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## Teacher Preparation and Teacher Learning

### *A Changing Policy Landscape*

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The last two decades have witnessed a remarkable amount of policy directed at teacher education—and an intense debate about whether and how various approaches to preparing and supporting teachers make a difference. Beginning in the mid-1980s with the report of the Carnegie Task Force on Teaching as a Profession, the Holmes Group (1986), and the founding of the National Board for Professional Teaching Standards (NBPTS) in 1987, a collection of analysts, policy makers, and practitioners of teaching and teacher education argued for the centrality of expertise to effective practice and the need to build a more knowledgeable and skillful professional teaching force. A set of policy initiatives was launched to design professional standards, strengthen teacher education and certification requirements, increase investments in induction mentoring and professional development, and transform roles for teachers (see, e.g., National Commission on Teaching and America's Future [NCTAF], 1996).

Meanwhile, a competing agenda was introduced to replace the traditional elements of professions—formal preparation, licensure, certification, and accreditation—with market mechanisms that would allow more open entry to teaching and greater ease of termination through elimination of tenure and greater power in the hands of districts to hire and fire teachers with fewer constraints (see, e.g., Thomas B. Fordham Foundation, 1999). Some have argued that teaching does not require highly-specialized knowledge and skill, and that such skills as there are can be learned largely on the job (e.g., Walsh, 2001). Others see in these “systematic market attacks” a neo-liberal project that aims to privatize education, reduce the power of the teaching profession over its own work, and allow greater inequality in the offering of services to students (Barber, 2004; Weiner, 2007).

Particularly contentious has been the debate about whether teacher preparation and certification are related to teacher effectiveness. For example, in his Annual Report on Teacher Quality (USDOE, 2002), Secretary of Education

Rod Paige argued for the redefinition of teacher qualifications to include little specific preparation for teaching. Stating that current teacher certification systems are “broken,” and that they impose “burdensome requirements” for education coursework comprising “the bulk of current teacher certification regimes” (p. 8), the report suggested that certification should be redefined to emphasize verbal ability and content knowledge and to de-emphasize requirements for education coursework, making student teaching and attendance at schools of education optional and eliminating “other bureaucratic hurdles” (p. 19). Associated policy initiatives, encouraged by the federal government under No Child Left Behind, have stimulated alternative certification programs and, in a few states, pathways to certification with no professional preparation at all.

Some commentators have also argued that certification of teachers should be abandoned by states in order to remove “regulatory barriers” to teaching. Their arguments are linked to concerns that state requirements for teacher preparation are burdensome and unlinked to teacher performance (see, e.g., Walsh, 2001, pp. 1–2), and that “professionalization” of teaching is an unnecessary barrier to school choice (Ballou & Podgursky, 1997, p. 44). Debates about the value of teachers' preparation have generally focused on technical analyses of studies on the topic (see, e.g., Ballou & Podgursky, 1997; Darling-Hammond, 1997, 2000a, 2002; Darling-Hammond & Youngs, 2002; Walsh, 2001; Walsh & Podgursky, 2001), but there are substantial social, political, and economic implications of how teacher education is treated by policy. These include implications for school funding and allocations of teaching resources to students of different socioeconomic backgrounds, as well as for the nature of the teaching career.

This chapter will examine research about the outcomes of different kinds of preparation and professional learning opportunities that emerge from these different policy perspectives. We treat not only governmental policy but also “professional policy” made by professional bodies

(e.g., standards boards, accrediting agencies, professional associations) as they develop and implement standards for preparation and practice. In the process, we examine the emergence of a standards movement in teaching and what has been learned about the challenges and effects of implementing such standards.

#### Framing the Issues of Teacher Preparation and Teaching Quality

The importance of these questions is increasingly clear. Recent studies of teacher effects have found that teachers strongly determine differences in student learning, far outweighing the effects of differences in class size and composition (Rivkin, Hanushek, & Kain, 2005; Rockoff, 2004; Sanders & Rivers, 1996), and sometimes matching the sizable effects of student background variables like family income and education (Clotfelter, Ladd, & Vigdor, 2007; Ferguson, 1991). Teacher effects appear to be sustained and cumulative; that is the effects of a very good or poor teacher spill over into later years, influencing student learning for a substantial period of time, and the effects of multiple teachers in a row who are similarly effective or ineffective produce large changes in students' achievement trajectories.

Furthermore, in the United States, teachers are the most inequitably distributed resource. On any measure of qualifications—extent of preparation, level of experience, certification, content background in the field taught, advanced degrees, selectivity of educational institution, or test scores on college admissions and teacher licensure tests—studies show that students of color, low-income and low-performing students, particularly in urban and poor rural areas, are disproportionately taught by less qualified teachers (Darling-Hammond, 1997, 2004; Hanushek, Kain, & Rivkin, 2001; Ingersoll, 2002; Jerald, 2002; Lankford, Loeb, & Wyckoff, 2002). In some high-minority schools, a majority of teachers are inexperienced and uncertified, and in those with more than 90% students of color, the odds of having a math or science teacher with a certification and a degree in the field taught are less than 50% (Oakes, 1990).

It is worth noting that, among industrialized nations, this circumstance is virtually unique to the United States. Most high-achieving countries fund their schools centrally and equally, and pay teachers on a common scale that is competitive with other professions, sometimes with additional stipends for working in remote or high-need schools. Furthermore, these countries support a well-prepared teaching force—funding high-quality teacher education (usually 3 to 4 years, completely at state expense, plus a living stipend), beginning teacher mentoring, and ongoing professional development for all teachers. These teachers work in schools where they have continuous access to their colleagues for planning and fine-tuning curriculum and to professional learning opportunities inside and outside the school. Most of the highest-achieving nations attribute much of their educational success to these investments in teacher education (Darling-Hammond, 2005, 2008).

Because of public attention to the importance of teacher quality for student learning and the unequal access U.S. students have to well-qualified teachers (see, e.g., NCTAF, 1996), the federal Congress included a provision in No Child Left Behind Act of 2002 that states should create plans to ensure that all students have access to “highly qualified teachers,” defined as teachers with full certification and demonstrated competence in the subject matter field(s) they teach (defined as completing a college major or passing a test in the field). This provision was historic, especially since the students targeted by federal legislation—students who are low-income, low-achieving, new English language learners, or identified with special education needs—have been in many communities those least likely to be served by experienced and well-prepared teachers (NCTAF, 1996).

At the same time, reflecting the differences in views among policy makers, the law encouraged states to expand alternative certification programs, now operating in at least 47 states, and regulations later developed by the U.S. Department of Education allowed candidates who had just begun—but not yet completed—such a program to be counted as “highly qualified.” Policies across the states since then have both increased expectations for teacher education and certification—for example, adding subject matter requirements and testing—and, in some states, reduced the expectations for pre-service preparation for those undertaking alternative routes. In a few states, candidates can gain a license without pedagogical preparation if they pass a content test. In some others, meanwhile, requirements for pedagogical preparation and assessment of skill have increased. Although research is not yet dispositive on the wisdom of these distinctive policy choices, it sheds some light on the implications of these choices.

#### Influences of Teacher Attributes and Knowledge on Teacher Quality

Over the years, researchers have analyzed how differences in teacher characteristics, including educational background and teacher training, are related to student learning. Various lines of research looking at teacher effectiveness since the 1960s have suggested that many kinds of teacher knowledge and experiences may contribute to teacher effects, including teachers' general academic and verbal ability; subject matter knowledge; knowledge about teaching and learning; teaching experience; and the set of qualifications measured by teacher certification, which typically includes the preceding factors and others (for reviews, see Darling-Hammond, 2000b; Wilson, Floden, & Ferrini-Mundy, 2002; Rice, 2003). Other studies have also found that traits like adaptability and flexibility are also important to teacher effectiveness (for a review, see Schalock, 1979).

In particular, a review commissioned by USDOE's Office of Educational Research and Improvement, which analyzed 57 studies that met specific research criteria and were published after 1980 in peer-reviewed journals, concluded that the available evidence from technically sound studies

demonstrates a relationship between teacher education and teacher effectiveness (Wilson, Floden, & Ferrini-Mundy, 2001). The review showed that empirical relationships between teacher qualifications and student achievement have been found across studies using different units of analysis and different measures of preparation and in studies that employ controls for students' socioeconomic status and prior academic performance.

While there is some research supporting the importance of each of these traits or areas of knowledge, there are debates about the relative importance of various elements and about how strong the research is supporting different correlates of teacher effectiveness. One reason for these debates is that few studies have examined multiple elements of teacher knowledge, skills, and abilities at the same time. For example, some analysts argue on the basis of studies in the 1960s through 1980s that general academic or verbal ability matters most for teacher effectiveness, as there were a number of studies finding small but significant effects of teachers' test scores on both general ability and tests of teaching knowledge during this time. However, none of these studies included measures of teacher education or certification which became available in large data sets during the 1990s. Later studies that include measures of teacher preparation find effects of teachers' knowledge about subject matter and pedagogy, above and beyond general intellectual ability (for a review, see Darling-Hammond & Youngs, 2002).

During the period of time that teacher characteristics have been examined, requirements for teaching have also evolved. Since the mid-1980s, states have taken steps to strengthen their licensure requirements, which are now substantially stronger than they were 20 or more years ago. In most states, candidates for teaching must now earn a minimum grade point average and/or achieve a minimum test score on tests of basic skills, general academic ability, or general knowledge in order to be admitted to teacher education or gain a credential. In addition, they must generally secure a major or minor in the subject to be taught and/or pass a content test, take specified courses in education and, sometimes, pass a test of teaching knowledge and skill. In the course of teacher education and student teaching, candidates are typically judged on their teaching skill, professional conduct, and the appropriateness of their interactions with children.

A few well-controlled studies have been able to compare the relative influences on student achievement of some of these aspects of teacher qualifications. In a large-scale study of mathematics and science achievement, for example, Monk (1994) found that teachers' content preparation, as measured by coursework in the subject field, was positively related to student achievement in mathematics and science but that the relationship was curvilinear, with diminishing returns to student achievement of teachers' subject matter courses above a threshold level (e.g., five courses in mathematics). He also found that the number of content-specific pedagogical courses had a positive effect on student learn-

ing and was in some cases more influential than additional subject matter preparation.

