.7	7.2	6.6	8.5	56,693
6–10 years	82.4	6.8	4.5	6.3	75,284
11–30 years	86.9	5.7	2.5	4.9	165,873
More than 30 years	77.0	4.0	0.7	18.3	6,978
All	81.8	6.5	4.8	6.9	378,790

Source: Eric A. Hanushek, John F. Kain, and Steven G. Rivkin, "Why Public Schools Lose Teachers," *Journal of Human Resources* 39, no. 2 (2004).

rience leave the Texas public schools each year. Again, national data on mobility show a similar pattern.

When we look more closely to see where teachers' transitions begin and end, we find only weak support for a widely held belief that teachers commonly leave urban districts for suburban positions. Though most urban teachers who switch districts do relocate to suburban schools, less than 2 percent of all teachers in large urban school districts switch to suburban districts each year. Indeed, the absolute number of teachers moving into urban districts is only slightly smaller than the number moving out.

How Salary and Working Conditions Affect Teacher Choices in Texas

By delving more deeply into these data to explore why teachers choose to make these transitions we can shed light on how salary and other factors work together to determine the attractiveness of a specific teaching job. Although the Texas data contain neither teacher nor administrator reports on working conditions, they do contain information on student demographics, which we use as proxies for working conditions. The Texas data also do not specify a teacher's reason for exiting a school, in particular whether the exit is voluntary. Although anecdotal evidence suggests that the vast majority of transitions are voluntary, it is certainly not correct to assume that all are. Because voluntary moves would tend to lead to greater improvements in salary and working conditions, the data likely understate implied teacher preferences.

Table 4 reports changes in salaries and average student demographics for teachers changing district, by experience and gender. On average, new teachers improve their salaries, with men gaining 1.2 percent, women gaining 0.7 percent.[7] The average salary gain declines with experience for both women and men and is actually negative (roughly –0.1 percent) for women with three to nine years of experience.[8] The average gain for all movers with less than ten years of experience is slightly more than 0.4 percent of annual salary, or roughly $100.

These averages, however, mask considerable variation, some of which appears to relate systematically to the types of schools from

Table 4. Average Change in Salary and Characteristics of District Students for Texas Public Elementary and Middle School Teachers Who Change Districts, by Gender and Experience

Teacher salary and student characteristics	Men by experience		Women by experience	
	0–2 years	3–5 years	0–2 years	3–5 years
Base year salary (percent change)	1.2% (0.003)	0.7% (0.003)	0.7% (0.001)	–0.1% (0.001)
Student test score	0.05 (0.008)	0.05 (0.011)	0.08 (0.004)	0.08 (0.006)
Percent Hispanic	–4.8 (0.6%)	–3.4 (1.0%)	–4.8 (0.3%)	–4.6 (0.5%)
Percent black	–0.7 (0.4%)	–0.9 (0.5%)	–2.6 (0.2%)	–2.5 (0.3%)
Percent subsidized lunch	–4.7 (0.6%)	–3.8 (0.9%)	–7.0 (0.3%)	–5.8 (0.4%)

Source: See table 3. Average test score is the district average of mathematics and reading score on Texas Assessment of Academic Skills exams, normalized to mean 0 and standard deviation 1.

and to which teachers move. For example, teachers who move from large urban to suburban schools have average nominal salary losses of 0.7 percent. This is not to say that teachers who move to suburban schools prefer lower salaries. Instead, other advantages of suburban schools appear to make up for their lower salaries. Other things being equal, teachers would gravitate toward higher-salary districts and schools. Indeed, a study by Hanushek, Kain, and Rivkin indicates that central city schools would have to undertake substantial salary increases to reduce teacher turnover to the level observed in the typical suburban school.[9] For new teachers and teachers with three to five years of experience, the central city school would have to offer women an average salary increase of 25–43 percent. Men appear to be considerably more responsive and would require salaries around 10 percent higher.

