

## II TEACHER QUALITY: WHAT DOES RESEARCH TELL US?

Jennifer A. Whitcomb & Tanya Rose, University of Colorado, Boulder

### INTRODUCTION

Common sense suggests a good teacher matters. Personal experiences with inspirational and challenging teachers reinforce this notion. Research has also shown that some teachers have a more significant impact on student achievement than others (McAffrey, Lockwood, Koretz, & Hamilton, 2004; Rivkin, Haushek, & Kain, 2005; Rockoff, 2004). Teacher quality is seen as a key policy lever to narrow achievement gaps that exist along racial and economic lines. Ensuring the quality profile of the teacher workforce is crucial to extend the democratic mission of public schooling to the unprecedented number of students who are more diverse than at any point in US history.

This literature review provides a brief overview to key research findings informing policy efforts to improve teacher quality. It is organized around the following questions:

- What does research say about individual teacher qualifications and characteristics associated with teacher quality?
- What does research say about how schools and districts contribute to teacher quality?

Before turning to these questions, we clarify terms widely used in policy discussions of teacher quality and note some limitations in the research and policy efforts to improve teacher quality.

### Terms in the Teacher Quality Discussion

**HIGHLY QUALIFIED TEACHER [HQT].** This term refers to language used in the federal No Child Left Behind act passed in 2001 (NCLB). In Colorado, highly qualified teachers must (1) hold a bachelor's degree, (2) obtain a state teaching license, and (3) demonstrate subject matter competency (e.g., pass the PLACE<sup>2</sup> or Praxis II<sup>3</sup> licensure tests). This definition sets a minimum bar for teacher knowledge and focuses on input measures and content knowledge. The Colorado teacher licensing tests assess an individual's knowledge of content rather than knowledge of teaching.



**EFFECTIVE TEACHER OR HIGHLY QUALIFIED EFFECTIVE TEACHER.** Teacher effectiveness generally refers to a teacher's ability to foster student achievement. There is a long tradition of research on teacher effectiveness, dating back to the 1960s and 70s (Shulman, 1986). Much of this research examined specific teaching practices (e.g., teacher's questioning strategies) and correlated them with student learning gains. In the recent Aspen Institute report, *Beyond NCLB* (Commission on No Child Left Behind, 2007), written to guide the reauthorization of NCLB, the Commission defines "effective" in terms of a teacher's ability to improve student achievement as measured on standardized tests. The Commission draws upon

<sup>2</sup>PLACE<sup>®</sup> - Program for Licensing Assessment for Colorado Educators<sup>®</sup> was developed as a result of the 1991 Educator Licensing Act. These are criterion referenced and objective based tests designed to measure a candidate's knowledge in relation to an established standard of performance. PLACE was designed to align with the Colorado teacher standards which are aligned with the Colorado Model Content Standards for K-12 students. For more information: [www.place.nesinc.com](http://www.place.nesinc.com)

<sup>3</sup>Praxis II<sup>®</sup> tests measure general and subject-specific knowledge and teaching skills. The test required in Colorado focuses primarily on subject-specific knowledge. For more information: [www.ets.org](http://www.ets.org)

studies using value-added methodologies to argue that in the NCLB reauthorization, emphasis should be placed on developing data systems that allow states and districts to identify those effective teachers who contribute to children's achievement growth each year. This is a shift from a focus on qualifications to describe teacher quality to a focus on achievement outcomes. At this point, Colorado does not have an adequate data system to conduct value-added analyses on all teachers.

*Good teacher* is perhaps the most common and least precise of all terms. Shulman, President of the Carnegie Foundation for the Advancement of Teaching, describes a good teacher in the following way:

In the classroom of a good teacher, students are visible, engaged, attentive and participating...In good teaching, students are responsible for their learning; they are accountable for their understanding....Good teaching is passionate, and it induces an emotional response in students....Good teaching starts with inducing habits of mind, but doesn't stop there. Good teaching engages practical thinking and problem-solving skills that can be applied in a variety of settings. And good teaching affects students' values, commitments, and identities. (as cited in Loeb, Rouse, and Shorris, 2007, p. 7)

Shulman's definition reminds us that a good teacher connects learners with significant ideas, with themselves, and with their world. Good teachers do more than boost achievement, they shape lives.