Goldhaber and Brewer (2000) also found influences of both content and pedagogical preparation on teachers' effectiveness in math and science. They found that the effects of teachers' certification exceeded those of a content major in the field, suggesting that what licensed teachers learn in the pedagogical portion of their training adds to what they gain from a strong subject matter background:

[We] find that the type (standard, emergency, etc.) of certification a teacher holds is an important determinant of student outcomes. In mathematics, we find the students of teachers who are either not certified in their subject ... or hold a private school certification do less well than students whose teachers hold a standard, probationary, or emergency certification in math. Roughly speaking, having a teacher with a standard certification in mathematics rather than a private school certification or a certification out of subject results in at least a 1.3 point increase in the mathematics test. This is equivalent to about 10% of the standard deviation on the 12th grade test, a little more than the impact of having a teacher with a BA and MA in mathematics. Though the effects are not as strong in magnitude or statistical significance, the pattern of results in science mimics that in mathematics. (p. 139, emphasis added)

This study also found that beginning teachers on probationary certificates (those who were fully prepared and completing their initial 2- to 3-year probationary period) from states with more rigorous certification exam requirements had positive effects on student achievement, suggesting the potential value of recent reforms to strengthen certification.

The individual and cumulative effects of various kinds of teacher qualifications were recently estimated in a large-scale study using North Carolina data to examine learning gains of high school students. This study found that teachers were more effective if they held a standard license (as compared to those who entered without having completed training), had a license in the specific field taught, had higher scores on the teacher licensing test (especially in mathematics), had taught for more than 2 years, had graduated from a more competitive college, and went through the process of National Board certification to demonstrate their teaching skills (Clotfelter, Ladd, & Vigdor, 2007).

While each of these variables was statistically significant in its own right, the combined influence on student achievement of a teacher with low overall qualifications (no experience, low licensure test scores, no prior teacher preparation, certification in a field other than the one taught, no board certification, no graduate degree, and from an uncompetitive college) as compared to one having most of them was 0.30 standard deviations lower. Using a more conservative measure representing a comparison between teachers whose mix of qualifications were in the top 10% versus those in the bottom 10%, the effect on student achievement of 0.18 standard deviations was larger than that of race and parent education (e.g., the average difference in achievement

between a White student with college-educated parents and a Black student with high-school educated parents).

These very large effects suggest the importance of focusing on what teachers have had the opportunity to learn through their general education, subject matter training, and preparation for teaching, as well as their experience and professional learning opportunities such as National Board certification (discussed further below). A similar study of teachers in New York City (Boyd, Lankford, Loeb, Rockoff, & Wyckoff, 2007) also found that teachers' certification status, pathway into teaching, teaching experience, graduation from a competitive college, and math SAT scores were significant predictors of teacher effectiveness in elementary and middle grades mathematics. Certified teachers who graduated from university pre-service programs and who had attended a competitive college were the most effective as beginners. Additional experience also had strong positive effects. In combination, improvements in these qualifications reduced the gap in achievement between the schools in deciles serving the poorest and most affluent student bodies by 25%. Changes in the mix of teacher qualifications available to students appear to influence student achievement, thus suggesting that policies which tackle the twin problems of inadequate and unequally distributed teacher quality may help improve school outcomes.

These studies and other evidence suggest that it is a mistake to believe that only one or two characteristics of teachers can explain their effects on student achievement. The message from the research is that multiple factors are involved and teachers with a combination of attributes—strong general ability, solid grasp of subject matter, and knowledge of effective methods for teaching that subject matter, including the knowledge acquired in teacher education about how to instruct, motivate, manage and assess diverse students—appear to hold the greatest promise for producing student learning.

***Pathways into Teaching*** This conclusion, which undergirds the approach of contemporary teacher certification systems, is disputed by some (though not all) proponents of fast-track alternative certification programs, who have argued that individuals with higher academic ability are likely to produce stronger student achievement gains than other teachers, even without the benefit of teacher preparation (e.g., Ballou & Podgursky, 1997; Raymond, Fletcher, & Luque, 2001; Schaefer, 1999).

***Evidence on Routes into Teaching That Reduce Pre-Service Training*** This hope has not yet been borne out by controlled studies on the topic. In the North Carolina study cited above, the largest negative effect on student achievement was found for teachers who had entered teaching on the state's "lateral entry" program, an alternate route that allows entry for mid-career recruits who have subject matter background but no initial training for teaching. In addition, three recent, large well-controlled studies, using longitudinal individual-level student data from New York

City and Houston, Texas, found that teachers who enter teaching without full preparation—as emergency hires or alternative route candidates—were less effective than fully-prepared beginning teachers working with similar students, especially in teaching reading (Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2006; Darling-Hammond, Holtzman, Gatlin, & Heilig, 2005; Kane, Rockoff, & Staiger, 2006). This was equally true of alternate routes like the New York City Teaching Fellows and the highly selected Teach for America (TFA) recruits as it was of other entrants who entered without pre-service preparation.

All three studies also found that by the third year, after the alternate route teachers had completed their required teacher education coursework for certification, there were few significant differences in their effectiveness and that of the traditionally prepared teachers. Indeed, in two of the studies, students of experienced Teach for America recruits had larger gains on average in mathematics. However, 80% of the TFA entrants and one-half of other alternatively prepared teachers had left the profession, leaving questions about whether the measured effectiveness of later year recruits was a result of selection (since less effective teachers were found to leave earlier) or of gains in performance.

Findings from analyses of teacher effectiveness depend substantially on the nature of the comparison groups examined. For example, two studies of TFA recruits have found them to be as effective as other teachers in their school or district who were even less likely to be trained and certified than the TFA candidates (Decker, Mayer, & Glazerman, 2004; Raymond, Fletcher, & Luque, 2001). TFA recruits' 5 weeks of pre-service training—including a few weeks of student teaching—plus the additional coursework for a credential they took while on the job gave them more preparation than many recruits entering on emergency permits.

In these studies and others, the schools staffed by such under-prepared teachers invariably serve concentrations of low-income students of color in disadvantaged communities where non-competitive salaries, poor working conditions, and personnel policies have allowed shortages to fester (NCTAF, 1996, 2004). However, some states and districts have changed this outcome for low-income schools by putting in place strong incentives and supports for recruiting and retaining teachers (for examples, see Darling-Hammond & Sykes, 2003). From a policy perspective, then, the questions of how to recruit and prepare teachers depend on the expectations policy makers and the public are willing to hold for the education of different groups of students and the strategies they are willing to put in place to achieve these expectations.

Even given evidence that teacher education may support teacher effectiveness, important questions arise about what pathways into teaching can recruit academically able individuals, prepare them adequately for the challenges they face, and keep them in the profession so that students can benefit from both the knowledge they have when they enter and the skills they gain with experience. Furthermore, it is clear from recent studies of program models that there is

so much variability in the features of so-called “traditional” teacher education programs and within the newer set of “alternative” programs—and considerable overlap among the groups of programs described under these different labels—that these descriptors do not really help much in guiding policy or practice (see e.g., Zeichner & Schulte, 2001; Humphrey, Wechsler, & Hough, 2008).

*Evidence on Routes into Teaching That Reconfigure Pre-Service Preparation* The term “traditional teacher education” is often used to compare and contrast the features of university-based teacher preparation and teacher preparation routes that are organized and run by non-university entities such as state and district internship programs and other recruiting programs that fast-track the placement of individuals into classrooms. However, most “alternative” certification programs are actually operated by universities (Feistritzer, 2005), and they range widely in design—from post-baccalaureate master’s degree programs that provide a year or more of pre-service preparation, including a year-long internship or residency in the classroom of a veteran teacher (such as the MAT models launched in the 1960s), to designs that offer a few weeks of summer training before becoming a teacher of record. Many alternative certification policies were initially created to provide post-baccalaureate options to the traditional undergraduate pathways, rather than to reduce preparation; thus, the range of strategies is quite large (Zeichner & Hutchinson, in press). Furthermore, there are widely varying practices among “traditional” teacher preparation programs—including the kinds and organization of coursework and the extent, quality, and structure for clinical work.

The format and content of teacher education programs are shaped both by state laws professional associations, such as general and professional accrediting bodies. What teachers encounter when they try to become prepared for their future profession depends on the state, college, and program in which they enroll, and the professors with whom they study. Prospective teachers take courses in the arts and sciences and in schools of education, and they spend time in schools. What they study and who teaches it vary widely. Unlike other professions where the professional curriculum is reasonably common across institutions and has some substantive coherence, the curriculum of teacher education is often idiosyncratic to the professors who teach whatever courses are required, which are different from place to place. These courses are distributed widely, often with little coordination (Darling-Hammond & Ball, 1997).

What is considered “traditional” teacher preparation has evolved over the last nearly 200 years that teachers have received professional preparation for their work. Feiman-Nemser (1990) describes three historic traditions that have influenced approaches to teacher education: the normal school tradition, the liberal arts tradition, and professionalization through graduate preparation and research. The liberal arts tradition has dominated since the 1950s, with teachers earning their credentials through 4-year college

programs. From the time when normal schools were the primary pathway for entry into teaching, reformers have continually sought to improve the status and quality of teaching by lengthening programs and adding requirements. In the past, reformers have sought to create alternatives to undergraduate teacher education, which has been criticized as lacking rigor (Conant, 1963; Koerner, 1963) and practical relevance (Lanier & Little, 1986; Lortie, 1975). These alternatives have included extending undergraduate programs to 5 years (e.g., blended undergraduate and graduate programs, fifth-year programs), moving professional studies to the graduate level (e.g., MAT programs and M.Ed. programs), and on-the-job training programs (e.g., alternate route and internship programs; Feiman-Nemser, 1990).

Five-year extended programs were seen as having an advantage over 4-year programs because of greater flexibility in the organization of fieldwork and education coursework, allowing for a gradual induction into the teaching profession and a better integration of theory and practice. This flexibility also allowed for early field experiences throughout the undergraduate portion of the program and for extending the amount of student teaching time. Graduate-level MAT programs, promoted in the 1930s by James Conant, president of Harvard University, were seen as more academically rigorous than undergraduate programs and as a means to attract a stronger pool of applicants (those who had already completed a liberal arts education with a specific content major). MAT programs were a particularly favorable strategy for recruitment in times of teacher shortages, as they open up new pools of potential recruits and can be completed in 1 or 2 years, combining educational coursework with clinical internships.

The Educational Masters (Ed.M.) was promoted by Henry Holmes, dean of the Harvard Graduate School of Education in the 1920s and namesake of the Holmes Group of education deans and chief academic officers from 120 research universities. In their 1986 report *Tomorrow’s Teachers*, this group argued for the elimination of undergraduate degrees in education in favor of graduate-level programs and called for improved articulation between coursework and field experiences through the creation of school-university partnerships called professional development schools (Holmes Group, 1986). In these sites, new teachers are expected to learn to teach alongside more experienced teachers who plan and work together, and university and school-based faculty work collaboratively to design, implement, and conduct research about learning experiences for new and experienced teachers, as well as for students (Holmes Group, 1990). Ideally, the university program and the school develop a shared conception of good teaching that informs their joint work. Thus PDSs aim to develop *school practice* as well as the *individual practice* of new teacher candidates.

