What Is the Problem? The Challenge of Providing Effective Teachers for All Children

Richard J. Murnane and Jennifer L. Steele

Summary

Richard Murnane and Jennifer Steele argue that if the United States is to equip its young people with the skills essential in the new economy, high-quality teachers are more important than ever. In recent years, the demand for effective teachers has increased as enrollments have risen, class sizes have fallen, and a large share of the teacher workforce has begun to retire. Women and minorities have more career options than ever before, making it increasingly difficult to attract and retain the many effective teachers who are needed. Moreover, schools are limited in their ability to identify and reward the most effective teachers.

Perhaps the most urgent problem facing American education, say Murnane and Steele, is the unequal distribution of high-quality teachers. Poor children and children of color are disproportionately assigned to teachers with the least preparation and the weakest academic backgrounds. Teacher turnover is high in schools that serve large shares of poor or nonwhite students because the work is difficult, and the teachers who undertake it are often the least equipped to succeed.

Murnane and Steele point out that in response to these challenges, policymakers have proposed a variety of policy instruments to increase the supply of effective teachers and distribute those teachers more equitably across schools. Such proposals include across-the-board pay increases, more flexible pay structures such as pay-for-performance, and reduced restrictions on who is allowed to teach. Several of these proposals are already being implemented, but their effectiveness remains largely unknown. To measure how well these policies attract effective teachers to the profession and to the schools that need them most, rigorous evaluations are essential.

Murnane and Steele also note that policymakers may benefit from looking beyond U.S. borders to understand how teacher labor markets work in other countries. Although policies rooted in one nation's culture cannot be easily and quickly transplanted into another, it is important to understand what challenges other countries face, what policies they are using, and how well those policies are working to enhance teacher quality and improve student achievement.

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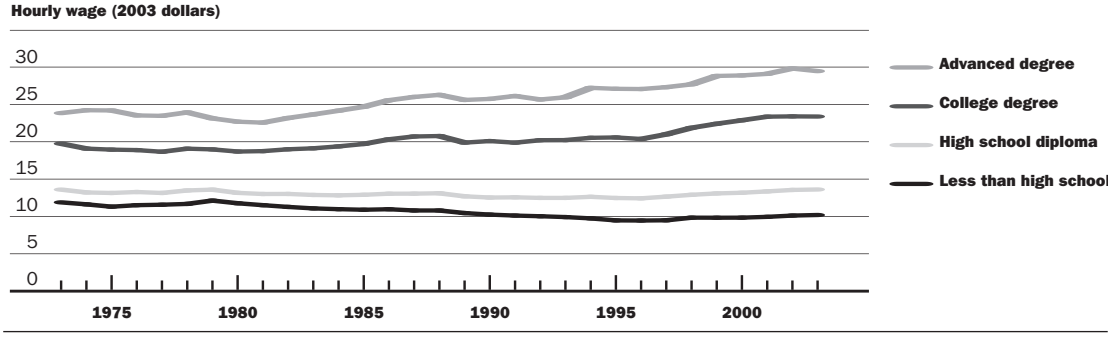
Public education in the United States has long been viewed as a means of expanding economic opportunity, enhancing social mobility, developing a skilled workforce, and preparing young people to participate in a democratic society.[1] High-quality public education is especially crucial today, as advances in the U.S. economy have made cognitive skills more important than ever in determining labor market success. But today's public schools are not equipping all students with the skills needed to thrive in a rapidly changing economy, and the economic consequences are becoming more serious for students who leave school without critical skills.

Cognitive skills are strong predictors of educational attainment. Students with weak skills are the most likely to drop out of school before earning a high school diploma, whereas those with strong skills are the most likely to enroll in college and to graduate with a four-year degree.[2] Wage trends of workers with differing levels of formal education illustrate the growing importance of cognitive skills in the American labor market. As shown in figure 1, real hourly earnings (net of inflation) for American workers who graduated from high school but did not go to college were no higher in 2003, on average, than they were thirty years earlier. High school dropouts fared even less well: their real wages fell 14 percent over the same period. But the real wages of four-year college graduates grew during this period, and the wages of those with advanced degrees grew even more. These are remarkable trends, especially because a simultaneous increase in the share of the labor force with four-year college degrees created downward pressure on the relative wages of college graduates.

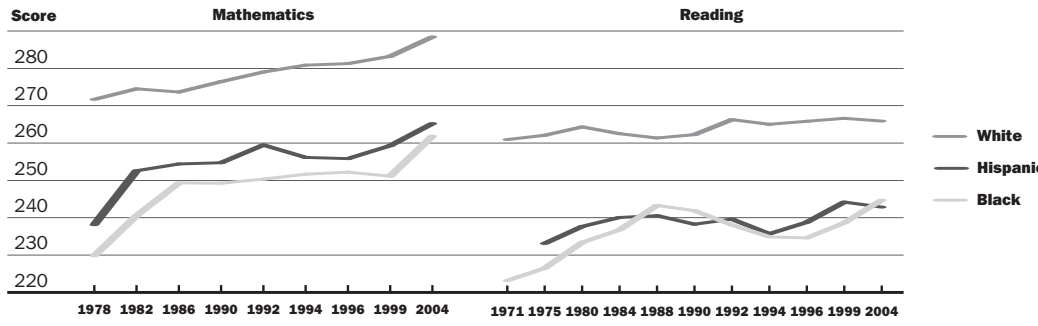
The problem facing American education is not that schools are less effective than they were thirty years ago. As figure 2 illustrates, the math and reading test scores of black and Latino students are significantly higher today than they were in the early 1970s, when the National Assessment of Educational Progress (NAEP) first began measuring the math and reading skills of American students. The NAEP scores of white students have also risen.[3] The problem is that technological advances have routinized manufacturing and clerical jobs and facilitated international competition, thereby increasing the demand for cognitive skills, especially problem-solving and communication skills. The nation's educational problem, in other words, is that an education that was good enough to

Figure 1. Real Hourly Wage for U.S. Workers by Education, 1973–2003



Source: Based on data from the Economic Policy Institute Data Zone, available at www.epinet.org/datazone/05/wagebyed_a.xls.

Figure 2. Trends in NAEP Scores in Math and Reading: Eighth-Grade National Averages



Source: Based on data for eighth graders (thirteen-year-olds) from the National Center for Education Statistics, available at nces.ed.gov/nationsreportcard/ltt/results2004/age_13_math_avg_score.asp and nces.ed.gov/nationsreportcard/ltt/results2004/age_13_reading_perf.asp# score.

allow Americans to earn a decent living in the economy of 1973 is not good enough to enable them to earn a decent living today.[4] As a result, the gulf between those who thrive and those who struggle financially is increasingly driven by differences in skills. And these skill differences are influenced by variation in the quality of K–12 education—variation that depends heavily on the quality of teachers in the nation's classrooms.

In the next section, we describe how supply and demand work in the labor market for teachers in America, and we explain several economic concepts that recur in articles elsewhere in this volume. We describe forces affecting the demand for and supply of teachers and show how changes in these forces have contributed to the challenge of providing all students with skilled teachers. We conclude with a brief discussion of policy approaches to increasing the supply of effective teachers and improving their distribution.