For those teachers who move, the type of students changes far more than their salaries do. As table 4 shows, teachers who move systematically favor higher-achieving, nonminority, non-low-income students. The findings for student achievement are clearest and most consistent: for the average mover, the district average achievement rises by roughly .07 standard deviation, or 3 percentile points on the state distribution. The shares of students who are black, Hispanic, and eligible for a subsidized lunch fall. On average, black and Hispanic compositions of districts decline 2 and 4.4 percent, respectively, and the share eligible for free or reduced-price lunch falls almost 6 percent. Particularly for women (who make up three-quarters of the teaching force), salary differences are far smaller than changes in student characteristics.

It should be noted that the share of black students declines primarily for white teachers. Black teachers, on average, move to schools with more minority students. Although the declining share of black students for white teachers may reflect a difference in preferred working conditions, it may also simply reflect travel distance to school. Housing patterns (either because of choice or because of discrimination) may lead black teachers to live nearer to schools with a higher share of black students than do white teachers. In fact,

some evidence shows that taking into account travel distance to school eliminates the difference in apparent preferences regarding school racial composition between black and white teachers.[10]

Another sign of the potential importance of working conditions is the fact that private school salaries are systematically lower than public school salaries. Moreover, as Michael Podgursky demonstrates, this holds for nonsectarian private schools and therefore is not simply a reflection of the unique financial status of nuns and other religious professionals. His interpretation is that the salary differential reflects both better behaved and easier to teach students and other working conditions.[11]

Other researchers have used teacher self-reports in place of or in addition to student demographics to investigate how working conditions affect turnover. Susanna Loeb and Linda Darling-Hammond find that self-reported working conditions significantly affect the probability that administrators regard turnover as a serious problem, as well as their difficulty in filling vacancies and also the share of teachers in their first year.[12] Richard Ingersoll finds that most teachers exit for reasons other than dissatisfaction with their current job—retirement, for example, or personal reasons, or the pull of other jobs. According to Ingersoll's analysis, the roughly one-quarter of teachers who leave schools because they are dissatisfied cite low salaries, lack of support from the school administration, student discipline problems, and lack of teacher influence over decisionmaking.[13]

How Turnover Affects Student Achievement in Texas Data

We now turn to the question of how teacher turnover affects student outcomes. Schools in urban districts serving disadvantaged students do have higher turnover generally, leading to their having a greater share of teachers with little or no experience—clearly a cost to these schools, as inexperienced teachers tend to be less effective.[14] But the cost would be markedly reduced if the teachers leaving these schools tended to be the least effective teachers. To address that issue, we compare the overall effectiveness of teachers who exit a large urban district in Texas with the effectiveness of those who remain, to learn more about systematic differences in quality. We measure quality by teacher value added to achievement. Specifically, we investigate the mathematics performance of students in fourth through eighth grades on state tests in each grade, between 1996 and 2001. These students are linked to each of their mathematics teachers. The measure of quality assigned to each teacher is the gain in standardized achievement scores that is attributable to each teacher.

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Table 5 compares teachers who stay in their urban school with those who move to go to another school in the same district, to go to another district, or to leave teaching altogether. All comparisons give the estimated value both of the movers and the stayers in terms of standard deviations of the average student test score gains. The first column compares moving teachers with all other teachers in the district, and the second com-

Table 5. Estimates of Mean Differences in Teacher Quality, by Transition Status, for Elementary and Middle School Teachers in a Large Texas Urban School District

Transition status	All nonmovers in district	Nonmovers within school and year
Change campus	–0.089 (3.96)	–0.054 (2.59)
Change district	–0.011 (0.36)	–0.023 (0.78)
Exit public schools	–0.044 (1.90)	–0.072 (3.53)

Source: Eric A. Hanushek and others, "The Market for Teacher Quality," Working Paper 11154 (Cambridge, Mass.: National Bureau of Economic Research, 2005).

Note: All specifications include full sets of dummy variables for experience, year, and grade. The second estimates also include student fixed effects. The sample size is 230,000. Comparisons are to teachers remaining in same school; absolute value of *t* statistics in parentheses.

pares them with nonmovers in the same school and year. Those who exit teaching, it turns out, are significantly less effective, on average, than those who stay. Teachers who switch campuses within the same district are also significantly less effective, while those who switch districts do not appear to differ much from the stayers. Thus, in this large district in Texas, the teachers who stay are not lower in quality, on average, than those who leave.