In large part because of reform efforts of groups like the Holmes Group, the 1990s saw important structural changes in some teacher education programs. A growing number of teachers are now prepared in 5- or 6-year programs of study

that include a disciplinary degree at the undergraduate level, graduate-level education coursework, and intensive year-long internships, often in professional development schools that seek to model state-of-the-art practice. Levine's (2006) study *Educating school teachers* reported that in 2002–03, the nearly 1,200 schools and departments of education in the United States produced 106,000 teachers in undergraduate programs, 63,000 teachers in masters programs, and about 4,000 teachers in certificate programs. Thus, it appears that although colleges and universities continue to prepare the most teachers at the undergraduate level (about 61%), there has also been an increase in the number of teachers prepared at the graduate level (36% in master's programs and 3% in post-baccalaureate credential programs). In addition, as of 1998, the American Association of Colleges for Teacher Education estimated that there were more than 1,000 professional schools in 47 states in operation across the country (Abdal-Haqq, 1998).

Some studies have found that, on average, teachers prepared in extended teacher education programs, such as the Holmes Group's recommended 5-year models, feel better prepared, are more committed to the profession, and enter and remain in teaching at higher rates than teachers in traditional 4-year programs and at even higher rates than those prepared in short-term alternative certification programs (Andrew & Schwab, 1995; Applegate & Shaklee, 1988; Baker, 1993; Denton & Peters, 1988; Shin, 1994).

Recent research on professional development schools associated with both 4- and 5-year teacher education programs has also shown some promise in improving teacher retention (Kenreich, Hartzler-Miller, Neopolitan, & Wiltz, 2004; Hunter-Quartz, 2003; Fleener, 1998; Latham & Vogt, 2007). Although most of these studies had small sample sizes and followed graduates only a few years after program completion, Latham and Vogt's (2007) longitudinal study of about 1,000 graduates compared the retention rates of teachers prepared in PDS programs versus traditional elementary education programs over 8 years, between 1996 and 2004. They found that controlling for teacher background and academic qualifications, teachers prepared in PDS programs had higher rates of entry into teaching and retention in the teaching profession. Given the range of PDS models included in this and other studies, such findings are suggestive only, and more research is needed to evaluate what kinds of models and features influence teacher commitment and practice for various kinds of prospective teachers.

Nevertheless, it is reasonable to conjecture that the full year of clinical training such programs often provide may be associated with some of these outcomes, as several studies have found a relationship between the experience of student teaching and feelings of preparedness (California State University, 2002a, 2002b), as well as retention in teaching (Henke, Geis, Giambattista, & Knepper, 1996; Henke, Chen, & Geis, 2000; NCTAF, 2004).

Indeed, given the large differences in attrition rates associated with teachers' preparation and entry pathways, the National Commission on Teaching and America's Fu-

ture (1997) estimated that by the third year of a teacher's career, based on the costs of preparation and the costs of teacher attrition, it actually costs substantially less to have underwritten the costs of an extended program than it does to prepare candidates in shorter programs who leave much sooner.

However, other changes in teacher education may be improving the capacity of undergraduate programs to attract and prepare candidates who are more committed to the profession than was once the case when many undergraduates, especially young women, were advised to take an education major as "insurance" in case they did not get married or find another job. Most states have substantially raised requirements for admission into teacher education programs by requiring either a basic skills test or minimum grade point average, and nearly all have revised the teacher education curriculum, requiring more content courses as well as education courses including more clinical training. Many now require that prospective teachers major in an academic content area, rather than solely in education (Council of Chief State School Officers [CCSSO], 1998; Darling-Hammond & Youngs, 2002). A recent study of graduates of bachelor's degree programs in teacher education using the longitudinal Baccalaureate and Beyond data set found that nearly 80% of those who finished university-based pre-service programs remained in teaching 5 years after graduation (Henke, Chen, & Geis, 2000).

Furthermore, a study of seven teacher education programs that graduate extraordinarily well-prepared candidates—as judged by observations of their practice, administrators who hire them, and their own sense of preparedness and self-efficacy as teachers—found exemplars among 4-year, 5-year, and graduate-level programs, which suggests that program structure is not the determinative factor in predicting program success (Darling-Hammond, 2006).

The programs did, however, have a number of features in common, including a strong, shared vision of good teaching and well-defined standards of practice guiding coursework, clinical placements, and performance assessments; a common core curriculum grounded in substantial knowledge of development and learning in cultural contexts, as well as subject matter pedagogy, taught in the context of practice, using case methods and other pedagogies that connect theory and practice; extended clinical experiences (at least 30 weeks), interwoven with coursework and carefully mentored; and strong partnerships between universities and schools. Similar program features and pedagogical tools are noted in other studies of strong programs (e.g., Cabello, Eckmier, & Baghieri, 1995; Graber, 1996) that have documented program influences on candidates' preparedness and performance.

**Teacher Education Program Effects** Although the kinds of case studies described above are suggestive of teacher education program features that may make a difference, there are relatively few well-controlled studies that look at the effects of specific aspects of teacher education on teacher

effectiveness as measured by student achievement. Recent reviews by the Center for the Study of the Teaching Profession (Wilson, Ferrini-Mundy, & Floden, 2001), the American Educational Research Association (Cochran-Smith & Zeichner, 2005), and the National Academy of Education (Darling-Hammond & Bransford, 2005) capture both the limitations of that literature and the relatively small number of studies that signal potentially fruitful directions.

While research on the effects of specific teacher education program elements on teacher effectiveness is slim, there is considerably more evidence from research on teaching about kinds of preparation or professional development that have been found to enable teachers to engage in practices that influence student learning. For example, teachers trained to use formative assessment to provide feedback to students and opportunities for them to revise their work have been found in many dozens of studies to have large effect sizes on student learning gains (Black & Wiliam, 1998), as have teachers prepared to use cooperative learning strategies effectively (for reviews, see Cohen & Lotan, 1995; Johnson & Johnson, 1989). Teachers who have learned to teach students specific meta-cognitive strategies for reading, writing, and mathematical problem solving have been found to produce increased student learning of complex skills (for a review, see Darling-Hammond & Bransford, 2005). Mathematics and science teachers who have learned to engage in hands-on learning, such as the use of manipulatives in math or laboratory experiments in science, and who emphasize higher-order thinking skills appear to produce stronger student achievement (Perkes, 1967–1968; Wenglinisky, 2002). Similarly, preparation in how to work with diverse student populations appears to have an effect on teacher effectiveness, in particular, training in multicultural education, teaching limited English proficient students, and teaching students with special needs (Wenglinisky, 2002).

There is also evidence that teachers learn different things from different programs and pathways and feel differentially well-prepared for specific aspects of teaching depending on the program or pathway completed (Darling-Hammond, Chung, & Frelow, 2002; Cohen & Hill, 2000; Denton & Lacina, 1984; Desimone, Porter, Garet, Yoon, & Birman, 2002). While research does not offer precise guidance about many of the program features that may be associated with differential effectiveness, a growing body of evidence points toward some considerations that appear to be important.

For example, *the content, sequencing, and connections among coursework* and other learning experiences may matter as much as their number or duration (Kennedy, 1998, 1999). For example, a number of large-scale studies suggest that the extent of content-specific study of teaching methods may influence teacher effectiveness (Begle, 1979; Druva & Anderson, 1983; Ferguson & Womack, 1993; Goldhaber & Brewer, 2000; Harris & Sass, 2006; Monk, 1994; Monk & King, 1994; Sykes et al., 2006). Furthermore, in a number of experimental studies, teachers who participated in targeted learning opportunities on effective

teaching practices in specific content areas, with immediate opportunities to apply these practices, have produced student achievement gains that were significantly greater than those of comparison group teachers (Angrist & Lavy, 2001; Crawford & Stallings, 1978; Ebmeier & Good, 1979; Good & Grouws, 1979; Lawrenz & McCreath, 1988; Mason & Good, 1993). In the pre-service context, courses that occur while or after candidates have been in the field may be more salient than front-loaded courses where theory is learned in the absence of practice (Denton, 1982; Denton, Morris, & Tooke, 1982; Henry, 1983; Ross, Hughes, & Hill, 1981; Sunal, 1980).

*The quality, duration, and timing of clinical experiences* may also matter. Research suggests that candidates learn more from their fieldwork and coursework when they have opportunities to connect their coursework in real time to practice opportunities in the classroom. Carefully constructed field experiences can enable new teachers to reinforce, apply, and synthesize concepts learned in coursework (Denton, 1982; Denton, Morris, & Tooke, 1982; Henry, 1983; Ross et al., 1981; Koerner, Rust, & Baumgartner, 2002; Sunal, 1980). For example, Denton (1982) found that teacher candidates with early field experiences performed significantly better in their methods courses than those without early field experiences. Other work suggests that the care with which placements are chosen, the quality of practice that is modeled, and the quality and frequency of mentoring candidates receive may influence candidates' learning (Feiman-Nemser & Buchmann, 1985; Goodman, 1985; Knowles & Hoefler, 1989; Laboskey & Richert, 2002; Rodriguez & Sjoström, 1995).

In addition, the quality and intensity of supervision, and the evaluation tools used to guide supervision, are factors that may be potentially important elements of teacher learning. The match between placements in which candidates learn to teach and their eventual teaching assignments—in terms of the type of students, grade level, and subject matter—appear to be associated with stronger teaching in the early years (Koerner et al., 2002; Goodman, 1985). Some research also suggests that the duration of student teaching experiences may influence teachers' later teaching practice and self-confidence (Koerner et al., 2002; Chin & Russell, 1995; Denton & Lacina, 1984; Denton, Morris, & Tooke, 1982; Denton & Smith, 1983; Denton & Tooke, 1981–1982; Laboskey & Richert, 2002; Orland-Barak, 2002; Sumara & Luce-Kapler, 1996).

Perhaps because of the presence of several of these elements, studies of highly developed professional development schools—those that have managed to create a shared practice between the school and the university curriculum—have suggested that teachers who graduate from such programs often feel more knowledgeable and prepared to teach (Gettys, Ray, Rutledge, Puckett, & Stepanske, 1999; Sandholtz & Dadlez, 2000; Stallings, Bossung, & Martin, 1990; Yerian & Grossman, 1997). Although research has also demonstrated how difficult these partnerships are to enact, studies polling employers and supervisors showed

graduates of highly developed PDSs were viewed as much better prepared than other new teachers (Hayes & Wetherill, 1996; Mantle-Bromley, 2002). Veteran teachers working in highly-developed PDSs have reported changes in their own practice and improvements at the classroom and school levels as a result of the professional development, action research, and mentoring that are part of the PDS (Trachtman, 1996; Crow, Stokes, Kauchak, Hobbs, & Bullough, 1996; Houston Consortium of Professional Development, 1996; Jett-Simpson, Pugach, & Whipp, 1992).