Understanding Teacher Labor Markets

In this article, we focus on the labor market for *effective* teachers, defined as those who are skilled at raising the achievement levels of their students. Today's policy challenge is not simply to place enough adults in front of classrooms, but to recruit and retain teachers who have a strong positive impact on students' learning. In this section, we assume that effective teachers are a single, homogeneous category, with no differences by subject specialty, years of experience, or educational credentials; and that all effective teachers are paid the same salary. We also assume that everyone agrees how to identify an effective teacher. These assumptions are clearly unrealistic (and we later take such complications into account), but they are helpful in explaining the concepts of demand and supply.

Supply and Demand in Teacher Labor Markets

The number of effective public school teachers that will be demanded by a particular school district depends on student enrollments, class size policies, curriculum requirements, the district's fiscal capacity, the priorities of district residents, and the wage level of effective teachers. School districts will want to hire more teachers if the level of teachers' wages is low than if it is high. For instance, if market conditions are such that effective teachers command a very high wage, districts

may increase class sizes to accommodate that high cost.

Changes in labor market conditions other than wages shift the demand for effective teachers outward or pull it inward, meaning that more or (in the latter case) fewer teachers would be demanded *at any given wage*. For example, an increase in student enrollment would shift demand outward, which means that a school district will want to hire more effective teachers at any prevailing wage level.

School districts often respond to a shortage of effective teachers at the prevailing wage not by leaving teaching positions vacant, but by filling them with ineffective teachers.

The supply of effective teachers who are willing to work in a particular school district depends on the wage they will be paid, the working conditions they will face, the wages and working conditions available to them in other occupations, and the cost of services such as child care that they need to purchase if they decide to work outside the home. A greater number of effective teachers are willing to provide their services to schools if the wage is high than if it is low.

As with the demand side of the market, a change in supply-side factors other than wages will shift the supply of effective teachers outward or pull it inward. An outward shift in supply means that more teachers are willing to provide their services to schools at any given wage; an inward shift means that fewer teachers are willing to teach at any given wage. For example, an increase in the wages that effective teachers can command in other occupations would mean that at any given wage level, fewer effective teachers would be willing to provide their teaching services to schools.

The teacher labor market is in equilibrium when the number of effective teachers who are willing to teach is exactly equal to the number of effective teachers that the school district is willing to employ. The quantity supplied is equal to the quantity demanded at only a single wage, which economists call the market-clearing, or equilibrium, wage.

At any wage greater than the market-clearing wage, the quantity of effective teachers willing to provide their labor exceeds the quantity demanded by the school district. The result is a labor market surplus. At any wage below the equilibrium wage, the quantity of effective teachers demanded is greater than the quantity supplied, yielding a labor market shortage. School districts often respond to a shortage of effective teachers at the prevailing wage not by leaving teaching positions vacant, but by filling them with ineffective teachers.

The critical point to understand about labor markets is that a shortage can be ameliorated by raising the wage, just as a surplus can be ameliorated by lowering it. Given this adjustment mechanism, why do shortages of effective teachers sometimes persist for an extended time? The answer to this question has several parts. First, a variety of "shocks" affect the teacher labor market, changing either the demand for teachers or the supply of

teachers and also changing the equilibrium wage. For example, increases in student enrollment shift the demand for teachers outward, thus increasing the equilibrium salary. The prevailing teacher wage therefore needs to increase if the district is to avoid a shortage of effective teachers.

Second, actual teacher salaries adjust only slowly to changes in the equilibrium wage. Teacher salaries are typically negotiated for extended periods, so it may take several years for wage levels to be reconsidered. Also, it often takes considerable time for school district leaders to convince school boards and taxpayers that they do indeed face a shortage of effective teachers at prevailing wages. School board members know that diligent human resource directors typically can find adults with college degrees to fill teaching vacancies. That many of these applicants lack the skills to teach successfully is typically not obvious. Indeed, as we explain later in the article, information available at the time of hiring does not distinguish effective teachers from ineffective ones very well. Consequently, it takes time even for skilled school district leaders to marshal evidence of a shortage of effective teachers at prevailing wage levels. In the interim, with demand expanding and the wage remaining unchanged, there is a shortage of effective teachers.

Third, it can take a year or more for college students and other adults who decide they want to teach to acquire the necessary credentials. The slow pace at which teacher wages increase means that individuals are slow to receive the signal that financial opportunities in teaching have improved. When they do receive the signal, those who lack the necessary credentials need time to earn them. Consequently, an increase in teacher wages will yield a smaller increase in the supply of effective teachers in the short run than in the long run.

Why Money Matters

Some effective teachers are willing to work at wages below the equilibrium wage. The problem is that there are not enough effective teachers to meet the quantity demanded at that wage. Of course, there also are effective teachers whose employment decisions are based on factors other than wage. It is not that financial incentives do not matter. Rather, they matter because they influence the occupational choice for people who would like to teach and are on the fence about whether it makes sense to do so. One such person could be an experienced teacher who takes a leave of absence to bear a child. After learning that high-quality child care is costly, she may find that her decision about whether to return to the classroom is very sensitive to the wage she can earn by teaching.

To appreciate how teaching salaries help determine the supply of effective teachers, it is also important to understand the concept of *opportunity cost*—that is, what must be given up as a result of a decision to teach. The opportunity cost for a college graduate trained in computer science who decides to become a teacher, for example, is the highest wage she could have earned elsewhere in the economy. The opportunity costs for teachers trained in different disciplines differ substantially. For instance, Dan Goldhaber and Daniel Player show that during the mid-to-late 1990s, starting salaries in engineering, mathematics, and computer science occupations were 14 percent to 30 percent higher than starting salaries in liberal arts occupations.[5] The opportunity cost of becoming a teacher is thus much greater for a college graduate trained in computer science than for one trained in history. Studies based on

data from the United States, the United Kingdom, and Australia show that college graduates' decisions about whether to enter and remain in teaching depend not only on salaries in teaching, but also on opportunity costs.[6] Because almost all U.S. school districts pay computer science teachers and history teachers on the same scale, it is not surprising that many districts find they are not able to attract strong applicants to teach computer science, while they have an abundance of strong applicants to teach history.