How Salary and Working Conditions Affect Student Achievement

Having examined in detail how salary and working conditions interact in teacher turnover in Texas, we now review evidence that researchers have assembled generally on the causal effects of salary and working conditions on the quality of instruction.

We begin by focusing on how teachers' experience and education, the characteristics traditionally rewarded in teacher salary schedules, affect student achievement. Then we turn to direct comparisons of how salary and working conditions affect student outcomes. Efforts to produce a valid estimate of that direct relationship are complicated by the fact that working conditions, family income, and other factors affect both salary and outcomes.

How Teacher Education and Experience Affect Quality of Instruction

Because experience and teacher education are the primary determinants of a teacher's position in a district's salary schedule, it is often assumed that higher salaries raise quality because more experienced and highly educated teachers earn more and are more effective. Yet the structure of a salary schedule does not constitute evidence, and even such conceptually appealing assumptions require empirical validation.

Teacher experience and graduate education explain much of the overall variation in teacher compensation.[15] Dale Ballou and Michael Podgursky estimate that on average 17 percent of the teacher wage bill reflects extra payments for experience and an additional 5 percent reflects payments for a master's degree, though the premium for a postgraduate degree varies substantially.[16] These premiums tend to compare favorably with those in private industries, which typically lack the strong employment rights enjoyed by many tenured teachers. The experience and education "pay parameters" are commonly used in empirical analyses of teacher performance in the classroom, partly because experience and education would be expected to improve teacher skills and also because they are readily measured and virtually always available in administrative data sets.

Skepticism about how important education and experience are for teacher quality can be traced back to 1966, when a major federal

government study by James Coleman suggested that common measures of teacher and school quality seemed to have little effect on student achievement.[17] Sharp criticism of the Coleman Report generated a massive research effort on teacher quality, but subsequent findings have tended to reinforce the initial report.[18]

Analysts investigating teacher quality in the wake of the Coleman Report have tried to estimate the relationship between student achievement, on the one hand, and quantifiable characteristics of teachers and schools, along with measures of family background, on the other. They have inferred teacher quality from the way teacher education and experience affect student performance. But education and experience simply do not appear to have a strong effect on student achievement. Research has found little or no evidence of a systematic relationship between teacher value added to student achievement and a graduate education (master's degrees and above).[19] The few studies that find that a teacher's postgraduate education improves student outcomes are balanced by others that find just the opposite, that it lowers student achievement. And extensive investigation of the effects of teacher experience has resulted in widely different findings and also raised methodological concerns. One key issue is the extent to which experienced teachers select particular students. Many teacher contracts explicitly allow more experienced teachers to choose their school.[20] Because teachers prefer to teach in schools where student achievement is high, more experienced teachers tend to be at schools with higher-achieving students.[21] That finding, however, does not mean that more experienced teachers produce greater gains in student achievement than less experienced teachers do. Indeed, it could mean just the opposite—that higher student achievement "causes" teacher experience in the sense that schools with easier-to-educate students attract experienced teachers. The studies that most clearly identify the importance of teacher experience find that the quality of instruction tends to increase substantially during the first few years of teaching but not in subsequent years.[22]

Research has found little or no evidence of a systematic relationship between teacher value added to student achievement and a graduate education (master's degrees and above).

If education and experience are not good overall measures of teacher quality, does that mean that salary does not affect teacher quality or even that teacher performance is not an important determinant of student outcomes? The answer is no on both counts. First, as table 1 documents, much of the substantial salary variation across districts at the entry level is not explained by experience or by teacher education (most entering teachers do not have a postgraduate degree). Second, even a finding that quality is not systematically related to compensation does not mean that teacher performance has little overall impact on outcomes.

Teacher Salaries and Quality of Instruction

Many studies have pursued the question of whether more highly paid teachers generate higher student achievement. Some of these

studies can be difficult to interpret, in part because they tend to confuse differences in the level of salaries with the differences in compensation for experience and education discussed above. In addition, as Susanna Loeb and Marianne Page point out, many fail to account for the ways in which differences in working conditions help to pinpoint the causal effect of salary.[23] For example, teachers likely require higher pay to take a job at a dangerous school or one where the teaching requirements are more onerous, and it is difficult to separate the effect of such working conditions from that of salary.[24]

As a whole, there is little evidence to suggest that more highly paid teachers are systematically more effective, but methodological problems may limit the value of many studies.