Comparison group studies have found that PDS-prepared teachers have been rated stronger in various areas of teaching, ranging from classroom management and uses of technology to content area skills (Gill & Hove, 1999; Neubert & Binko, 1998; Shroyer, Wright, & Ramey-Gassert, 1996). A small set of studies has documented gains in student performance and achievement tied directly to curriculum and teaching interventions resulting from the professional development and curriculum work professional development schools have undertaken with their university partners (e.g., Frey, 2002; Gill & Hove, 1999; Glaeser, Karge, Smith, & Weatherill, 2002; Fischetti & Larson, 2002; Houston et al., 1995; Judge, Carrideo, & Johnson, 1995; Wiseman & Cooner, 1996).

Finally, *program standards* may matter in several ways: Recent work on the use of standards to guide teacher development and assessment suggests that the clarity and salience of standards and performance tasks against which candidates are judged—and the extent to which they represent research-based elements of teaching—may organize teacher learning in important ways (Darling-Hammond, 2006; Hammerness & Darling-Hammond, 2002). Also the rigor of the expectations the program holds for students—as seen in course expectations, grading policies, and whether weak candidates are counseled out of the program—may signal both aspects of selection and program quality. Finally, the extent to which the program holds itself accountable by engaging in self-study and continual improvement may be an indirect measure of program quality.

As we describe below, the emergence of new professional standards for teaching has been an important element of the policy context for teacher education and teacher learning over the last 20 years and may offer new possibilities for means to improve professional practice in the years ahead.

### **The Emergence of Standards for Teaching**

The last two decades have marked the emergence of professional standards for teaching, stimulated in large part by the view that heightened expectations for student learning can be accomplished only by greater expectations for teaching quality. As part of the standards-based reform movement initiative launched in the late 1980s, new standards for teacher education accreditation and for teacher licensing, certification, and ongoing evaluation have become a prominent lever for promoting system-wide change in teaching.

For example, the National Commission on Teaching and America's Future (NCTAF, 1996) argued that:

Standards for teaching are the linchpin for transforming current systems of preparation, licensing, certification, and ongoing development so that they better support student learning. [Such standards] can bring clarity and focus to a set of activities that are currently poorly connected and often badly organized...clearly, if students are to achieve high standards, we can expect no less from their teachers and from other educators. Of greatest priority is reaching agreement on what teachers should know and be able to do to teach to high standards. (p. 67)

Professions generally set and enforce standards in three ways: (a) through professional accreditation of preparation programs; (b) through state licensing, which grants permission to practice; and (c) through advanced certification, which is a professional recognition of high levels of competence.<sup>1</sup> In virtually all professions other than teaching, candidates must graduate from an accredited professional school in order to sit for state licensing examinations that test their knowledge and skill. The accreditation process is meant to ensure that all preparation programs provide a reasonably common body of knowledge and structured training experiences that are comprehensive and up-to-date. Licensing examinations are meant to ensure that candidates have acquired the knowledge they need to practice responsibly. The tests generally include both surveys of specialized information and performance components that examine aspects of applied practice in the field: Lawyers must analyze cases and, in some states, develop briefs or memoranda of law to address specific issues; doctors must diagnose patients via case histories and describe the treatments they would prescribe; engineers must demonstrate that they can apply certain principles to particular design situations. These examinations are developed by members of the profession through state professional standards boards.

In addition, many professions offer additional examinations that provide recognition for advanced levels of skill, such as certification for public accountants, board certification for doctors, and registration for architects. This recognition generally takes extra years of study and practice, often in a supervised internship and/or residency, and is based on performance tests that measure greater levels of specialized knowledge and skill. Those who have met these standards are then allowed to do certain kinds of work that other practitioners cannot. The certification standards inform the other sets of standards governing accreditation, licensing, and re-licensing: They are used to ensure that professional schools incorporate new knowledge into their courses and to guide professional development and evaluation throughout the career. Thus, these advanced standards may be viewed as an engine that pulls along the knowledge base of the profession. Together, standards for accreditation, licensing, and certification comprise a “three-legged stool” (NCTAF, 1996) that supports quality assurance in the mature professions.

This three-legged stool, however, has historically been quite wobbly in teaching, where each of the quality assurance functions has been much less developed than in other professions. Until recently, there was no national body to establish a system of professional certification. Meanwhile, states have managed licensing and the approval of teacher education programs using widely varying standards and generally weak enforcement tools. Furthermore, the utility of each of these functions has been hotly contended within and outside the profession on a variety of ideological and political grounds. In recent years, these debates have led to an array of empirical studies seeking to establish whether and how licensing, accreditation, and certification make a difference for teacher quality, as well as teacher learning and the distribution of teachers. We note that this phenomenon is largely unique to education, as the mature professions have adopted such quality controls without questioning their outcomes. In this section, we review much of this research and consider its implications for policy.

***The National Board for Professional Teaching Standards*** A set of efforts to set standards for teaching has been led by the National Board for Professional Teaching Standards (the National Board), an independent organization established in 1987 as the first professional body—comprised of a majority of classroom teachers—to set standards for the advanced certification of highly accomplished teachers. The board’s mission is to “establish high and rigorous standards for what accomplished teachers should know and be able to do, to develop and operate a voluntary national system to assess and certify teachers who meet those standards, and to advance related education reforms—all with the purpose of improving student learning” (Baratz-Snowden, 1990, p. 19). These standards stimulated the development of beginning teacher licensing standards developed by the Interstate New Teacher Assessment and Support Consortium (INTASC; 1992), a consortium of states working together on “National Board-compatible” licensing standards and assessments. Both of these have been reinforced by the National Council for Accreditation of Teacher Education (NCATE), which recently incorporated the performance standards developed by both.

The standards developed by the National Board, INTASC, and NCATE incorporate knowledge about teaching and learning that supports a view of teaching as complex, contingent on students’ needs and instructional goals, and reciprocal—that is, continually shaped and reshaped by students’ responses to learning events. The new standards and assessments take into explicit account the teaching challenges posed by a student body that is multicultural and multilingual and that includes diverse approaches to learning. By reflecting new subject matter standards for students which were articulated by the national professional associations in the 1990s, the demands of learner diversity, and the expectation that teachers must collaborate with colleagues and parents in order to succeed, the standards define teaching as a collegial, professional activity that responds

to considerations of subjects and students. By examining teaching in the light of learning, they put considerations of effectiveness at the center of practice. This view contrasts with that of the previous “technicist” era of teacher training and evaluation, in which teaching was seen as the implementation of set routines and formulas for behavior, unresponsive to the distinctive attributes of either clients or curriculum goals.

Another important attribute of the new standards is that they are *performance-based*: that is, they describe what teachers should know, be like, and be able to do rather than listing courses that teachers should take in order to be awarded a license. This shift toward performance-based standard-setting is in line with the approach to licensing taken in other professions and with the changes already occurring in a number of states. This approach aims to clarify what the criteria are for determining competence, placing more emphasis on the abilities teachers develop than the hours they spend taking classes.

To achieve National Board certification (NBC) candidates must complete a rigorous two-part assessment. The assessment includes a portfolio completed by the teacher at the school site, which incorporates student work samples, videotapes of classroom practice, and extensive written analyses and reflections based upon these artifacts. The portfolio is meant to allow teachers to present a picture of their practice as it is shaped by the particular needs of the students with whom the teachers work and the particular context of the teacher’s school. The assessment also includes a set of exercises completed at a local assessment center during which candidates demonstrate both content knowledge and pedagogical content knowledge through tasks such as analyzing teaching situations, responding to content matter prompts, evaluating curriculum materials, or constructing lesson plans.

***Influences of the Board*** By 2007, the National Board for Professional Teaching Standards had offered advanced certification to 63,821 accomplished teachers, about 2% of the U.S. teaching force. This represents about 40% of those who apply for certification. However, the board has had much greater impact than the initial numbers of certified teachers suggested. As the first professional effort to define accomplished teaching, it has also had an enormous influence on standard-setting for beginning teacher licensing, teacher education programs, teacher assessment, on-the-job evaluation, and professional development for teachers throughout the United States.

The standard-setting work completed by the National Board for Professional Teaching Standards influenced the setting of national standards for the licensing of beginning teachers through the work of the Interstate New Teacher Assessment. These standards have been adopted or adapted by most states as part of their licensing standards and incorporated into the standards of NCATE. NCATE then began working with universities to help them design advanced masters degree programs focused on the development of

teaching practice and organized around the standards of the National Board.

As a result of these combined initiatives, systems of licensing and accreditation that seek to assess what teachers know and can do are gradually replacing the traditional methods of tallying specific courses as the basis for granting program approval or a license. Furthermore, because these three sets of standards are substantively connected and form a continuum of development along the career path of the teacher, they conceptualize the main dimensions along which teachers can work to improve their practice. By providing vivid descriptions of high-quality teaching in specific teaching areas, some analysts argue, “[the standards] clarify what the profession expects its members to get better at ... profession-defined standards provide the basis on which the profession can lay down its agenda and expectations for professional development and accountability” (Ingvarson, 1997, p. 1).

These standards and the board’s assessment process have stimulated initiatives in teacher education to focus coursework on standards of practice and to use portfolios to evaluate teaching. Documenting the spread of portfolio assessments throughout teacher education, and into teacher evaluation and teacher development enterprises as well, Nona Lyons (1998a) directly attributes to the National Board the widespread move to performance assessments focused on documentation of practice. In addition, Lyons argues that portfolios hold the seed of a “new professionalism” that supports teaching quality in a number of ways:

Portfolio assessment systems hold out standards of rigor and excellence; require evidence of effective learning; foster one’s own readiness to teach, to author one’s own learning; make collaboration a new norm for teaching, creating collaborative, interpretive communities of teacher learners who can interrogate critically their practice; and uncover and make public what counts as effective teaching in today’s complex world of schools and learners. (p. 21)

This is an ambitious set of aspirations, and not easily met. As Lee Shulman (1998)—who launched the design work for the board’s portfolios—noted, these great possibilities are accompanied by potential dangers as well. These include the possibilities that showmanship might trump substance, that portfolios—like other assessments—might eventually begin to trivialize teaching by measuring what is easy rather than what is important, that they might misrepresent teachers’ actual practice, and that the amount of work they require might be viewed as not worth the benefits (pp. 34–35).