Why Working Conditions Matter

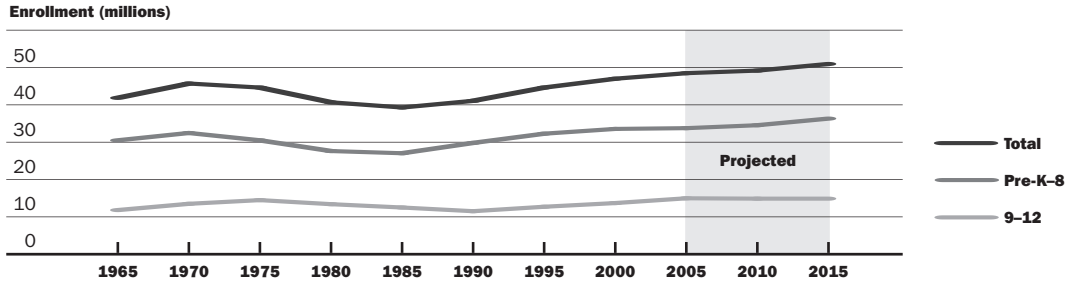
People's decisions to enter teaching and to teach in a particular school depend not just on financial incentives but also on a wide range of nonpecuniary incentives, such as working conditions. Working conditions include easily measurable conditions such as class size and contract hours, as well as more difficult-to-measure conditions such as facilities quality, parent support, school leadership quality, collegiality within the school, and curricular autonomy.[7]

The experiences of two hypothetical neighboring school districts—Oceanside and Rivercity—make clear the importance of working conditions. Both districts have the same number of students and the same demand for effective teachers. But Oceanside has new facilities, nationally recognized school leaders, and strong parent support, whereas Rivercity's schools have dilapidated facilities, frequent turnover among struggling school leaders, and weak parental support. Under these circumstances, fewer effective teachers will want to work in Rivercity at any given wage level than will want to work in Oceanside. In other words, the supply of effective teachers to Oceanside will be greater than the supply of effective teachers to Rivercity. The equilibrium wage for Oceanside—the wage at which the demand for effective teachers is equal to the supply—would result in a shortage of effective teachers in Rivercity.

Even if Rivercity pays enough to avoid a technical shortage of effective teachers—that is, if it pays its market-clearing wage—it still will not have as many effective teachers as Oceanside. Given its inferior working conditions, Rivercity would need to pay a wage even higher than its own equilibrium wage to attract the same number of effective teachers as Oceanside. Economists use the term *compensating wage differential* to refer to the wage premium that Rivercity would need to pay over and above the equilibrium wage in Oceanside in order to attract the same number of effective teachers that Oceanside attracts.

The evidence is clear that urban school districts serving large concentrations of low-income students have trouble attracting and retaining effective teachers.[8] Some school districts have responded to this problem by offering higher salaries to teachers willing to work in hard-to-staff schools. To date, researchers have only limited evidence on the size of compensating wage differentials that schools with poor working conditions would need to pay to attract a full faculty of effective teachers. Old and dilapidated physical facilities can be part of the problem, but of greater importance may be the difficulty of serving large numbers of children with complex needs without adequate resources to do the job well.[9] Offering compensating wage differentials makes sense, but only if accompanied by the resources needed to educate well the children in these schools. Recently a number of urban districts have introduced initiatives to improve education in schools serving high concentrations of poor children

Figure 3. Public School Enrollment in Pre-K through Grade 12, 1965–2015



Source: Adapted from Patrick Rooney and others, *The Condition of Education 2006* (Washington: Institute of Education Sciences, National Center for Education Statistics, 2006). Data for 1965 through 2000 are in five-year intervals in the fall of given year; data for 2005 though 2015 are projected for the fall of given year.

by offering higher teacher salaries and providing additional resources such as a longer school day and longer school year, as well as more support services for students. The initial evidence on the consequences of these initiatives is positive, but much more needs to be learned.[10]

The Demand Side of the Teacher Labor Market

We next focus on the demand side of the teacher labor market. We begin with factors that influence the quantity of teachers demanded. We then consider factors that influence the demand for effective teachers, and we explain the difficulty of distinguishing effective teachers from ineffective ones.

The Quantity of Teachers Demanded: What Hasn't Changed

One striking feature of the quantitative demand for teachers is how little it has been affected by the technological changes that have been reshaping the larger economy. The technological advances that have dramatically raised output per worker in many fields and reduced the demand for labor have left education almost unchanged. Though some teachers use computer technology to enhance their teaching practices and prepare students for the knowledge-based economy, computers have not sufficiently reconfigured the core tasks of teaching to produce notable efficiency gains or cost savings in public education.[11]

The Quantity of Teachers Demanded: What's New

Public school enrollments in the United States are on the increase, driven by immigration and a greater number of births.[12] Though the fertility rate (the number of live births per 1,000 women aged fifteen to forty-four) has fallen since 1970, when it stood at 87.9, it has risen modestly in recent years, from 64.6 in 1995 to 66.1 in 2003. Similarly, the number of live births rose from 3.9 million in 1995 to 4.1 million in 2003.[13]

Given that most students start school around age five, it takes roughly five years for elementary schools to feel the effects of changes in the number of births, and naturally it takes longer for these changes to be felt in secondary schools. This lag in enrollment trends between primary and secondary schools is visible in the pre-K–8 and high school enrollment lines in figure 3, where the peaks and valleys in the high school trajectory appear later than those in the pre-K–8 trajectory. As shown in figure 3, the National Center for Education Statistics (NCES) estimates that 48.7 million

students were enrolled in public schools in the fall of 2005, an increase of more than 8 percent over 1995 enrollment levels. By 2013, U.S. public school enrollments are projected to reach 50 million students.[14]

Also on the rise are the shares of children of color and children living in poverty. Between 1970 and 2003, the share of impoverished children in the United States rose from 14.9 percent to 16.7 percent, and the share of students of color in public schools rose from 30.9 percent to 41.5 percent.[15] These trends create a demand for teachers who can meet the needs of students who historically have not been well served by America's public schools. Two recent, well-designed studies find that students benefit academically from having teachers whose race or ethnicity matches their own.[16] But the share of teachers of color in the workforce remains low, at 15 percent in 2005.[17] The changing demographics of American schoolchildren suggest an increasing demand for effective teachers of color in particular and, in general, for teachers who are effective at raising the achievement of students from disadvantaged or minority backgrounds.

Class sizes also affect the demand for teachers, and average class sizes have declined in recent decades. State policies such as the California Class Size Reduction Initiative of 1996, which paid schools to cap class sizes at twenty in grades K–3, have been one factor contributing to the increasing demand for teachers.[18]

The most commonly cited indicator of trends in class size, the average ratio of students to teachers, has fallen steadily in the United States since the 1950s. In 1955, the ratio was 26.9; by the fall of 1985, it was 17.9; and by 1995, it had fallen to 17.3. The NCES has estimated that the ratio was 15.5 in 2005 and that it will drop to 14.5 by 2014.[19]

Although the trend in the average student-teacher ratio is informative, it is important to realize that student-teacher ratios are typically smaller than average class sizes. One reason is that schools generally employ enough faculty members to grant each teacher a preparation period during the school day.[20] A second reason is that student-teacher ratios usually include all licensed educators working in a school, though many of these, including counselors, librarians, and resource teachers, are not teachers of record for a particular class.

One federal policy that has contributed to the decline of student-teacher ratios in the past three decades is the Individuals with Disabilities Education Act (IDEA). First implemented in 1975 and reauthorized most recently in 2005, IDEA requires schools to provide accommodations for students with learning disabilities.[21] Many schools have hired additional teachers to support students and to manage the act's extensive reporting requirements. In a review of the research on class size effects, Eric Hanushek found that IDEA implementation explained about a third of the decline in student-teacher ratios over the past fifty years.[22]

The Demand for Quality Teachers: What Hasn't Changed

The commonsense belief that teacher quality matters is supported by a great deal of evidence, much of which comes from studies showing that children in some classrooms learn a great deal more over a school year than do demographically similar children in other classrooms.[23] The evidence highlights the importance of improving the quality of the nation's teacher workforce. This chal-

lenge, however, is complicated by considerable disagreement among educators and policymakers about how to identify highly effective teachers.