As a whole, there is little evidence to suggest that more highly paid teachers are systematically more effective, but methodological problems may limit the value of many studies. Two studies, however, attempt to circumvent problems resulting from the purposeful sorting of families and teachers among schools and the difficulty of accounting for working conditions.

Loeb and Page find that higher salaries significantly improve students' educational attainment. They use the average differences across states and time in the salaries of nonteachers as a way to identify the causal effects of salaries, the idea being that salaries of nonteachers affect the ability of schools to hire teachers but otherwise have no direct effect on the probability that a student remains in high school. The paper provides evidence that the observed relationship between student achievement and salary is quite sensitive to controls for alternative earnings opportunities and other factors that affect both teacher labor market decisions and student achievement.[25]

Hanushek and several colleagues use a sample of teachers who move from a large Texas central city school district to other Texas districts to examine whether districts appear to use higher salaries and more generally desirable student demographic characteristics to attract higher-quality teachers. They measure quality by teacher value added to student achievement in the urban district before moving.[26] They find little or no evidence that the teachers who move to schools with higher salaries or higher-achieving students, higher-income students, and lower shares of minority students are of systematically higher quality as measured by value added to student achievement. The lack of a systemic link between quality, on the one hand, and salary and working conditions, on the other, suggests that districts may have difficulty measuring the quality of potential hires or that they do not place great weight on instructional effectiveness relative to other characteristics.

Teacher Policy

In conclusion, we explore the policy implications of the evidence on how pay and working conditions affect teacher quality. At the outset of our discussion, we emphasize the crucial importance of teacher quality to student outcomes. A string of good teachers can help offset the deficits of home environment or

push students with good preparation even farther.

As the relative pay of teachers has slipped over the past half-century, many observers have begun to call for increasing teachers' overall pay. Improving teacher quality, they assert, requires making salaries competitive. Some even propose a "grand bargain." The idea is that if districts raise overall pay—say, to the level of that of accountants—teachers and their unions will agree to more flexible pay arrangements and work rules.[27] But holding all parties to such a bargain would be difficult, because wage setting is a political activity, not a market activity.

Simply raising all salaries would not only be expensive; it would also be inefficient. Although it could attract a new group of teachers into the profession and retain teachers who would otherwise leave, it would not necessarily improve the quality of teachers in the short term.[28] Retaining teachers would be beneficial if they were the high-quality ones, but there is no strong reason to expect this to be the case. Although higher salaries appear to reduce the departure rates of teachers with graduate degrees—teachers who would thus have higher salaries in other professions—graduate degrees are not a good predictor of teacher effectiveness.[29] Moreover, as noted, movers are on average less effective than stayers, at least for our large urban district.

It is possible, but by no means certain, that higher-quality movers would be more sensitive to salary. Higher salaries would certainly tend to increase the pool of potential teachers, but how that would affect overall teacher quality depends on the ability of principals and human resource teams to hire and, more important, retain the better teachers. Existing evidence, while not definitive, suggests that schools are not very effective at choosing the best teachers.[30]

With few exceptions, advocates of across-the-board salary increases pay too little heed to teachers' classroom performance and to administrators' personnel decisions. A better policy approach is to focus much more on student performance and administrator accountability, while increasing the supply of potential teachers. The idea is to loosen up on prescribed schooling and training requirements and focus on potential and actual effectiveness in the classroom, rather than "potential."

Our position is simple: if student performance is the issue, policy should emphasize student performance. Researchers have found wide variation in teacher quality, even among teachers with similar education and experience. The variation appears to spring from differences in teacher skill and effort, inadequate personnel practices (particularly in retention but also in hiring) in many schools and districts, and differences in the number and quality of teachers willing to work, by subject and working conditions. That final source of variation may well justify substantial flexibility in pay schedules, promotion opportunities, and rigorous retention standards, and more should be learned about the consequences of differentiated pay and job classifications. The variation in skill and effort raises the most difficult set of issues for policymakers, because regulations, including but not limited to certification requirements, are not likely to get at the crux of the issue.