As the National Board certification process has spread, policy makers and researchers have begun to look for evidence about its effects on teacher learning as well as its validity as a measure of teacher effectiveness. As of 2005, 31 states encouraged teachers to pursue National Board certification by offering support for the hefty application fee, and 32 states provided incentives in the form of salary supplements to teachers who earn such certification. A number of states also provided full or partial license reciprocity on

the basis of National Board status, and 28 used certification status as a proxy for full or partial license renewal. More than 500 school districts provided incentives in the form of fee support and/or salary increases, often in addition to state incentives (Humphrey, Koppich, & Hough, 2005). In addition, a number of districts have incorporated National Board certification into teacher evaluation processes, compensation systems, and career ladders that identify teachers for new roles and responsibilities, such as master or mentor teacher positions.

*The Effectiveness of Board Certified Teachers* As initiatives to recognize board certified teachers for compensation and advanced responsibilities have grown, the question of whether the certification process indeed recognizes individuals who are more effective than other teachers has given rise to a number of studies, most of which have answered the question in the affirmative. For example, Cavaluzzo (2004) examined mathematics achievement gains for nearly 108,000 high school students over 4 years in the Miami-Dade County Public Schools, controlling for a wide range of student and teacher characteristics (including experience, certification, and assignment in field, as well as board certification). Each of the teacher quality indicators made a statistically significant contribution to student outcomes. Students who had a typical NBC teacher made the greatest gains, exceeding gains of those with similar teachers who had failed NBC or had never been involved in the process. The effect size for National Board certification ranged from 0.07 to 0.12, estimated with and without school fixed effects. Students with new teachers who lacked a regular state certification, and those who had teachers whose primary job assignment was not mathematics instruction made the smallest gains.

Goldhaber and Anthony (2005), using 3 years of linked teacher and student data from North Carolina representing more than 770,000 student records, found the value-added student achievement gains of National Board certified teachers (NBCTs) were significantly greater than those of unsuccessful NBCT candidates and non-applicant teachers. Students of NBCTs achieved growth exceeding that of students of unsuccessful applicants by about 5% of a standard deviation in reading and 9% of a standard deviation in math.

In two other large-scale North Carolina-based studies using administrative data at the elementary and high school levels, Clotfelter, Ladd, and Vigdor (2006, 2007) found positive effects of National Board certification on student learning gains, along with positive effects of other teacher qualifications, such as a license in the field taught. Comparing NBC teachers to all others (rather than to those who had attempted and failed the assessment, where the differences are greatest in most studies), they found effect sizes of .02 to .05 across different content areas and grade levels, with fairly consistent estimations using student and school fixed effects.

Using randomized assignment of classrooms to teachers

in Los Angeles Unified School District, Cantrell, Fullerton, Kane, and Staiger (2007) found that students of NBC teachers outperformed those of teachers who had unsuccessfully attempted the certification process by 0.2 standard deviations, about twice the differential that they found between NBC teachers and unsuccessful applicants from a broader LAUSD sample not part of the randomized experiment, but analyzed with statistical controls.

Significant positive influences of NBC teachers on achievement were also found in much smaller studies by Vandevoort, Amrein-Beardsley, and Berliner (2004) and Smith, Gordon, Colby, and Wang (2005). Smith and colleagues also examined how the practices of their 35 NBCTs compared to those of 29 who had attempted but failed certification, finding significant differences reflecting the ways in which NBCTs fostered deeper understanding in their instructional design and classroom assignments.

Not all findings have been as clearly positive. Using an administrative data set in Florida, Harris and Sass (2007) found that NBC teachers appeared more effective than other teachers in some but not all grades and subjects—and on one of the two different sets of tests evaluated (the Florida Comprehensive Assessment Test and the SAT-9). This study did not compare NBCs to those who had attempted certification unsuccessfully, which is the strongest comparison for answering the question of whether the board's process differentiates between more and less effective teachers. Finally, using a methodology different than that used in most other studies, Sanders, Ashton, and Wright (2005) found effect sizes for NBCTs similar to those of other studies (about .05 to .07 in math), but most of the estimates were not statistically significant because of the increased size of the standard errors when allowing for teacher random effects in a small sample.

The weight of the evidence does suggest that the board's certification process differentiates in a meaningful way between teachers who are more and less effective, which provides some support for policy decisions to use the certificate as a basis for differentiating compensation and responsibilities. It also suggests that use of the board's standards and assessments to guide preparation, licensing, and professional development may be warranted. Indeed, many have justified the time and expense associated with the certification process in part by the gains in teacher learning and practice that are thought to occur as teachers go through the process of certification and, in some cases, assume leadership roles.

*Effects of Board Certification on Teacher Learning* Early studies examining teachers' reactions to the assessment process, along with testimonials from individual teachers, have consistently reported that teachers become more conscious of their teaching decisions and change their self-reported practices as a result (see, e.g., Chittenden & Jones, 1997; Sato, 2000; Tracz, Sienty, & Mata, 1994; Tracz et al., 1995). National Board participants often say that they have learned more about teaching from their participation in

the assessments than they have learned from any other previous professional development experience (Areglado, 1999; Bradley, 1994; Buday & Kelly, 1996). David Haynes' (1995) statement is typical of many:

Completing the portfolio for the Early Adolescence/Generalist Certification was, quite simply, the single most powerful professional development experience of my career. Never before have I thought so deeply about what I do with children, and why I do it. I looked critically at my practice, judging it against a set of high and rigorous standards. Often in daily work, I found myself rethinking my goals, correcting my course, moving in new directions. I am not the same teacher as I was before the assessment, and my experience seems to be typical. (p. 60)

In an early pilot of portfolios in the Stanford Teacher Assessment Project (1987–1990), which led to the National Board's work, 89% of teachers who participated felt that the portfolio process had had some effect on their teaching. Teachers reported that they improved their practice as they pushed themselves to meet specific standards that had previously had little place in their teaching (Athanases, 1994). A 2001 survey of more than 5,600 National Board candidates found that 92% believe the National Board certification process has made them a better teacher, reporting that it helped them create stronger curricula, improved their abilities to evaluate student learning, and enhanced their interaction with students, parents, and other teachers (80%; NBPTS, 2001a).

Another survey which reported similar results regarding self-reported improvements in practice also found that most (80%) teachers who had gone through the certification process felt it was more productive than other professional development experiences they had had. Nearly 80% of teachers involved as assessors similarly felt that serving as an assessor was more useful professional development activities. Large majorities of both the board certified teachers and assessors felt their experiences had a strong effect on their teaching (NBPTS, 2001b).

Another study of teachers' perceptions of their teaching abilities before and after completing portfolios for the National Board found that teachers reported statistically significant increases in their performance in each area assessed (planning, designing, and delivering instruction, managing the classroom, diagnosing and evaluating student learning, using subject matter knowledge, and participating in a learning community; Tracz et al., 1994; Tracz et al., 1995). Teachers commented that videotaping their teaching and analyzing student work made them more aware of how to organize teaching and learning tasks, how to analyze student learning, and how to intervene and change course when necessary.

In a longitudinal, quasi-experimental study that investigated learning outcomes for high school science teachers who pursued National Board certification, Lustick and Sykes (2006) found that the certification process had a significant impact upon candidates' understanding of

knowledge associated with science teaching, with a substantial overall effect size of 0.47. Teachers' knowledge was assessed before and after candidates went through the certification process through an assessment of their ability to analyze and evaluate practice.

In an ingenious design, each candidate was sent an identical interview packet containing a sealed six-minute video clip of a whole class discussion in science, student artifacts, and classroom situations to be discussed during the interview. The specific questions they would be asked about these materials were not included in the packet. During an extended telephone interview (ranging from 40 to 90 minutes), teachers examined and analyzed the artifacts, responded to the interview questions, and watched the videotape for the first time. After the audio taped interview was transcribed, a "processed" version of the transcription<sup>13</sup> was then scored by at least two assessors using rubrics associated with the thirteen standards of the National Board certification process. The 13 assessed scores for each candidate were then aggregated to the group level so that means representing different observations could be compared for significant differences at the overall, set, and individual standard level of analysis. The greatest gains—as measured by data from interviews and examination of portfolio entries—were associated with standards dealing with *scientific inquiry* and *assessment*.

More recent research that followed comparison groups of teachers over time found that teachers who undertook National Board certification did indeed change their assessment practices significantly more over the course of their certification year than did teachers who did not participate in the certification process (Sato, Chung, & Darling-Hammond, 2008). This study tracked National Board candidates' assessment practices over 3 years—a year prior to pursuing certification, a year of candidacy, and the post-candidacy year—along with those of a comparison group of teachers who were interested in pursuing certification but who postponed their candidacy until the study was completed. Evidence of teachers' practices on 6 dimensions of formative assessment included classroom data (lesson plans, videotaped lessons, and student work samples), student surveys, and teacher interviews. Although the National Board group began the study with lower mean scores than the comparison group on all 6 dimensions of formative assessment, by the second year of the study, the group had higher mean scores on all dimensions, with statistically significant gains on 4 of them, and they continued to demonstrate substantially higher scores in the year after they completed in the certification process. The most pronounced changes were in the ways teachers used a range of assessment information to support student learning.

Other studies have looked at how National Board teachers may influence the learning of other teachers through mentoring, assistance, and other leadership activities. A 2001 national survey of nearly 2,200 board certified teachers indicated substantial involvement in such activities,

with 99.6% reporting they were involved in at least one leadership activity and most involved in as many as ten (Yankelovich Partners, 2001). Among these, 90% reported mentoring or coaching candidates for board certification, 83% reported mentoring or coaching new or struggling teachers, 80% reported developing or selecting programs or materials to support or increase student learning, and 68% reported district or school leadership roles. A large majority (81%) agreed that the certification opened up new leadership activities for them.

Another study surveyed nearly 1,600 teachers from 47 elementary schools in 2 states, evaluating the helping behavior of NBCTs compared to others who were comparable in experience and other background characteristics. Based on other teachers' reports of which teachers had helped them, the study found that National Board certified teachers helped, on average, 40% more teachers than other similar colleagues (Frank & Sykes, 2006). This research suggests that National Board certified teachers may contribute in important ways to school improvement beyond the contributions they make in their own classrooms.