Historically, the demand for teachers has been driven by local preferences, and hiring decisions have not always been based on estimates of teachers' instructional effectiveness. Some districts and schools have based hiring decisions largely on a prospective teacher's ability to coach athletics or connections within the community.[24]

Another reason schools have not always made instructional effectiveness a priority in their hiring decisions is the complexity of their scheduling needs, especially at the secondary level. For instance, if a school needs to staff three sections of biology and two sections of algebra, the principal may hire a certified biology teacher to cover both the biology and algebra sections because it would be more difficult either to find a person who is trained in both subjects or to hire two part-time teachers. When teachers are assigned to teach classes for which they lack academic preparation, they are said to be teaching "out of field." Using 1993–94 data from the NCES Schools and Staffing Survey, Richard Ingersoll found out-of-field-teaching to be widespread in grades seven through twelve, especially in schools serving a large share of low-income students. Overall, he found that 57 percent of physical science teachers, 53 percent of history teachers, and 33 percent of secondary math teachers lacked degrees in the subjects they were teaching, though the shares were closer to 20 percent for more broadly defined subjects like social studies and general science.[25]

Even if districts and schools make instructional effectiveness a top priority, they may still find it hard to select the most effective teachers because information available at the point of hiring does not predict well how effective a teacher will be in enhancing students' skills. For example, teachers with two years of experience appear to be more effective, on average, than teachers with no classroom experience. But most studies do not find that experience beyond the initial two or three years results in improved student test scores. Similarly, most studies find that whether a teacher holds an advanced degree does not predict student achievement gains.[26]

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One teacher characteristic that *is* somewhat helpful in predicting student outcomes is academic ability, as measured by verbal aptitude scores, ACT scores, or undergraduate college selectivity.[27] Academically talented teachers are better, on average, at raising student achievement than teachers with fewer academic skills. But the measures of teachers' academic ability that are available in personnel records and in quantitative research studies explain only a small part of the variation in teachers' effectiveness as measured by student test score gains.

Recent years have seen considerable debate about whether a teaching license is a useful

indicator of a teacher's effectiveness. Teaching licenses, also known as certificates or credentials, function much like licenses in other trades and professions in that they signal to employers that a teacher has completed the level of training and preparation required to practice the occupation within that state. The requirements for licenses in most states include completion of a bachelor's degree and certain education course requirements, as well as student teaching. Teacher licensing regulations are designed to prevent districts and schools from hiring people whom the state does not deem acceptable—namely, those lacking a bachelor's degree or formal teacher preparation.[28] Some observers argue, however, that the costs associated with licensure requirements deter talented people who do not major in education from entering the profession.[29] In general, empirical studies find little or no difference in average effectiveness between those teachers who are traditionally licensed and those who enter the profession through alternative routes.[30]

Another new feature of the demand for teacher quality is the growing interest among policymakers and school administrators in measuring a teacher's "value added"—that is, her effectiveness in raising students' test scores.

Since 1987, the National Board of Professional Teaching Standards has provided a national voluntary teacher certification program for teachers who choose to submit detailed portfolios and pass a rigorous examination that evaluates their professional mastery. Unlike traditional licensure programs, national board certification appears to be a useful indicator of teacher effectiveness. Using data from North Carolina, Dan Goldhaber and Emily Anthony found that that national board certified teachers are more effective at raising test scores than both those who do not apply for board certification *and* those who apply but do not pass.[31] The evidence on national board certification is discussed in greater detail in subsequent articles in this volume.

The Demand for Quality Teachers: What's New

The No Child Left Behind Act of 2001 (NCLB) has established an unprecedented role for the federal government in regulating teacher quality. In particular, the law required that teachers be "highly qualified" by 2006 in schools that receive federal Title I funding, earmarked for poor children. As defined by NCLB, a highly qualified teacher has a bachelor's degree as well as a state teaching license and demonstrated competence in the academic subject(s) he or she teaches.[32] This definition addresses the problem of out-of-field teaching by ensuring that all students are taught by teachers who are knowledgeable in the subjects they teach. Among all the provisions of NCLB, however, the highly qualified teacher requirement has been the least thoroughly enforced.[33]

Another new feature of the demand for teacher quality is the growing interest among policymakers and school administrators in measuring a teacher's "value added"—that is, her effectiveness in raising students' test scores. Advances in data storage and data

processing have enabled a growing number of states to create long-term databases linking students' and teachers' records, making it possible to estimate value-added contributions. Indeed, although NCLB has raised interest in these measures, some states have estimated value added for many years. For example, Tennessee has used value-added modeling (VAM) as one of several ways to estimate school effectiveness since 1992, and in 1996 it began using three years' worth of VAM estimates to assess the effects of individual teachers on student learning.[34] Although VAM estimates are not used in their formal evaluations, Tennessee teachers have the option of using their value-added results to demonstrate that they have met the state's definition of a highly qualified teacher under No Child Left Behind.[35]

Some researchers see VAM as a powerful tool in efforts to recruit and retain better teachers. For example, Thomas Kane and Douglas Staiger argue that because it is so hard to predict a teacher's effectiveness at the point of hiring, schools should use value-added measures to evaluate teachers carefully after their first or second year on the job. Typically in the United States, teachers are granted tenure in their third or fourth year of teaching. Although tenure does not offer unlimited job security, it does offer protection from termination without rigorously documented due cause.[36] Rather than granting teachers tenure and job security almost reflexively, Kane and Staiger recommend hiring teachers with probationary status for the first one to two years and terminating at the point of the tenure decision those who are least effective at raising student achievement.[37]

Other analysts, however, have found that some teachers respond in undesirable ways to high-stakes pressure to increase test scores. For instance, Brian Jacob and Steven Levitt discovered incidents of teachers' outright cheating in 4–5 percent of classrooms, with more cheating in classrooms that had fewer students who were exempt from score reporting.[38] Other researchers cite the empirical uncertainty of value-added models as a reason for caution about their policy applications (see box 1).

What's True Internationally

The United States is not the only industrialized nation experiencing growth in primary and secondary school enrollments. Internationally, enrollments increased 15 percent in North America and 10 percent in Europe between 1990 and 1997.[39] Nevertheless, the school-aged population is growing faster in the United States than in other industrialized nations. For instance, between 1993 and 2003 the number of youth aged five to nineteen grew 12 percent in the United States, but only 7 percent in Canada and 5 percent in the United Kingdom.