Rather, the evidence strongly suggests to us that principals and superintendents should make decisions about teacher hiring, retention, promotion, and pay based on their eval-

uation of teachers' potential and actual effectiveness in raising student achievement and other outcomes, and not on a set of teacher characteristics such as education and experience. Principals do in fact know who the better teachers are.[31] Their demonstrated ability to identify teachers at the top and bottom of the quality distribution could almost certainly be extended toward the middle ranges, particularly if good tests of student achievement are administered regularly. But other aspects of personnel management, including tenure, promotion, and pay decisions, leave tremendous room for improvement.[32]

Unless those who make personnel decisions have a strong incentive, they are unlikely to make difficult, high-stakes choices regarding teacher pay, promotion, and employment.

Researchers to date have not found most performance-based teacher pay plans effective.[33] But experiments in performance-based pay, though numerous, have been limited in the size and character of their incentive schemes.[34] Of particular importance to the success of such pay programs, and to school effectiveness more generally, is the accountability of administrators. Unless those who make personnel decisions have a strong incentive, they are unlikely to make difficult, high-stakes choices regarding teacher pay, promotion, and employment. Such choices are often difficult and uncomfortable, and the path of least resistance is to grant tenure to virtually all teachers except in extreme cases and to avoid making decisions about compensation. Because such accountability is not common in education today, there is little to build on in implementing administrator accountability. A variety of institutional structures may provide appropriate incentives; schools nationwide are experimenting with different organizational arrangements, including charter schools, school report cards, merit schools, school vouchers, and public school choice.

Finally, our analysis of teacher mobility showed that salary affects mobility patterns less than do working conditions, such as facilities, safety, and quality of leadership.[35] Compensation alone, it seems clear, is but a partial measure of the returns to work. But school policy discussions give remarkably little attention to working conditions. Research has linked teachers' negative perceptions of working conditions with their exit from schools, but it has not closely tied poor working conditions to the quality of teachers in the classroom. An important agenda item, both for research and for policy, is to learn which working conditions are most important for teachers.

Notes

1. The description of working conditions follows closely the work of Susanna Loeb and Linda Darling-Hammond, "How Teaching Conditions Predict Teacher Turnover in California Schools," *Peabody Journal of Education* 80, no. 3 (2005): 44–70.

2. Note that salaries for teachers include all earnings, regardless of source. Thus, any summer or school year earnings outside of teaching are included. No adjustments are made, however, for any differences in the length of the school day or in number of days worked during the year. Nor is any calculation of employer-paid fringe benefits made. A clear discussion of the importance of each of these, along with interpretation of the overall salary differences, can be found in Michael Podgursky, "Fringe Benefits," *Education Next* 3, no. 3 (2003). For the time-series comparisons, these omitted elements of compensation are most relevant if there have been relative changes in their importance between teachers and nonteachers over time. We currently have few data on any such changes.

3. Fredrick Flyer and Sherwin Rosen, "The New Economics of Teachers and Education," *Journal of Labor Economics* 15, no. 1, pt. 2 (1997), describe a more formal model of changing female opportunities and their impact on the teaching profession. Darius Lakdawalla, "The Economics of Teacher Quality," *Journal of Law and Economics* 94, no. 1 (2006): 285–329, and Darius Lakdawalla, "Quantity over Quality," *Education Next* 2, no. 3 (2002), extend this to concentrate on the role of productivity changes in competing industries.

4. Marigee P. Bacolod, "Do Alternative Opportunities Matter? The Role of Female Labor Markets in the Decline of Teacher Quality" (University of California, Irvine, Department of Economics, 2005).

5. National Center for Education Statistics, *Digest of Education Statistics, 2001* (U.S. Department of Education, 2002).

6. Todd R. Stinebrickner, "An Analysis of Occupational Change and Departure from the Labor Force," *Journal of Human Resources* 37, no. 1 (2002), provides comparisons across occupations and finds that teacher job and occupational changes are below those elsewhere in the economy, but that teachers are much more likely to exit entirely from the labor force.

7. Because women teachers are more likely to be married or have children than men of the same age, the smaller gains of women may reflect the fact that more transitions are precipitated by family considerations. However, we have no explicit information on reason for moving or family status. In our analysis we also provide "adjusted" salary measures that allow for features of the schools.