## Limitations in the Research on Teacher Quality

Both common sense and research tell us that the teacher is one of the most essential factors in student achievement. Three limitations in this body of research deserve mention.

**IMPRECISE INDICATORS.** In large-scale quantitative studies many researchers use imprecise indicators to measure a qualification they think is related to teacher quality. For example, *certification* is sometimes used as a proxy for a teacher's knowledge of how to teach. Requirements for certification vary by state, and they have varied over time, particularly as more states have developed alternative-preparation programs. Thus, whether a teacher is "certified" or "not certified" says little about what kind of teacher preparation an individual has completed, and therefore little about teacher quality. Many other indicators used in large-scale studies are also rough, thus limiting the impact of study findings.

*Good teachers do more than boost achievement, they shape lives.*

**CONFOUNDING VARIABLES.** Mary Kennedy (in progress) points out that an inherent problem in most studies of teacher qualifications and teacher quality is that they face challenges in separating sources of quality from background noise, that is they are "susceptible to confounding variables." She explains,

Teachers self-select their own educational programs; consequently, their own values and predispositions are confounded with their credentials. Once certified, their non-random job seeking practices, coupled with districts' non-random hiring practices, yield a pattern of job placements in which teachers' educational backgrounds, credentials, attitudes, and predispositions become confounded with the types of students they eventually teach....Because of these problems, studies of qualifications are tremendously various, as different researchers try different strategies to ferret out the relationships of interest (pp. 1-2).

**COMPLEX CHAIN OF EVIDENCE.** The chain of evidence to connect teachers with student achievement is complex and sensitive to many factors. Most of the studies cited by policy makers are quantitative, involving statistical procedures relating certain teacher or school factors with student achievement outcomes. Whether students achieve desired academic outcomes depends on interactions among many factors, including learner's prior achievement, teacher's knowledge and skills, the appropriateness and relevance of curriculum, learner's willingness and effort, peer-to-peer interactions, a school organization and culture that supports learning, and sensitivity of outcome measures to instructional practice.

Value-added models, which have provided the primary research support for the importance of teachers, do not take into account all of these variables. Braun (2003) writes, "It is essentially impossible to fully disentangle the contributions of the different factors in order to isolate the teacher's contribution (i.e., obtain a statistically unbiased estimate of a teacher's effectiveness" (p. 9). Indeed, "analysis of data from a

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large-scale U.S. government study suggested that teachers are responsible for somewhere between 4 percent and 18 percent of student test score changes" (American Educational Research Association [AERA], 2004, p. 2). More importantly, a central assumption of value-added modeling is that the achievement scores are valid measures of learning. Yet, the longer high stakes testing is used, the more likely the score results will be corrupted

(Nichols & Berliner, 2007). Researchers are grappling with many of these issues. Soon, value-added modeling may provide state-of-the-art ways to isolate an individual teacher's contribution to student learning, but for now, we should view cautiously findings from studies using value-added modeling.

### Comments on Current Framing of the Teacher Quality Movement

The goals of public education are broader than the current focus to improve student achievement as measured by standardized tests. Historically, US society has had many aims for public education. Along with knowledge of core academic subjects, we believe public schools should provide society with an engaged citizenry, productive workers, and creative individuals who will develop new knowledge and innovations in the arts and sciences. Recent reform efforts to improve student achievement in core subjects and to close the achievement gap are critical since strong performances in reading, writing, mathematics, and science are foundational. However, academic achievement is only one of many important outcomes. Moreover, our current measures of student learning are relatively narrow in scope. Thus, efforts to enhance teacher quality are primarily framed around only one essential outcome of public education. Other important learning aims, ones that are difficult to measure, are often overshadowed by student achievement in the teacher quality conversation.