While a growing student population creates the challenge of finding enough skilled teachers, a declining student population introduces a different problem. For example, in Japan, where the population of five- to nineteen-year-olds fell 21 percent from 1993 to 2003, there are relatively few opportunities to invigorate the teaching profession with young, energetic teachers.[40]

Like the United States, several countries are experiencing mismatches between the ethnic composition of their teaching forces and their increasingly diverse student populations. For instance, in the Netherlands, ethnic minorities constitute 12 percent of primary school students but only 4 percent of teachers.[41] The situation is similar in Norway, where the mostly white, Norwegian-speaking teaching

Box 1. Measuring Teachers' Effectiveness through Value-Added Modeling

Under the No Child Left Behind Act of 2001, schools must make "adequate yearly progress" (AYP) by showing improvements in test scores from one year to the next. Critics of AYP often point out that the gains required by NCLB are not long-term measures of student growth. Rather, they are cohort-to-cohort, cross-sectional measures that compare last year's students to the current year's students in a given class or grade. For instance, instead of looking at how much Mrs. Smith's fifth graders improved since they were tested in fourth grade, the cross-sectional approach asks how well Mrs. Smith's fifth graders this year performed in comparison with the fifth graders she taught last year.

One criticism of the cross-sectional approach is that it assumes that this year's fifth graders are the same as last year's fifth graders in their baseline skills. A related criticism is that it does not encourage schools or teachers to focus on individual students' progress over time.

Given these limitations of cross-sectional school improvement measures, interest is growing in how to measure schools' and teachers' effectiveness by tracking the performance of individual students over time through value-added modeling (VAM). Value-added models estimate the academic progress that students make in a given teacher's class (or in a given school) from one year to the next, and they attempt to isolate the impact that a particular teacher or school has on student achievement.

A major advantage of value-added models lies in their attention to teachers' (or schools') contributions to the learning of individual students over time. But the tremendous potential of VAM to measure teachers' effectiveness is constrained by several statistical and measurement challenges.

First, isolating a teacher's effect on students' achievement requires estimating what would have happened to the students' achievement under an alternative scenario. (Economists call this estimating the counterfactual.) It is not always clear whether the counterfactual means being taught by the average teacher in the district or by the least effective teacher. Nor is it clear that the teacher's effect would be the same with entirely different students.[1]

A second challenge lies in specifying statistical models that take into account the correlations between an individual student's test scores from one year to the next. Such models require statistical assumptions about the persistence of teacher effects over time, and using different assumptions can generate different estimates of teachers' effectiveness.[2]

Third, value-added models must attempt to account for the relatively small numbers of students with whom most teachers work. The smaller a teacher's student load, the more weight any one student will exert on the estimate of a teacher's effectiveness, so estimates may be less reliable for teachers who have fewer students. The statistical procedures that minimize this problem have the disadvantage of also minimizing the impact of the very strongest and weakest teachers.[3]

A fourth challenge lies in the difficulty of disentangling contextual effects, such as school and classroom characteristics, from teacher effects. Because students are not randomly assigned to classrooms or schools, and because teacher effectiveness may be systematically related to student characteristics, it is difficult to distinguish statistically between effects that are due to teach-

ers and effects that are due to other characteristics of the students' classroom, school, and district environments.

Missing student test scores or missing links between students and their teachers pose a fifth challenge to value-added modeling. In most district-level and state-level data on student achievement, it is not unusual to encounter missing or incomplete information. If students with missing data are systematically different from their peers (as may be true for students who change schools frequently or are absent on testing days), then value-added models may produce biased estimates of teachers' (or schools') effectiveness.

A sixth challenge concerns the suitability of the standardized tests used in the value-added models. Because VAM seeks to measure students' achievement gains from one test administration to the next, it is essential that the scores be measured on the same scale and that the tests measure comparable content. It is also essential that the tests measure content that the teachers have covered, which is more difficult to ascertain in higher grades, where there is greater curricular differentiation among classrooms.[4] In fact, VAM's potential for large-scale teacher evaluation is constrained by the fact that students are not tested in all grades and subjects under NCLB. In many states, data are inadequate for measuring the value added of high school teachers or teachers of subjects other than math and language arts.

Researchers have estimated that VAM can reliably identify the roughly one-fourth to one-third of teachers whose effectiveness is much greater or much less than that of the average teacher.[5] But more precise rankings are hard to obtain because of the small number of students taught by each teacher.[6] These challenges suggest the limitations of heavy reliance on VAM estimates in drawing high-stakes conclusions about teachers' skills. Nevertheless, VAM can provide useful insights about teachers' effectiveness that would be difficult to obtain in the absence of such methods.[7]

1. Daniel F. McCaffrey and others, *Evaluating Value-Added Models for Teacher Accountability* (Santa Monica, Calif.: RAND Corporation, 2003).

2. Ibid.

3. Ibid.

4. Daniel M. Koretz, "Limitations in the Use of Achievement Tests as Measures of Educators' Productivity" 37, no. 4 (2000): 752–77.

5. Daniel F. McCaffrey and others, "Models for Value-Added Modeling of Teacher Effects," *Journal of Educational and Behavioral Statistics* 29, no. 1 (2004): 67–101.

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force is increasingly called on to teach immigrant youth who arrive speaking only Urdu, Arabic, or Somali.[42]

Other countries also face challenges in identifying effective teachers. Like the United States, most industrialized nations use teacher salary scales that base compensation on years of teaching experience and educational credentials. Most of these countries, like the United States, screen before the point of hiring and do little screening for effectiveness once they have placed teachers in schools. But in some countries it is much more difficult to enter the teaching profession than it is in the United States. For example, in countries like Korea, Hong Kong, and Singapore, entry into teacher education de-

pends on a strong academic background in one's subject area. Other nations, including France, Germany, Greece, Italy, Japan, Korea, parts of Mexico, and Spain, require aspiring teachers to take competitive examinations to obtain teaching certificates or job placements.[43]

The Supply Side of the Teacher Labor Market

It is somewhat misleading to speak of a national teacher labor market in America. In reality, the U.S. market is localized in such a way that teachers in one geographic region typically do not compete for jobs in another region. Thus, teacher shortages are often specific to certain regions or even to specific districts or schools within a region.

Another feature of teacher supply is the relatively high attrition rate among new teachers. Indeed, some researchers argue that so-called shortages result not so much from a paucity of licensed teachers as from a revolving door into and out of the profession.[44] Using data from the nationally representative 1991–92 Teacher Follow-Up Survey (TFS), David Grissmer and Sheila Kirby found that the attrition rate for teachers with one to three years of experience is roughly 8 percent annually, compared with 4.5 percent for teachers with four to nine years of experience.[45] Using TFS data from 1989–90, 1991–92, and 1994–95, Ingersoll calculated that roughly one-third of new teachers leave the profession within three years of entry, and that almost half leave within five years.[46] Neither of these estimates, however, considers the number of teachers who leave the classroom and later return. In the past, this "reserve pool" of licensed teachers who are not currently teaching has been an important source of supply when demand for teachers has risen.[47]

Teacher Supply: What Hasn't Changed

The supply of teachers—the number of eligible (that is, traditionally, alternatively, or temporarily licensed) people willing to teach at a given wage—has always been a function of workforce demographics, salaries, opportunity costs, and working conditions.

Over the past forty years, the supply of teachers has varied by academic subject area.[48] Supply has been less adequate relative to demand for teachers who have high opportunity costs—those trained in fields such as mathematics, computer science, chemistry, or physics—than for those trained in fields that have lower opportunity costs, such as the humanities.