8. We present the analysis in terms of teacher experience, but tenure within the district may also have separate implications for salary and other factors that affect satisfaction and mobility.

9. Eric A. Hanushek, John F. Kain, and Steven G. Rivkin, "Why Public Schools Lose Teachers," *Journal of Human Resources* 39, no. 2 (2004).

10. Don Boyd and others, "The Draw of Home: How Teachers' Preferences for Proximity Disadvantage Urban Schools," *Journal of Policy Analysis and Management* 24, no. 1 (2005).

11. Podgursky, "Fringe Benefits" (see note 2).

12. Loeb and Darling-Hammond, "How Teaching Conditions Predict Teacher Turnover in California Schools" (see note 1).

13. See the review and evidence in Richard M. Ingersoll, "Teacher Turnover and Teacher Shortages: An Organizational Analysis," *American Educational Research Journal* 38, no.3 (2001): 499–534.

14. See, for example, Charles T. Clotfelter, Helen F. Ladd, and Jacob L. Vigdor, "Who Teaches Whom? Race and the Distribution of Novice Teachers," *Economics of Education Review* 24, no. 4 (2005): 377–92.

15. The central compensation component of most teacher contracts is a matrix that indicates the salary for a teacher based on years of experience and amount of education. This salary schedule seldom varies by other, apparently natural, factors such as field of teaching or demonstrated results in the classroom.

16. See Dale Ballou and Michael Podgursky, "Returns to Seniority among Public School Teachers," *Journal of Human Resources* 37, no. 4 (2002): 892–912. They provide comparisons showing that teacher wage growth, at least over the first fifteen years of a career, is comparable to that in other white collar professions. Podgursky, "Fringe Benefits" (see note 2), does provide evidence that salaries in private schools tend to rise faster earlier in the career than do those in public schools.

17. James S. Coleman and others, *Equality of Educational Opportunity* (U.S. Government Printing Office, 1966).

18. The various criticisms of the Coleman Report centered largely on the statistical methodology and the biases introduced by the analytical approach. They did not, however, provide an alternative view of what factors were important in determining student achievement. See, for example, Samuel Bowles and Henry M. Levin, "The Determinants of Scholastic Achievement—An Appraisal of Some Recent Evidence," *Journal of Human Resources* 3, no. 1 (1968); Glen G. Cain and Harold W. Watts, "Problems in Making Policy Inferences from the Coleman Report," *American Sociological Review* 35, no. 2 (1970); and Eric A. Hanushek and John F. Kain, "On the Value of 'Equality of Educational Opportunity' as a Guide to Public Policy," in *On Equality of Educational Opportunity*, edited by Frederick Mosteller and Daniel P. Moynihan (New York: Random House, 1972).

19. Summaries of research related to teacher education and to other measures of teacher characteristics can be found in Eric A. Hanushek, "The Failure of Input-Based Schooling Policies," *Economic Journal* 113, no. 485 (2003); and Eric A. Hanushek and Steven G. Rivkin, "How to Improve the Supply of High Quality Teachers," *Brookings Papers on Education Policy 2004.*

20. The impact of teacher experience on teacher mobility and school choices was first noted by David Greenberg and John McCall, "Teacher Mobility and Allocation," *Journal of Human Resources* 9, no. 4 (1974); and Richard J. Murnane, "Teacher Mobility Revisited," *Journal of Human Resources* 16, no. 1 (1981).

21. See Hanushek, Kain, and Rivkin, "Why Public Schools Lose Teachers" (see note 9).

22. The source of this experience effect is important to understand. The simplest explanation is that the teacher learns classroom management, solidifies subject matter knowledge, and develops pedagogical skills during the first year or two on the job. Another interpretation of teacher experience is that it is not really that teaching skills improve over time but that teacher experience merely indicates something about those who elect to stay in teaching. Direct investigation of this question finds that both learning and selection are relevant, though in the first two years, the dominant effect is learning to teach better. Two early investigations of experience effects and their interpretation are Richard J. Murnane and Barbara Phillips, "What Do Effective Teachers of Inner-City Children Have in Common?" *Social Science Research* 10, no. 1 (1981); and Richard J. Murnane and Barbara R. Phillips, "Learning by Doing, Vintage, and Selection: Three Pieces of the Puzzle Relating Teaching Experience and Teaching Performance," *Economics of Education Review*