Though we note some limitations in the framing of teacher quality and the research base that informs policy, we underscore the teacher quality movement's ambitious commitment to equity. Students who live in low-income homes or communities, students of color, English language learners and recent arrivals to the US most need quality teachers, yet they are least likely to have them nationally (AERA, 2004; Allgood & Rice, 2002; Carey, 2004; Lankford, Loeb, & Wykoff, 2002; Mayer, Mullens, & Moor, 2000), and in Colorado (Alliance for Quality Teaching, 2006).

In the policy effort to improve teacher quality, “quality” is often synonymous with “effective.” The movement to enhance teacher quality must go farther than its current focus on teachers who improve student achievement on standardized tests. This is particularly important as schools and teachers adapt to the NCLB context and become ever more strategic, focusing instructional energy on those “bubble kids” (Nichols & Berliner, 2007).<sup>4</sup> A quality teacher does promote student achievement, but s/he also contributes to other valued learning outcomes not captured in current tests and s/he does so in ways that are culturally responsive and caring.

The next section considers research over the last 25 years about teacher qualifications and characteristics that are associated with teacher quality. For each qualification or characteristic, relevant research is highlighted and connections to current Colorado policies are noted.

## Teacher Qualifications and Characteristics

One approach to understand teacher quality considers individual teacher qualifications and characteristics associated with teacher performance. Researchers have studied the following factors: academic or intellectual ability, academic subject matter preparation, pedagogical knowledge, teaching experience, race/ethnicity, and pedagogical knowledge for diverse learners.

Measures for each factor vary across studies, with some being more precise than others. For example, to measure intellectual ability different studies have looked at a teacher's verbal ability, college entrance test scores (SAT or ACT), or the selectivity of the undergraduate college s/he attended. Across studies, indicators of teacher effectiveness vary and have included student achievement, principal's evaluation, classroom observation of teacher's practice, teacher's perceptions of her own performance, or teacher retention.

In recent years, policy makers have focused primarily on student achievement gains as the most critical teacher performance measure. Not all studies have looked for relationships between teacher qualifications or characteristics and student achievement. The varied ways in which factors are measured and studies are designed makes it difficult to synthesize across them. Thus, the research base on teacher quality is not highly conclusive.

## Academic or Intellectual Ability

Looking at academic ability boils down to the question, do “smarts” matter? The underlying assumption is that “smarts” do matter and that we should be recruiting our “best and brightest” to teach. Measures for academic intellectual ability have included verbal ability, college entrance tests (SAT or ACT scores), or the selectivity of the college an individual attended.

**VERBAL ABILITY.** Since the Coleman Report (Coleman et al., 1966) found a positive relationship between teachers' verbal ability and composite student achievement, verbal ability has been considered an indicator of teacher quality. The basic logic is that teachers rely on talk to teach (e.g., explaining, questioning, and providing directions). What verbal ability means and how to measure it, it turns out, are not straightforward. For example, the Coleman study measured teachers' verbal ability with a 30-item sentence completion test; others have used SAT-verbal scores to measure this construct.

<sup>4</sup>Nichols & Berliner (2007) define “bubble kids” as “those almost at the point of passing the high-stakes test, perhaps needing a little extra teaching time to help them to pass” (p.75). A recent study by Matthew Springer (2008) suggests that this form of “educational triage” is not occurring.

In a meta-analysis to evaluate the strength of the relationship between teachers' verbal ability and teacher quality, Aloe and Becker (2007) found that data used to support the positive relationship rely on the Coleman et al. study. They found only 12 studies since 1960 that examined the predictive power of verbal ability. They summarized the research, "The results from correlation studies and from multiple regression studies are very similar, and the overall conclusion is that the relation of teachers' verbal ability to school outcomes is weak at best" (2007, p. 23). Thus, though talk about the importance of teachers' verbal ability persists (Paige, 2002; Walsh, 2001), it is not a strong measure of teacher quality.