Special education is another area in which the supply of teachers has often been inadequate. One reason may be that special education teachers work with students who face greater academic, and in some cases behavioral, challenges than other students. Furthermore, special education teachers must complete, update, and implement Independent Educational Plans (IEPs) for their students in order to comply with the Individuals with Disabilities in Education Act (IDEA). Thus, special education positions often entail more administrative responsibilities and paperwork than do general education positions. A national sample of principals surveyed in 1999–2000 reported difficulty staffing 75 percent of their special education openings and 77 percent of their mathematics openings, as against only 30 percent of social studies openings.[49]

There is considerable evidence that the supply of effective teachers is not equitably distributed across U.S. schools. A 2002 study by Hamilton Lankford, Susanna Loeb, and James Wyckoff found that New York State

schools serving high concentrations of poor, nonwhite, or low-achieving children were disproportionately staffed by teachers who were inexperienced, were uncertified in subjects they taught, had graduated from noncompetitive colleges, or had failed their licensing examination on the first attempt. For instance, in schools with more than 20 percent of students scoring at the lowest proficiency level in fourth-grade English language arts in 2000, 35 percent of teachers had failed their licensing examination on the first try and 26 percent had degrees from noncompetitive colleges, as against only 9 percent and 10 percent of teachers, respectively, in the highest-scoring schools. The authors also found that roughly a third of this sorting occurred within districts where compensation differences did not play a role.[50]

The distribution problem is not confined to New York. National board certified teachers in North Carolina, for example, disproportionately work in suburban schools serving economically advantaged students.[51] Also, throughout their schooling, African American students in North Carolina are especially likely to be taught by novice teachers.[52] Along similar lines, a national study of the Teach for America (TFA) program found that non-TFA teachers working in socioeconomically disadvantaged schools served by TFA were far less likely than the average U.S. teacher to have attended a selective college or to have completed student teaching before becoming a teacher.[53] Just as the problem is not confined to one geographical area, it is not new. Howard Becker described it in the Chicago public schools as early as the 1950s, and it remains one of the most pressing challenges facing public education today.[54]

The likely explanation for why well-educated, experienced teachers tend to avoid working in schools serving high concentrations of low-income children or children of color is that working conditions in these schools are especially difficult. Many books by journalists support this proposition.[55] But because few quantitative studies include direct measures of working conditions in schools serving different types of student populations, few data exist about which working conditions contribute to the distribution problem. One study based on the 1991–92 Teacher Follow-Up Survey does indicate that among teachers who transfer, those who transfer from urban high-poverty public schools are more likely than the broad population of such teachers to cite the following as reasons for their dissatisfaction: "student discipline problems" (29 versus 18 percent), "lack of faculty influence" (26 versus 13 percent), "lack of student motivation" (27 versus 10 percent), "interference in teaching" (12 versus 5 percent), and "lack of professional competence as colleagues" (23 versus 8 percent).[56]

Because few quantitative studies include direct measures of working conditions in schools serving different types of student populations, few data exist about which working conditions contribute to the distribution problem.

Teachers' preferences for working in areas close to or similar to those where they grew up also contribute to the distribution prob-

lem. Using New York State data from 1999 to 2002, Donald Boyd and colleagues found, for instance, that 61 percent of new teachers took jobs within fifteen miles of where they went to high school and that 85 percent stayed within forty miles of home.[57] Because economically disadvantaged areas have fewer college graduates than more affluent areas do, they also have more trouble providing their own educators. Thus the lack of educational attainment in these areas becomes a self-sustaining cycle.

Late hiring in school districts serving many disadvantaged students also exacerbates the distribution problem. For example, a three-state survey of 374 new teachers showed that 28 percent of new teachers in low-income schools were hired after the start of the school year, compared with only 8 percent in high-income schools.[58] The problem of late hiring in urban districts is explored more fully by Brian Jacob in his article in this volume.

One component of teacher supply that has received little research attention is substitute teachers—a group that, from the beginning of kindergarten to the end of grade twelve, teaches the typical American public school child for about two-thirds of a school year.[59] Although the No Child Left Behind legislation required that all teachers become highly qualified by 2006, it explicitly excluded substitute teachers. In fact, nineteen states do not even require substitutes to hold a bachelor's degree.[60] Although some substitute teachers use these temporary jobs to gain entry into permanent positions, there is little research on the qualifications or skills of the substitute pool, whether these vary by type of school district, and what share of substitute teachers eventually moves into permanent teaching positions.[61]

Teacher Supply: What's New

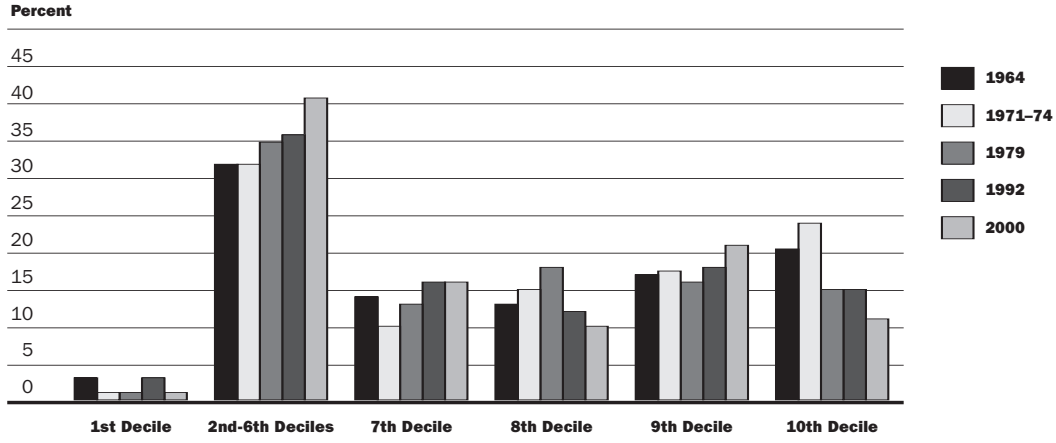
We now turn to a discussion of changes in the supply of teachers over the past two decades. Because the supply of teachers is a function of population demographics, salaries, opportunity costs, and working conditions, we examine how trends in each of these factors have affected teacher supply.

Demographics. The teacher workforce in the United States has aged steadily since the mid-1970s and is on the verge of a large wave of retirements. In 2005, 42 percent of teachers were aged fifty or older, compared with 25 percent in 1996. The distribution of teacher experience shows the same trend. In 2001, 38 percent of U.S. teachers had more than twenty years of experience—up from 28 percent in 1986 and 18 percent in 1971.[62] The implication is that more teachers will be needed to replace the many who will retire soon.

In the past, two sources of supply have been important in responding to increased demand for teachers. One is the share of college students who train to become teachers, which has grown. The second is the reserve pool—licensed teachers who return to teaching after a period spent in another activity. Undoubtedly, both sources of supply will be important in responding to the increase in demand for teachers in the years ahead. But, as we show, several labor market developments have made it much harder for today's schools to attract talented college graduates.