1, no. 4 (1981). More recent analyses finding that any experience effects are concentrated in the early years include Jonah E. Rockoff, "The Impact of Individual Teachers on Student Achievement: Evidence from Panel Data," *American Economic Review* 94, no. 2 (2004); Steven G. Rivkin, Eric A. Hanushek, and John F. Kain, "Teachers, Schools, and Academic Achievement," *Econometrica* 73, no. 2 (2005); Eric A. Hanushek and others, "The Market for Teacher Quality," Working Paper 11154 (Cambridge, Mass.: National Bureau of Economic Research, 2005); Don Boyd and others, "How Changes in Entry Requirements Alter the Teacher Workforce and Affect Student Achievement," Working Paper 11844 (Cambridge, Mass.: National Bureau of Economic Research, 2005); and Thomas J. Kane, Jonah E. Rockoff, and Douglas O. Staiger, "What Does Certification Tell Us about Teacher Effectiveness? Evidence from New York City" Working Paper 12155 (Cambridge, Mass.: National Bureau of Economic Research, 2006).

23. Susanna Loeb and Marianne E. Page, "Examining the Link between Teacher Wages and Student Outcomes: The Importance of Alternative Labor Market Opportunities and Non-Pecuniary Variation," *Review of Economics and Statistics* 82, no.3 (2000): 393–408.

24. One justification for reducing class size even if class size has no direct impact on teachers is that teachers like smaller classes and therefore would have to be paid less to work with them, thus offsetting the costs of class size reduction. But little evidence supports this hypothesis; see Eric A. Hanushek and Javier A. Luque, "Smaller Classes, Lower Salaries? The Effects of Class Size on Teacher Labor Markets," in *Using What We Know: A Review of the Research on Implementing Class-Size Reduction Initiatives for State and Local Policymakers*, edited by Sabrina W. M. Laine and James G. Ward (Oak Brook, Ill.: North Central Regional Educational Laboratory, 2000), pp. 35–51.

25. Loeb and Page, "Examining the Link" (see note 23).

26. Hanushek and others, "The Market for Teacher Quality" (see note 22). A growing number of researchers have investigated whether some teachers tend to get larger achievement gains than others. These analyses invariably show very large differences in the achievement associated with individual teachers. The historical development of this body of work can be traced from Eric A. Hanushek, "Teacher Characteristics and Gains in Student Achievement: Estimation Using Micro Data," *American Economic Review* 60, no. 2 (1971); Eric A. Hanushek, "The Trade-Off between Child Quantity and Quality," *Journal of Political Economy* 100, no. 1 (1992); Richard J. Murnane, *Impact of School Resources on the Learning of Inner City Children* (Cambridge, Mass.: Ballinger, 1975), David J. Armor and others, *Analysis of the School Preferred Reading Program in Selected Los Angeles Minority Schools* (Santa Monica, Calif.: Rand Corp., 1976); and Murnane and Phillips, "What Do Effective Teachers of Inner-City Children Have in Common?" (see note 22); through Daniel Aaronson, Lisa Barrow, and William Sander, "Teachers and Student Achievement in the Chicago Public High Schools" (Federal Reserve Bank of Chicago, 2003); Rockoff, "The Impact of Individual Teachers on Student Achievement" (see note 22); and Rivkin, Hanushek, and Kain, "Teachers, Schools, and Academic Achievement" (see note 22).

27. An early statement of this is found in Carnegie Forum on Education and the Economy, *A Nation Prepared: Teachers for the 21st Century* (New York, 1986). This proposal became the foundation of the pay and contract changes of the "Rochester plan," whose unfortunate demise was chronicled in Ray Marshall and Marc Tucker, *Thinking for a Living: Education and the Wealth of Nations* (New York: Basic Books, 1992).

28. See Dale Ballou and Michael Podgursky, *Teacher Pay and Teacher Quality* (Kalamazoo, Mich.: W. E. Upjohn Institute for Employment Research, 1997), on this point.