**COLLEGE ENTRANCE TESTS.** Scores on college entrance tests (ACT or SAT) have some predictive validity with regard to academic performance in college. In this sense they are a measure of broad academic ability. Though, as Zumwalt and Craig (2005b) point out, relying on college entrance tests as an indicator of quality implies that little value is added in the college experience. These data, however, are relatively easy to gather, and a number of large scale studies have used these scores as a measure of teacher quality.

A 1999 study linked SAT or ACT college entrance scores with scores of 300,000 prospective teachers who took either a college of education entrance test or a teacher licensure test (PRAXIS®) between 1994-1997 (Gitomer, Latham & Ziomek, 1999). They found wide variation in the academic profile of teachers; for example, elementary teachers tended to have lower SAT or ACT scores than those pursuing licensure in a secondary content area. Recently, Gitomer (2007b) conducted a similar analysis of 153,000 teachers taking the Praxis II licensure test between 2002 and 2005. When comparing the 1994-97 cohort to the 2002-2005 cohort, Gitomer found, "The academic profile of the entire candidate pool has improved. Candidates who graduate from teacher education programs are stronger than in years past" (Gitomer, 2007b, p.3). However, as in the 1999 study, academic profiles for secondary teachers continue to be much stronger than those of elementary, special education, and physical education teachers.

Though the overall academic ability of the teaching force is improving, students in high poverty schools are more likely to have teachers whose SATs were in the bottom quartile (Henke, Chen & Geis, 2000). Mayer and colleagues found that only 10% were in the top quartile (Mayer et al., 2000) Also, candidates with scores in the top SAT and ACT quartile are less likely to take jobs as teachers or less likely to stay (Zumwalt & Craig, 2005b).

Two well-designed studies have linked college entrance test scores with student achievement (Ferguson & Ladd, 1996; Greenwald, Hedges & Laine, 1996). While there is evidence that a teacher's college entrance test score is related positively to student achievement, it's important to remember Lanier and Little's (1986) challenging question, "What would constitute a reasonable percentage of the top quintile of the college-educated persons that should pursue a career in teaching, assuming that society also wants bright and talented doctors, scientists, lawyers, and other professionals?" (p. 539). Zumwalt and Craig (2005b) observe that given teacher attrition, even if all individuals in the top quintile chose teaching, we would still not fill all positions.

**SELECTIVITY OF UNDERGRADUATE COLLEGE.** Another proxy measure for teachers' general academic or intellectual ability has been the selectivity of a teacher's undergraduate college, as rated by Gourman or Barron guides<sup>5</sup>.

<sup>5</sup>The **Gourman Report**, published by Princeton Review, uses a variety of criteria to produce quantitative rankings of colleges. **Barron's Guide to the Most Competitive Colleges**, published by Barron's, provides detailed profiles of competitive four-year colleges.

If you are a student in an urban school, you are more likely to have teachers who went to a less competitive college (Clotfelter, Ladd, & Vigdor, 2004; Lankford et al., 2002). Early studies (Ehrenberg & Brewer, 1994; Summers & Wolf, 1977) found a positive relationship between the selectivity of a teacher's undergraduate college and student achievement.

More recently, Clotfelter et al. (2004) drew from an administrative data set of all students and teachers in North Carolina. They found evidence of teacher sorting (teacher's preference to teach more advantaged students) and teacher shopping (parent's lobbying to get the best teachers for their child) that led to classrooms where “teachers with stronger observable qualifications end up with more advantaged and higher performing students” (p. 12). In the full sample they found that teachers from more competitive colleges (as ranked in Barron's Guide) were associated with higher student achievement. However, in their analysis of this study, Kennedy, Ahn, and Choi (2008) examined the subset of this data that included those schools that assigned teachers randomly to schools. They found, “In schools where students are not matched to their teachers, teachers from the most prestigious alma maters appear to be less able to foster learning in their fifth grade students” (p.1265).