Salaries and Opportunity Costs. The supply of teachers in the labor market has been adversely affected by increasing labor market opportunities for women and minorities. Before the civil rights and women's movements, opportunities for women and people of color

Figure 4. Distribution of New Female Teachers, by High School Ranking, Selected Years, 1964–2000



Source: Sean P. Corcoran, William N. Evans, and Robert M. Schwab, "Women, the Labor Market, and the Declining Relative Quality of Teachers," *Journal of Policy Analysis and Management* 23, no. 3 (2004): 455, 465. Data for 1964 are from the Wisconsin Longitudinal Survey; data for 1971–74, from Project Talent; data for 1979, from the National Longitudinal Study of the Class of 1972; data for 1992 from the High School and Beyond survey; and data for 2000, from the National Educational Longitudinal Survey.

were severely constrained by discrimination. As a result, among the available alternatives, teaching was a relatively high-status occupation for both women and people of color—a situation that helped guarantee a steady flow of academically talented women and minorities into the teaching profession. Changes in the occupational choices of black college graduates illustrate this trend. In the late 1960s, six out of every ten black college graduates entered teaching within five years of graduation; by the early 1980s, that figure was one in ten.[63]

As labor market opportunities for women and minorities have expanded, their opportunity costs have risen—and have risen most sharply for those with stronger academic abilities. Research by Sean Corcoran, William Evans, and Robert Schwab shows that from 1964 to 2000 the average ability level of entering female teachers declined only slightly, but the share of young female teachers from the top decile of their high school class fell from 20 percent to 11 percent.[64] Figure 4, which is excerpted from their work, illustrates these trends.

In summary, improved labor market opportunities for women and minorities have forced education to compete increasingly with other occupations for talented college graduates. And as figure 4 indicates, education is losing this competition. Part of the explanation is that other occupations reward strong academic skills more than education does.[65] Using data from the National Center for Education Statistics' 1993–2003 Baccalaureate and Beyond Longitudinal Survey, Dan Goldhaber and Albert Liu found that unlike teaching salaries, nonteaching salaries for recent female college graduates rewarded college selectivity, technical majors, and high GPAs.[66]

Working Conditions. In the past two decades, teachers' working conditions have improved in some ways and deteriorated in others. On the one hand, as noted, both class sizes and student-teacher ratios have fallen.[67] On the

other hand, NCLB and state accountability systems have increased pressure on teachers to improve student test scores. The pressure is particularly great on teachers working in schools that serve high shares of disadvantaged students. For instance, one 2004 study found that after the implementation of a statewide accountability system, teachers in North Carolina were more likely to leave schools with low test scores and those that were labeled "low-performing."[68]

International comparisons also reveal considerable variation in teachers' working conditions, even among nations with strong systems of public education.

Another trend in working conditions is the movement to differentiate the traditionally flat teaching career. Historically, the main option for teachers who wanted to advance professionally was to stop teaching and become administrators.[69] The 1980s saw efforts to create career ladders that would generate leadership opportunities for teachers. But many of these initiatives faltered because some teachers saw them as threats to the egalitarian nature of the profession.[70] Today a similar trend toward differentiation of teaching roles appears to have two distinct rationales. One is the belief that peer-to-peer professional development will help teachers raise student achievement.[71] The other is the belief that more opportunities for advancement will mitigate attrition among new teachers, some of whom report wanting upward job mobility.[72] Among today's new positions are mentors, who assist new teachers; peer coaches, who provide instructional guidance to colleagues; and peer reviewers, who evaluate their colleagues' instruction.[73] Little systematic data, however, exist on how widespread these roles are or whether they improve instruction or increase teacher retention.[74]

What's True Internationally

In most countries, salaries, class size policies, curriculum requirements, and licensure standards are set at the national level; in the United States, they are set at local and state levels. Nevertheless, the problem of inequitable distribution of effective teachers across schools is not unique to the United States. For example, teacher surpluses in the north of England coexist with teacher shortages in more populous, diverse areas such as London and the southeast.[75] Research in Norway has also shown that teachers are more likely to leave schools with high shares of minority or special needs students.[76] The inequitable distribution of effective teachers poses a troubling challenge for policymakers worldwide—a challenge that may take on even greater proportions in industrialized nations as Europe continues to become more ethnically diverse.

International comparisons also reveal considerable variation in teachers' working conditions, even among nations with strong systems of public education. In Singapore, whose students scored first among the forty-nine nations that participated in the 2003 Trends in International Mathematics and Science Study (TIMSS), the central government prescribes the curriculum and places a heavy emphasis on students' performance on standardized tests.[77] In Finland, whose students scored first on the Program for International

Student Assessment (PISA) in 2000 and 2003, teachers have high levels of curricular autonomy, and student assessments tend to be individualized and diagnostic.[78] These differences in working conditions between nations with high-performing educational systems suggest the need for caution in thinking about the types of working conditions that will foster a highly effective teaching workforce in the United States.

Policy Responses

Several policies have been proposed to increase the supply of effective teachers and distribute them more equitably. We briefly summarize three categories of responses, leaving detailed discussions to other articles in this volume.

Increase Salaries Uniformly

Given that shortages of effective teachers result when the quantity demanded exceeds the quantity supplied at a given wage, one oft-proposed policy solution has been across-the-board increases in teachers' salaries.[79] The rationale is that in the short term, salary increases draw reserve-pool teachers into classrooms, and in the long term they make the profession more attractive to young people considering teaching careers. By increasing the number of applicants for teaching positions, salary increases would allow schools to be more selective in their hiring decisions.

On the other side of the ledger, across-the-board salary hikes are likely to increase the number of ineffective as well as effective teachers who want to enter and remain in public schools.[80] Consequently, salary increases will improve the teaching force only if schools are able to make wise decisions about whom they hire and retain. Because schools typically lack the information they need to identify effective teachers at the point of hiring and often have difficulty terminating ineffective teachers they have already employed, across-the-board salary increases are unlikely, by themselves, to improve the effectiveness of the teaching force.

Reduce Barriers to Entry

One way to increase the number of people willing and able to teach at the going wage is to reduce or eliminate restrictions on who is allowed to teach. In 2005, forty-seven states offered some form of alternative program that enabled people to become licensed quickly, with minimal preparation time and expense.[81] But these alternative programs vary enormously in terms of their selectivity, their management, and the training they provide, making it difficult to generalize about their effectiveness.[82]

Still, there is evidence that teachers who enter the profession through competitive alternative licensure programs, such as Teach for America or the New York City Teaching Fellows Program, are as effective as those who enter teaching through traditional routes and that some alternative certification programs (for example, the New York City Teaching Fellows) are better than traditional programs at recruiting minority teachers.[83] Nevertheless, critics argue that the brief summer training programs offered by several of these alternative programs cannot adequately prepare new teachers to work with disadvantaged students whose backgrounds and learning experiences often differ markedly from their own. Critics also warn that the short-term commitments required by some alternative certification programs, such as the two years required by Teach for America, help ensure that the least-advantaged students are constantly taught by a stream of novices.[84] Further evidence on alternative licensure is

presented in the article by Donald Boyd, Daniel Goldhaber, Hamilton Lankford, and James Wyckoff in this volume.