*Policy Implications* From a policy perspective, then, encouraging teachers to pursue National Board certification may both improve their own teaching effectiveness and support the learning of other teachers through mentoring, coaching, and other leadership activities. It also appears to provide a useful marker for teacher performance for purposes of recognition and reward. Yet, NBCTs frequently find that their schools and districts have not begun to envision new roles that will allow them to share their expertise. Often these potential teacher leaders feel they are "all dressed up with nowhere to go," even in states like North Carolina that have provided substantial base salary increments for board-certified teachers and have grown a sizable cadre of NBCTs (see, e.g., Southeast Center for Teaching Quality, 2002; Williams & Bearer, 2001; Loeb, Elfers, Plecki, Ford, & Knapp, 2006). From this perspective, much policy development work is yet to be done to develop differentiated teacher roles and collegial workplace settings that provide the time and opportunity for expertise to be shared—and, in particular, to create means for such investments in organizational learning to occur in the schools that most need them.

For example, Humphrey, Koppich, and Hough (2005) found that, of the more than 30 states offering various incentives for board certification, only two had made any effort to equalize the distribution of such teachers through their policies. Among six states they examined more closely, only California—which offers a \$20,000 bonus (paid out over 4 years) to NBCTs who teach in underperforming schools—showed a reasonably equitable distribution of board certified teachers to schools serving poor, minority, and lower performing students. Other incentives may also contribute to this finding, since a large proportion of NBCTs working in low performing, minority, and poor schools were in Los Angeles, which not only has a large number of the states' underperforming schools, it is also one of a

very few California districts providing a 12% base salary increase to NBCTs.

A modest beginning on this agenda has occurred in local career ladder plans in a few districts such as Rochester, New York; Cincinnati, Ohio; and Denver, Colorado, and state incentives for career ladder plans in Arizona, Iowa, and Minnesota, among others. Some federal legislative proposals have aimed to increase leverage for local experimentation with these ideas. For example, the TEACH Act, introduced by George Miller in the House and Edward Kennedy in the Senate, encouraged career ladders and authorized incentive pay to attract “effective” teachers to high need schools and to pay them stipends to serve as mentors or master teachers.

These new proposals represent the growing political interest in moving beyond traditional measures of teacher qualifications—such as experience, degrees, and licensing status—to evaluate teachers’ actual performance and effectiveness as the basis for making decisions about hiring, tenure, licensing, compensation, and selection for leadership roles. In addition to measures like National Board certification, measures of effectiveness have included other performance-based evaluations.

Often based on those of the National Board, standards-based teacher evaluations used by some districts have been found to be significantly related to student achievement gains for teachers and to help teachers improve their practice and effectiveness. Like the board’s performance assessments, these systems for observing teachers’ classroom practice are based on professional teaching standards grounded in research on teaching and learning. They use systematic observation protocols to examine teaching along a number of dimensions. All of the career ladder plans mentioned earlier use such evaluations as part of their systems and many use the same or similar rubrics for observing teaching. The Denver compensation system, which uses such an evaluation system as one of its components, describes the features of its system as including: well-developed rubrics articulating different levels of teacher performance, interrater reliability, a fall-to-spring evaluation cycle, and a peer and self-evaluation component.

In a study of three districts using standards-based evaluation systems, researchers found significant relationships between teachers’ ratings and their students’ gain scores on standardized tests (Milanowski, Kimball, & White, 2004). In the schools and districts studied, assessments of teachers are based on well-articulated standards of practice evaluated through evidence including observations of teaching along with teacher interviews and, sometimes, artifacts such as lesson plans, assignments, and samples of student work.

The set of studies on standards-based teacher evaluation suggest that the more teachers’ classroom activities and behaviors are enabled to reflect professional standards of practice, the more effective they are in supporting student learning—a finding that would appear to suggest the desirability of focusing on such professional standards in the preparation, professional development, and evaluation of

teachers. Yet the policy community is still divided about whether preparation for teachers should be universally guided by and held to common professional standards.

***Standards for Licensing Beginning Teachers*** While the emergence of the INTASC standards for licensing beginning teachers have created a substantially common set of standards for teaching across the states, there are still important differences in the ways that states manage licensing and the approval of teacher education programs. States issue many types of licenses, endorsements, and certifications, and in some states, there is a wide variety of loopholes and exceptions for any requirement. Furthermore, standards for teaching candidates vary with the wide range of licensing examinations enacted across the 48 states, plus the District of Columbia, that require them (Goldhaber, 2006). These exams, too, set different standards of knowledge and skill for both content and levels of performance.

Whereas a few states require examinations of subject matter knowledge, teaching knowledge, and teaching skill and use relatively high standards for evaluating those assessments, others require only basic skills or general knowledge tests that do not seek to measure teaching knowledge or performance. In 2004, 34 states required basic skills tests for admission to teacher education or for an initial license, 38 required tests of subject matter knowledge, 25 required tests of pedagogical knowledge, and 13 states required successful completion of a state performance assessment to obtain the advanced license (NASDTEC, 2004). In most states, prospective teachers are required to pass at least two tests and sometimes as many as four.

The nature, content, and quality of tests constructed and selected across the states vary greatly, as do their cutoff scores (NCTAF, 1996; Strauss, 1998). A report by the Committee on Assessment and Teacher Quality of the National Research Council (Mitchell, Robinson, Plake, & Knowles, 2001) noted that while the initial licensure tests used by states are designed to identify candidates qualified for minimally competent beginning practice, the several hundred different tests currently in use, despite their quantity, do not provide information about some of the most important competencies relevant to beginning practice. Haertel (1991) summarized the many concerns as follows:

The teacher tests now in common use have been strenuously and justifiably criticized for their content, their format, and their impacts, as well as the virtual absence of criterion-related validity evidence supporting their use...these tests have been criticized for treating pedagogy as generic rather than subject-matter specific, for showing poor criterion-related validity or failing to address criterion-related validity altogether, for failing to measure many critical teaching skills, and for their adverse impact on minority representation in the teaching profession. (pp. 3–4)

While teacher tests have evolved some over the last decade, many of these concerns remain. Over the years, a number of studies have examined the relationship between

teachers' scores on traditional licensing tests and teacher ratings or their contributions to student achievement. The findings of these studies have been mixed. Although many studies have found little or no relationship between teachers' scores on licensing tests and teacher effectiveness (Ayers, 1988; Ayers & Qualls, 1979; Boyd et al., 2007; Dybdahl, Shaw, & Edwards, 1997; Haney, Madaus, & Kreitzer, 1987; Hanushek, 1971), some studies have found that teachers' scores on tests that include aspects of professional knowledge are related to their effectiveness in raising student achievement (Clotfelter, Ladd, & Vigdor, 2006; Ferguson, 1991; Goldhaber, 2005, 2006; Sheehan & Marcus, 1978; Strauss & Sawyer, 1986).

Some of these tests do appear to measure aspects of the knowledge base specific to teaching. For example, Gitomer, Latham, and Ziomek (1999) found that teachers who were never enrolled in a teacher education program had the lowest pass rates on the PRAXIS II curriculum tests, even though they had comparable SAT scores to those who had completed teacher education programs.

Given the uncertain relationship between teachers' performance on the multiple licensure tests they are required to take and the effectiveness of their teaching practice, some have voiced concerns about the effects on teacher supply of the requirements. For example, while Goldhaber (2006) found a small positive relationship between the PRAXIS Curriculum test and student achievement, he also pointed out that the high rate of Type I and Type II errors results in significant tradeoffs: Cut scores allow some teachers with little contribution to student achievement to become licensed based on their performance on these tests, while others who would be effective teachers are ineligible to receive licensure.

Furthermore, there is evidence that many licensing tests have served to limit the diversity of the teaching force. Several studies have found a differential impact of teacher exams (the now-ended National Teacher Examinations, the currently used PRAXIS series, and a number of state-developed exams) on teacher candidates of different races, with African Americans and Hispanics having lower pass rates than Whites (Angrist & Guryan, 2003; Garibaldi, 1991; Gitomer et al., 1999; Murnane & Schwinden, 1989; Texas Education Agency, 1994). Finally, some teacher educators have argued that state licensing tests may undermine accountability for teaching and learning if they are not aligned with the programs' goals for their teacher candidates (Graham, Lyman, & Trow, 1995).

All of these concerns—and a desire to create stronger measures for both developing and assessing readiness to teach—have led to recent experimentation with performance assessments for beginning teacher licensure.

***Beginning Teacher Performance Assessments*** The need for licensing examinations that can better predict teachers' effectiveness in the classroom and for a way to support the professional development of beginning teachers has led some states and school districts to adopt performance-

based assessments that measure teachers' application of their pedagogical and content-area knowledge as the basis for licensure and professional development. Over the last decade, teaching performance assessments have also begun to find wide appeal in the context of teacher education programs and teacher licensing for their innovative ways of assessing teacher knowledge and skill but also for their potential to promote teacher learning and reflective teaching. Such assessments come in a variety of formats including tasks that ask teachers to analyze student work, evaluate textbooks, analyze a teaching video, or solve a teaching problem; lesson planning exercises; videotapes and direct observations of teaching in the classroom.

Within individual programs, locally-developed assessments represent distinctive conceptualizations of teaching tasks, a wide range of quality, and differential attention to concerns for reliability and validity. These assessments, no doubt, also vary in how much they affect candidate competence, program planning, and improvement. However, with pressures on programs to demonstrate their effects—and with public policy concerns for gauging teachers' practice and effectiveness—more systematic, cross-cutting approaches to performance assessment have been undertaken in a number of states.

In some states, teacher performance assessments for new teachers, modeled after the National Board assessments, are being used either in teacher education, as a basis for the initial licensing recommendation (California, Oregon), or in the teacher induction period, as a basis for moving from a probationary to a professional license (Connecticut). These assessments require teachers to document their plans and teaching for a unit of instruction, videotape and critique lessons, and collect and evaluate evidence of student learning. Like the National Board assessments, beginning teachers' ratings on the Connecticut BEST assessment have been found to significantly predict their students' value-added achievement on the state reading test (Wilson & Hallam, 2006). As more states begin to implement performance-based assessments for teacher licensure on a wide scale, we can anticipate that there will be additional opportunities to examine the predictive validity of these assessments.

*The Impact of Performance Assessments on Beginning Teacher Learning* Because teacher education programs have been experimenting with the use of portfolios and other forms of performance-based assessment (such as teaching cases and exhibitions) since the 1980s, they have provided opportunities to study the effects of these alternative assessments on the learning of pre-service teachers. Across the country, a number of studies have examined the impact of performance assessments on pre-service teachers' learning and have suggested that, in some programs with highly-developed internal systems, such assessments have provided candidates with opportunities to put into practice the knowledge, principles, and skills they learned in their coursework, and to reflect on and learn from their teaching experiences (e.g., Anderson & DeMeulle, 1998;

Davis & Honan, 1998; Lyons, 1996, 1998a, 1998b, 1999; Richert, 1987; Shulman, 1992; Stone, 1998; Zeichner, 2000).