29. Richard J. Murnane and others, *Who Will Teach? Policies That Matter* (Harvard University Press, 1991); Peter J. Dolton and Wilbert van der Klaauw, "Leaving Teaching in the U.K.: A Duration Analysis," *Economic Journal* 105 (1995); Peter J. Dolton and Wilbert van der Klaauw, "The Turnover of Teachers: A Competing Risks Explanation," *Review of Economics and Statistics* 81, no. 3 (1999).

30. Dale Ballou, "Do Public Schools Hire the Best Applicants?" *Quarterly Journal of Economics* 111, no. 1 (1996); Ballou and Podgursky, *Teacher Pay and Teacher Quality* (see note 28); Hanushek and others, "The Market for Teacher Quality" (see note 22).

31. See Armor and others, *Analysis of the School Preferred Reading Program* (see note 26), and Murnane, *Impact of School Resources on the Learning of Inner City Children* (see note 22), who identify total teacher effects as discussed above and relate them to principals' evaluations. A recent analysis goes further, to survey teachers on their evaluations; Brian A. Jacob and Lars Lefgren, "Principals as Agents: Subjective Performance Measurement in Education," mimeo (John F. Kennedy School of Government, 2005); Brian A. Jacob and Lars Lefgren, "When Principals Rate Teachers," *Education Next* 6, no. 2 (2006).

32. Note that the issues of hiring and retaining district administrators are very similar to those for teachers. While less studied, there is little evidence that current requirements for certification are closely related to the effectiveness of administrators. One relevant study is Ronald G. Ehrenberg, Randy A. Ehrenberg, and Richard P. Chaykowski, "Are School Superintendents Rewarded for 'Performance'?" in *Microlevel School Finance: Issues and Implications for Policy*, edited by David H. Monk and Julie Underwood (Cambridge, Mass.: Ballinger, 1988). A recent policy statement, Broad Foundation and Thomas B. Fordham Institute, "Better Leaders for America's Schools: A Manifesto" (Washington, 2003), also makes policy recommendations on administrators that parallel the thoughts about teachers presented here. Such proposals are also similar to those developed in more detail in Marci Kanstoroom and Chester E. Finn Jr., eds., *Better Teachers, Better Schools* (Washington: Thomas B. Fordham Foundation, 1999). In addition, they encapsulate the current experiments being fostered in the Teacher Advanced Program; see Lowell Milken, "Growth of the Teacher Advancement Program: Teaching as the Opportunity 2002" (Santa Monica, Calif.: Milken Family Foundation, 2002).

33 See the article by Victor Lavy in this volume. See also David K. Cohen and Richard J. Murnane, "Merit Pay and the Evaluation Problem: Understanding Why Most Merit Pay Plans Fail and a Few Survive," *Harvard Educational Review* 56, no. 1 (1986).

34. For consideration of the available evidence on teacher merit pay, see Elizabeth Lueder Karnes and Donald D. Black, *Teacher Evaluation and Merit Pay: An Annotated Bibliography* (New York: Greenwood Press, 1986); Cohen and Murnane, "Merit Pay and the Evaluation Problem" (see note 33); David K. Cohen and Richard J. Murnane, "The Merits of Merit Pay," *Public Interest* 80 (1985); Ballou and Podgursky, *Teacher Pay and Teacher Quality* (see note 28); Dale Ballou and Michael Podgursky, "Teachers' Attitudes toward Merit Pay: Examining Conventional Wisdom," *Industrial and Labor Relations Review* 47, no. 1 (1993); Elchanan Cohn, "Methods of Teacher Remuneration: Merit Pay and Career Ladders," in *Assessing Educational Practices: The Contribution of Economics*, edited by William E. Becker and William J. Baumol (MIT Press, 1996); and James A. Brickley and Jerold L. Zimmerman, "Changing Incentives in a Multitask Environment: Evidence from a Top-Tier Business School," *Journal of Corporate Finance* 7 (2001).

35. If the teacher movements do not reflect a correlation with working conditions, the observed movements would suggest that racial preferences per se have a big influence on teachers. The policy implications of such a perspective would obviously be much more complicated.