Make Teacher Compensation More Flexible

A third response to the teacher quality challenge is to replace the uniform salary schedule that rewards only academic degrees and years of experience with more flexible pay structures. One form of flexible compensation is pay for performance, or merit pay—in which a portion of teachers' compensation is based on estimates of their effectiveness at raising student achievement. Pay-for-performance schemes have been attempted in thousands of U.S. school districts over the past century, only to be dropped within five years in most cases, mainly because of reduced incentives for teamwork, the inability of administrators to defend subjective evaluations, the wariness of administrators to give poor ratings to teachers who could not be easily terminated, and the unpredictability of awards from year to year.[85] Nevertheless, such schemes have recently enjoyed a resurgence in popularity. Denver undertook a comprehensive, union-approved merit pay program in 2006.[86] And other localities such as Houston are following suit.[87] A more thorough examination of pay-for-performance systems is presented in the article by Victor Lavy in this volume.

Other forms of flexible compensation reward teachers according to their opportunity costs or according to the characteristics of the schools in which they teach. Some researchers advocate higher pay for teachers (for example, in math and science) whose skills command a premium in the labor market, arguing that such policies would mitigate subject-specific shortages.[88] In fact, some schools already differentiate informally, by placing teachers in high-demand subjects at higher steps on the salary schedule than their experience would otherwise warrant.[89]

Certain state and federal programs also provide incentives for those who teach in shortage subject areas or in schools with difficult working conditions. For instance, the federal Perkins Loan program offers 100 percent loan forgiveness over a five-year period to those who teach in shortage subject areas or in low-income schools, and a similar incentive was implemented for federal Stafford Loans in 1998.[90] Although such programs target the distribution problem by improving the financial incentives for working in low-income schools, most do not specifically target the most effective or academically accomplished teachers.[91]

What's True Internationally

As we have shown, the United States is hardly alone among industrialized nations in its desire to staff public schools with effective teachers and to see that those teachers work in schools where they are most needed. It is therefore not surprising that a number of the policy incentives that are being tried in the United States have also been undertaken abroad. While articles elsewhere in this volume describe some of these initiatives in greater detail, we highlight a few noteworthy examples.

Salaries. In most industrialized nations, teacher salary schedules are similar in structure to those in the United States. That is, the schedules primarily reward experience and educational attainment.[92] Yet industrialized nations vary in the relative attractiveness of teachers' salaries and in the size of the salary increases associated with additional teaching experience. In some countries, including Korea, Japan, and Portugal, average salaries

of experienced teachers far exceed those of inexperienced teachers ($75,000 versus $27,000 in Korea in 2002), meaning that experience carries considerable financial rewards. In contrast, other countries, especially those in Scandinavia, offer starting salaries that are close to those at the top of the scale ($19,000 versus $22,000 in Iceland in 2002), meaning that teachers enjoy only minimal earnings growth as they advance through their careers. The United States falls somewhere in between, with average high and low salaries of $52,000 and $29,000, respectively, in 2002.[93]

Barriers to Entry. Many industrialized nations also resemble the United States in terms of barriers to entering the teaching profession. Most countries require teachers to obtain licenses through coursework, examinations, and student teaching, though the details of these requirements vary by country. Still, a few countries, including England and Wales, have responded to teacher shortages by creating alternative routes into the profession.[94]

Researchers for the Organization for Economic Cooperation and Development note that licensure requirements "are more likely to exist" in countries "where the provision of teacher education is diverse and perceived to be of variable quality."[95] From this perspective, government-issued licensure requirements are seen as important quality controls in countries like the United States, where teacher education programs are not tightly regulated and where the quality of such programs varies markedly.[96]

Flexible Compensation. Several countries are also experimenting with forms of pay for performance. In a few nations, such as Chile and Mexico, performance is defined partly in terms of gains in student achievement.[97] Such policies and their outcomes are described in greater detail in the article by Emiliana Vegas in this volume. In other nations, such as England, Portugal, and Switzerland, teachers can receive salary increases if they volunteer to have their pedagogy assessed against national teaching standards.[98] Because such assessments take into account teachers' curriculum vitae and work portfolios, they are in some ways comparable to national board certification in the United States.

One country that is notably different is Sweden. In 1995, Sweden abandoned the experience-based salary schedule to give schools more flexibility in what they paid each teacher. But subsequent research has shown that teachers' salaries in Sweden have become more rather than less uniform.[99]

Finally, several countries use compensating wage differentials to attract teachers to hard-to-staff schools and geographic regions. Australia, for example, offers geographic hardship incentives to encourage people to teach in its sparsely inhabited central desert area.[100]

Conclusion

If the United States is to equip its young people with the problem-solving and communication skills that are essential in the new economy, it is more important than ever to recruit and retain high-quality teachers. In recent years, the demand for quality teachers has increased as enrollments have risen, class sizes have fallen, and a large share of the teacher workforce has begun to retire. At the same time, because women and minorities have more career options today than ever before, it is increasingly difficult to attract and retain the many high-quality teachers that are needed. Moreover, schools are often limited in their ability to identify and reward the

most effective teachers. As a result of these challenges, schools now face high turnover and hiring problems in subjects with high opportunity costs and in the schools with the most difficult working conditions.

The unequal distribution of effective teachers is perhaps the most urgent problem facing American education. Poor children and children of color are disproportionately assigned to teachers who have the least preparation and the weakest academic backgrounds, and this pattern is long-standing. It is no wonder teacher turnover is high in schools that serve large shares of poor or nonwhite students. The work in these schools is difficult, and the teachers who attempt to do it are often the least equipped to succeed and often lack the working conditions necessary to succeed.

In response to these challenges, a number of policy instruments have been proposed. Some focus on increasing the supply of effective teachers; others, on correcting the inequitable distribution of effective teachers across schools. Though several of these policy proposals are already being tried, few are being rigorously evaluated.

Puzzles and Unanswered Questions

U.S. policymakers have tried many approaches to attracting and retaining high-quality teachers, but the effectiveness of these approaches remains largely unknown. Today, long-term databases that link teachers to students in states like Florida, North Carolina, and New York offer new opportunities to evaluate these policy interventions. In time, the data-keeping requirements of the accountability movement should provide researchers with additional data sets that can be used to analyze teachers' effectiveness in raising student achievement. An unresolved question is how to make constructive use of measures of teachers' value added.

There is also much to be learned by looking beyond U.S. borders to understand how teacher labor markets work in other countries. It would be naive to assume that policies rooted in one nation's culture can be easily and quickly transplanted into another, but it is important to consider what challenges other countries face, what policies they are using to deal with these challenges, and how effective the policies have been in attracting and retaining skilled teachers and in improving student achievement.

A final, critical need is to accumulate knowledge. States and school districts are trying a variety of strategies to attract skilled teachers to high-need schools and subject areas. Yet few of these initiatives have been designed in a way that makes it possible to evaluate their effectiveness rigorously.

It is also important to think broadly about the types of incentives that matter to teachers. Paying large financial bonuses to teachers to do impossible jobs will not help children. An essential part of the solution to the distribution problem is to find ways to make schools supportive and humane places for teachers and the students with whom they work.

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