Like those of the National Board, there is also some evidence that performance assessments may help beginning teachers improve their practice. Connecticut's process of implementing INTASC-based portfolios for beginning teacher licensing involves virtually all educators in the state in the assessment process, either as beginning teachers taking the assessment or as school-based mentors who work with beginners, as assessors who are trained to score the portfolios, or as expert teachers who convene regional support seminars to help candidates learn about the standards. Educators throughout the system develop similar knowledge about teaching and learn how principles of good instruction are applied in classrooms. These processes can have far-reaching effects. By the year 2010, an estimated 80% of elementary teachers, and nearly as many secondary teachers, will have participated in the new assessment system as candidates, support providers, or assessors (Pecheone & Stansbury, 1996).

A new teacher who participated in the assessment described the power of the process, which requires planning and teaching a unit, and reflecting daily on the day's lesson to consider how it met the needs of each student and what should be changed in the next day's plans. He noted: "Although I was the reflective type anyway, it made me go a step further. I would have to say, okay, this is how I'm going to do it differently. It made an impact on my teaching and was more beneficial to me than just one lesson in which you state what you're going to do ... the process makes you reflect on your teaching. And I think that's necessary to become an effective teacher."

Similar learning effects are recorded in research on the PACT assessment used in California teacher education programs. California recently enacted a new state law that will require all pre-service teachers in the state to pass a Teaching Performance Assessment (TPA) to qualify for a preliminary teaching credential beginning in 2008. Since 2003, teacher credential programs across the state have been piloting either the CA Teaching Performance Assessment (created in partnership with ETS) or the Performance Assessment for California Teachers, an alternative assessment designed by a consortium of 31 public and private universities (see Pecheone & Chung, 2006).

The assessment requires student teachers or interns to plan and teach a week-long unit of instruction mapped to the state standards; to reflect daily on the lesson they have just taught and revise plans for the next day; to analyze and provide commentaries of videotapes of themselves teaching; to collect and analyze evidence of student learning; to reflect on what worked, what did not and why; and to project what they would do differently in a future set of lessons. Candidates must show how they take into account students' prior knowledge and experiences in their planning. Adaptations for English language learners and for special needs students must be incorporated into plans and

instruction. Analyses of student outcomes are part of the evaluation of teaching.

*The Impact of Performance Assessment on Teaching and Teacher Education* Faculty and supervisors score these portfolios using standardized rubrics in moderated sessions following training, with an audit procedure to calibrate standards. Faculties use the PACT results to revise their curriculum. Like the National Board and Connecticut assessments, these promise to have learning effects that may affect the system more broadly, through the learning that occurs for assessors as well as for candidates (Darling-Hammond, 2006). For example:

For me the most valuable thing was the sequencing of the lessons, teaching the lesson, and evaluating what the kids were getting, what the kids weren't getting, and having that be reflected in my next lesson...the 'teach-assess-teach-assess-teach-assess' process. And so you're constantly changing—you may have a plan or a framework that you have together, but knowing that that's flexible and that it has to be flexible, based on what the children learn that day. (Prospective teacher)

This [scoring] experience ... has forced me to revisit the question of what really *matters* in the assessment of teachers, which—in turn—means revisiting the question of what really *matters* in the *preparation* of teachers. (Teacher education faculty member)

[The scoring process] forces you to be clear about "good teaching;" what it looks like, sounds like. It enables you to look at your own practice critically, with new eyes. (Cooperating teacher)

As an induction program coordinator, I have a much clearer picture of what credential holders will bring to us and of what they'll be required to do. We can build on this. (Induction program coordinator)

Significantly, early validation studies of the PACT have found no disparate impact of the assessment by race and ethnicity, in contrast to many other teach teacher tests (Pecheone & Chung, 2006.) Whether teachers' effectiveness actually improves as a result of completing performance-based assessments has not been established. However, there is some evidence that beginning teachers are capable of enacting what they report learning from a performance assessment in their actual classroom practice. Research on student teachers who had completed the Performance Assessment for California Teachers (see Chung, 2007, 2008) found that pre-service teachers did change their teaching practices as a consequence of their experiences with the performance assessment. Another study (Sloan, Cavazos, & Lippincott, 2007) found that first-year secondary science teachers who had completed the Performance Assessment for California Teachers during their pre-service year reported continued influences of the assessment on their teaching. Follow-up studies currently underway will reveal more about the relationship between PACT assessment ratings and beginning

teacher practice and effectiveness, including evidence of students' value-added learning.

***Standards for Accrediting Teacher Education*** A final element of the professional standards picture is the increasing use of such standards and performance assessments for evaluating schools of education. Until recently, the program approval process for schools of education, generally coordinated by the state's department of education, has typically assessed "the types of learning situations to which an individual is exposed and ... the time spent in these situations, rather than...what the individual actually learned" (Goertz, Ekstrom, & Coley, 1984, p. 4). The 20th century practice of admitting individuals into practice based on their graduation from a state-approved program was a wholesale approach to licensing. It assumed that program quality could be well-defined and monitored by states; that programs would be equally effective with all of their students; and that completion of the courses or experiences mandated by the state would be sufficient to produce competent practitioners. The state approval system also assumed that markets for teachers were local: that virtually all teachers for the schools in a given state would be produced by colleges within that state, a presumption that has become increasingly untrue over time.

Most states, meanwhile, have routinely approved virtually all of their teacher education programs, despite the fact that these programs offer dramatically different kinds and qualities of preparation (Goodlad, Soder, & Sirotnik, 1990; NCTAF, 1996; Tom, 1997). Many state education agencies have inadequate budgetary resources and person power to conduct the intensive program reviews that would support enforcement of high standards (David, 1994; Lusi, 1997). And even when state agencies find weak programs, political forces make it difficult to close them down. Teacher education programs bring substantial revenue to universities and local communities, and the availability of large numbers of teaching candidates, no matter how poorly prepared, keeps salaries relatively low. As Dennison (1992) notes, "the generally minimal state-prescribed criteria remain subject to local and state political influences, economic conditions within the state, and historical conditions which make change difficult" (p. A40).

Since the 1990s, however, states have been moving toward a common set of accreditation and teacher preparation standards linked to the National Board's professional standards for accomplished teachers and INTASC's standards for beginning teachers. This movement has been facilitated by a growing interest in national accreditation. In 1989, NCATE launched a new state partnership program in which its professional review of colleges of education is integrated with states' own reviews. The number of partnerships increased from 19 in 1990 to 48 in 2000. The partnerships eliminate duplication in an institution's preparation for state program approval and professional accreditation. One important result of these state partnerships is the alignment of state and professional standards. As of 2007, 39 states

have adopted or adapted NCATE unit standards as their own unit standards, and NCATE's professional program standards have influenced teacher preparation across the 48 partnership states plus the District of Columbia and Puerto Rico.

In addition, beginning in the early 1990s, NCATE moved away from a curriculum-based review of programs to performance-based accreditation, in which institutions must provide evidence of competent teacher candidate performance rather than showing that candidates have been exposed to curriculum. In the 1995 version of its standards, NCATE required institutions to use multiple measures of performance to demonstrate candidate ability, and in the late 1990s, began developing performance-based accreditation standards. At the same time, NCATE also incorporated the INTASC model state licensing principles and the National Board standards into its accreditation standards. Additionally, NCATE aligned its teacher preparation standards with national standards for P-12 students. NCATE expects national standards for teacher preparation in the various subject matter areas to be congruent with P-12 student standards.

A somewhat different approach has been pursued by the newly-created Teacher Education Accrediting Council (TEAC), which was launched in 1997 by a group of education school deans and college presidents as an alternative to NCATE accreditation, and which has accredited 41 institutions over the last decade. TEAC audits education programs based on their performance in relation to internally derived objectives and standards, rather than against a common set of national or professional standards. To be accredited, a program must present evidence that its faculty have accomplished its own objectives. While critics of TEAC's approach assert that allowing a program to determine its own set of objectives and standards could lower or ignore key standards, TEAC counters that its accreditation process relies on "a common standard all TEAC programs must meet, viz. (1) credible evidence of their common claim that their graduates are competent, etc., (2) evidence that the means by which they establish the evidence is valid, (3) evidence that program decisions are based on evidence, and (4) evidence that the institution is committed to the program" (Murray, 2004, p.8).

TEAC also anchors its review in part in state licensing standards to which programs are expected to be responsive, which, in turn, generally reflect the INTASC standards incorporated into NCATE's review. TEAC claims a high degree of alignment between its own principles and most of the NCATE standards (TEAC, n.d.). Thus, while their approaches to professional standards differ, both national accreditation systems currently emphasize the importance of credible evidence of candidate outcomes as the basis for accreditation and a set of standards against which programs are evaluated. While, in the past, evidence of inputs (i.e., the curriculum of teacher education) was sufficient for state and national accreditation, there has been a clear shift at the national level to a focus on evidence of outcomes of teacher education.

There have been few studies that have systematically examined the impact of accreditation on teacher education programs. Some studies indicate that negative NCATE reviews have led to substantial changes in weak education programs (e.g., Altenbaugh & Underwood, 1990; Williams, 2000), highlighting the fact that professional accreditation can spur program reform efforts. A study by the Gitomer, Latham, and Ziomek (1999) of the Educational Testing Service (ETS) also found that graduates of NCATE accredited colleges of education pass ETS subject matter and pedagogy examinations at a higher rate than do graduates of unaccredited colleges of education and those who did not prepare. At the state policy level, Darling-Hammond (2000b) found an indirect relationship between accreditation, teacher quality, and student achievement, showing that states with a higher percentage of NCATE-accredited institutions had a significantly higher percentage of teachers with full certification, which in turn was strongly and positively associated with average student achievement on the National Assessment of Educational Progress. This, however, likely reflects a general policy climate with respect to teacher education investments in states—and perhaps overall education support—rather than a direct effect of the accreditation process.

There is also some evidence from NCATE that accreditation can act as a policy lever and that programs engaged in the accreditation process may also engage in program improvement efforts. For example, the initial failure rate for programs seeking NCATE accreditation in the 3 years after NCATE strengthened its standards in 1987 was 27%. During the first 3 years of implementation, almost half of the schools reviewed could not pass the new “knowledge base” standard, which specified that schools must be able to describe the knowledge base on which their programs rest. However, most of these schools made major changes in their programs, garnering new resources, making personnel changes, and revamping curriculum, and were successful in their second attempt at accreditation. NCATE again upgraded its standards again in 1995 to incorporate the INTASC and National Board standards, and in 2005 introduced performance-based accreditation, requiring evidence of candidate outcomes. This means that many programs that want to secure or maintain professional accreditation will need to upgrade their efforts further.

In addition, recent reforms in teacher education seem to have resulted in improved perceptions of the quality of teacher preparation. Since 1990, surveys of beginning teachers who experienced teacher education (Gray et al., 1993; Howey & Zimpher, 1993; Kentucky Institute for Education Research, 1997; California State University, 2002a, 2002b) have found that more than 80%—felt that they were well prepared for nearly all of the challenges of their work, while a somewhat smaller majority (60 to 70%) felt prepared to deal with the needs of special education students and those with limited English proficiency. Veteran teachers and principals who work with current teacher preparation programs, particularly 5-year programs and those that feature

professional development schools, have also reported their perception that their newly-trained colleagues are much better prepared than they were some years earlier (Andrew & Schwab, 1995; Baker, 1993; Darling-Hammond, 1994; National Center for Education Statistics [NCES], 1996, tables 73 and 75).

Nonetheless, issues of teacher education quality and the efficacy of contemporary accreditation remain contentious. While identifying a few teacher education programs he deemed excellent, Levine’s (2006) report on U.S. teacher education echoed the historically common complaints of low quality for the field as a whole. In addition, the study used Northwest Evaluation Association student test score data to examine the relationship between students’ achievement and the accreditation status of the college where their teachers were prepared. Controlling for teachers’ years of experience, students taught by teachers prepared by NCATE institutions had slightly higher, but non-significant, gains in reading and math test scores than non-NCATE teachers. Having found that deans and faculty members most commonly cited accreditors as one of the most powerful forces in determining the organization and content of their curricula, Levine concluded that neither state regulations nor current accreditation processes are able to assure a minimum quality of teacher education. His critique centered on the need for greater attention to outcomes, implicitly discounting the value of such things as licensing examinations or even on-the-job ratings as evidence of teacher quality:

Process trumps outcomes; teachers overshadow students; and teaching eclipses learning. Today quality control focuses principally on teaching; for instance, it emphasizes the components that make up a teacher education program and focuses on attempts to measure teaching ability (passage rates on certification exams, principals’ assessments of new teachers) rather than learning outcomes. (p. 61)

Although Levine does not acknowledge the moves toward outcome-based accreditation that are already occurring, his expressed concern represents the drumbeat of the times.

### Evaluating Teacher Education Based on Learning Outcomes

Interest in basing decisions about teachers—and their preparation institutions—on evidence of student learning has been growing. After all, if student learning is the primary goal of teaching, it appears straightforward that it ought to be taken into account in determining a teachers’ competence. A prominent proposal is to use value-added student achievement test scores from state or district standardized tests as a key measure of teachers’ effectiveness. The value-added concept is important, as it reflects a desire to acknowledge teachers’ contributions to students’ progress, taking into account where students begin. Furthermore, as our review illustrates, value-added methods are increasingly used for research on the effectiveness of specific populations teachers (e.g., those who are National Board certified or

those who have had particular preparation or professional development experiences) and on the outcomes of various curriculum and teaching interventions.

Some analysts and policy makers are now urging that states develop data sets that link student test score data to their teachers' identifications so that it can be routinely used to evaluate individual teachers as well as the teacher education programs that prepared them. However, there are serious technical and educational challenges associated with using this approach to make strong inferences. In addition to the fact that curriculum-specific tests that would allow gain score analyses are not typically available in most teaching areas and grade levels, these include concerns that readily available tests do not measure many important kinds of learning, are inaccurate measures of learning for specific populations of students (e.g., new English language learners and some special education students), and that what appear to be the "effects" of a given teacher may reflect other teachers and learning experiences, home differentials, or aspects of the school environment that influence teaching (e.g., curriculum choices, resources and supports, class sizes, whether a teacher is assigned out-of-field, etc.).

Furthermore, value-added analyses have found that teachers look very different in their measured effectiveness depending on what statistical methods are used, including whether and how student characteristics are controlled, whether school effects are controlled, and how missing data are treated. In addition, effectiveness ratings appear highly unstable: a given teacher is likely to be rated differently in his or her effectiveness from class to class and from year to year. (For a summary of concerns, see Braun, 2005.)

Thus, while value-added models may prove useful for looking at groups of teachers for research purposes, and they may provide one measure of teacher effectiveness among several, they are problematic as the primary or sole measure for making evaluation decisions about individual teachers or even teacher education programs. More sophisticated judgments will be needed that take into account analyses of the teachers' students and teaching context, the nature of teachers' practices, and the availability of other learning opportunities if judgments are to reflect all the factors that influence student learning and teacher effects. Furthermore, evaluations of student learning will need to include both more comprehensive and more curriculum-connected measures of what students know and can do than are provided by most state-required standardized tests, which evaluate only a small, superficial set of learning objectives that are often a remote proxy for what is actually taught.

Conducting the kind of research that is necessary will be costly and difficult, though not impossible. Over the last few years, universities that are part of the "Teachers for a New Era" initiative funded by the Carnegie Corporation have been seeking to develop evidence of the learning outcomes of teacher education, and, despite difficulties with small sample sizes, inaccessible student learning data, and a host of other feasibility issues, some promising studies

that carefully evaluate the teaching process, context, and outcomes are underway.

One example of such research, conducted at the University of Virginia over the course of 2 years was designed explicitly "to examine the value added to pupil learning by contrasting teachers with and without formal pedagogical training, and to do so within the context of a theoretical model that more fully accounts for the complexity of teachers' and pupils' educational lives than do other value-added schemes" (Konold et al., 2008, p. 2). The study used an experimental design to assign 680 middle school pupils to instructional groups taught by two groups of university arts and sciences students, roughly half of whom had formal teacher training ( $N = 43$ ) and half without ( $N = 47$ ). University students within each of these two groups were matched on educational backgrounds and assigned in pairs to the randomly formed instructional groups of middle school pupils. Each student taught four lessons to his or her instructional group, and administered pre- and post-test measures on the content delivered in the four lessons and a reflection scale on lesson difficulty at the end of each lesson. Teachers' behaviors were recorded and scored independently by two trained observers. Data were analyzed using structural equations modeling and statistical procedures that accounted for the multi-level nesting of teachers within programs. The researchers found that teacher education candidates used teaching behaviors that had a statistically significant influence on pupils' acquisition of content knowledge, application, and interpretation of basic data analysis concepts, accounting for about 20% of the variation in gain scores. Students who were not enrolled in a teacher education program failed to demonstrate teaching behaviors that influenced student outcomes.

A teacher who scored high on the five sets of teaching behaviors might simply be described as one who provided support for learning. As noted by Konold and colleagues (2008): "These teachers gave clues and reminders, encouraged serious thought, broke problems into steps, provided examples, asked questions, gave feedback, and the like. Generally speaking, Teaching Behavior that worked appeared to be responsive to pupil understanding of the material and aimed at producing independent learners" (p. 23). Not included in the report of the study, but plausible to conduct, would be the companion research that reveals how these candidates learned to develop the kinds of teaching sensibilities and strategies that allowed them to be more effective.

A program of such careful research, conducted across subject matter domains, teaching contexts, and learning goals, and including teacher education graduates as well as current candidates, could begin to develop traction on many of the knotty questions of preparation strategies, as well as overall teacher education effects. The Carnegie-supported institutions engaged in this kind of research have been supported with grants of \$5 million each over 5 years to develop and study the implementation of a set of teacher education principles. It is unlikely that individual institutions, study-

ing themselves, will be able to build the needed corpus of research in the years ahead. Furthermore, many important research questions will need to be examined with larger samples across institutions and contexts.

This endeavor will require research funding on a scale that is not currently available. Sharp decreases in the funding available for teacher education research that occurred in the 1980s have not yet been reversed. Furthermore, the now-discontinued National Center for Research on Teacher Education, formerly located at Michigan State University, has not been replaced. A major federal investment in research on teacher education and learning—on the scale of that last undertaken in the 1970s—will be needed to build the knowledge base for increasingly sound policy and practice.

## Conclusion

Debates about teacher education policy have arisen from both technical and political disagreements about what qualifications and preparation predict effectiveness and what principles should guide teacher selection and learning opportunities. At the root of some of these debates is the question of whether all students are equally entitled to teachers of comparable quality, as well questions of what kinds of qualifications and training matter most.

Current research suggests that there are many teacher characteristics and abilities which, in combination, predict teaching effectiveness. The fact that teachers' effectiveness is greatly enhanced when they have had many opportunities to learn—including high-quality general education, deepening of both content and pedagogical knowledge, teaching experience, and opportunities to develop specific practices through professional development and assessment—suggests a multi-faceted approach to policy development on behalf of stronger teaching. Evidence suggests that if policies were to support the recruitment of well-educated candidates into high-quality preparation programs that ensure substantial opportunities to learn subject matter and pedagogy, and support their ongoing learning focused on effective practices, the overall quality of teaching could be expected to be significantly higher.

Such policies would need to include effective incentives for recruiting, retaining, and distributing teachers to the places where they are needed (for examples, see Darling-Hammond & Sykes, 2003) as well as professional policies governing accreditation, licensure, and advanced certification that encourage schools of education to adopt the kinds of connected coursework and clinical experiences that enhance teachers' capacities and effectiveness.

Promising among these policy possibilities are supports for teacher assessment strategies—such as standards-based teacher evaluations and assessments like those of the National Board for Professional Teaching Standards and the Performance Assessment for California Teachers—that have been found not only to measure features of teaching associated with effectiveness, but actually to help develop

effectiveness at the same time. Particularly useful are those approaches that both develop greater teaching skill and understanding for the participants and for those involved in mentoring and assessing these performances. These approaches may be particularly valuable targets for policy investments, as they may provide an engine for developing teaching quality across the profession—through their contributions to program improvement and to measures of how teachers contribute to student learning.

Finally, continued efforts to conduct careful, contextualized research on the outcomes of teacher education—in terms of teachers' retention in teaching, classroom practices, and associated learning results—will likely be essential to the development of policies that can both leverage program improvement and ensure that prospective teachers have access to the preparation that will allow them to teach effectively.

## Notes

1. In education, the term "certification" has often been used to describe states' decisions regarding admission to practice, commonly termed licensing in other professions. Until recently, teaching had no vehicle for advanced professional certification. Now, advanced certification for accomplished veteran teachers is granted by a National Board for Professional Teaching Standards. To avoid confusion between the actions of this professional board and those of states, we use the terms licensing and certification here as they are commonly used by professions: "licensing" is the term used to describe state decisions about admission to practice and "certification" is the term used to describe the actions of the National Board in certifying accomplished practice.

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