Teach for America's (TFA) strategy of recruiting teachers from the most selective institutions provides a different approach to consider whether graduating from a selective institution contributes to teacher performance. Kennedy et al. (2008) describe TFA's approach as the “bright well educated” hypothesis to improve teacher quality. In Kennedy and colleague's meta-analysis of TFA's approach to recruitment, they examine four studies of TFA (Darling-Hammond, Holtzman, Gatlin & Heilig, 2005; Decker, Mayer & Glazerman, 2004; Raymond & Fletcher, 2002; Raymond, Fletcher & Luque, 2001). In their analysis, they find that the “effects of TFA recruits relative to other teachers...on their pupil's mathematics achievement... were all positive, ranging from 3 percent of annual growth to 21 percent” (p. 1267). Kennedy and colleagues note that the sample size of TFA teachers was relatively small and the comparison groups included “large, amorphous samples of teachers with highly variable backgrounds” (p. 1268). They also note that the effect of the strongest study in their set, “suggests that bright well-educated people add about 3 or 4 percent to students' average annual achievement gains, an amount roughly equal to the benefit of a single course in education or in mathematics education” (p. 1268).

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**COLORADO POLICIES TO SUPPORT HIGH STANDARDS FOR TEACHERS' ACADEMIC ABILITY.** In Colorado, teacher preparation programs at institutes of higher education (IHE) attend to academic or intellectual ability in the admissions process. The Colorado Department of Higher Education reviews admission procedures when approving each program. Most state-approved IHE teacher preparation programs require applicants to have a minimum GPA of 2.75. Most universities also evaluate applicants' basic verbal and mathematical skills or abilities. The Alternative teacher preparation program requires a Bachelors degree to enter the program. In addition, a transcript review is completed to determine if the candidate has the required 30 semester hours of credit in the area in which they are seeking a license from an approved college or university. Applicants must pass the appropriate content test (PLACE® or PRAXIS II®) for the area they are seeking licensure before they start the program.

Taken together, studies of teachers' general academic or intellectual abilities show some evidence that “smarts” do have modest impact on teacher quality. The next two sections consider research studying the impact on teacher quality of subject matter preparation and coursework in how to teach.

## Academic Subject Matter Preparation

Common sense suggests that teachers who know their subject matter will be able to teach their content well. A number of studies have considered whether teachers' academic major or content-specific coursework contributes to teacher quality. Much of the research has focused on academic preparation for mathematics or science teachers. Less is known about the impact of academic preparation for other subject matters (e.g., English, history) or levels (e.g., elementary).

In Floden and Meniketti's (2006) review of eleven high quality studies of the relationship between content preparation and teacher performance, eight were specific to secondary mathematics. They summarized the research base saying, “most studies reported a positive correlation between teachers' study of mathematics and the measures of student achievement, but the results were not entirely consistent” (p. 267). For example, some studies showed a positive association, while others showed no significant association. Some found differential effects, depending on whether the students were advanced or remedial. Kennedy et al. (2008) conducted a meta-analysis of these studies. In explaining this counter intuitive finding—that more study in a content area appears to make one less effective—they offer the following argument.



This pattern of findings reminds us of the two important interpretive difficulties in this type of research: the effects we see in the studies must be interpreted in the context of the entire statistical model, and that these measures of course-taking reflect both the knowledge gained from the courses and the teachers' original interests and dispositions that motivated her to take these courses in the first place (Kennedy et al., 2008, p.1259).

Overall, large scale studies suggest a relationship between content preparation and student achievement. This relationship is most clearly established in mathematics, and the data are more convincing for higher grades and more advanced mathematics. The evidence is inconclusive when it comes to content preparation for elementary grades. A college major or teacher's scores on tests of content knowledge may not capture the subtleties of how a teacher's understanding of content shapes her teaching. What professionally valuable knowledge teachers gained through college-level study of content is difficult to tease out in these large quantitative studies.

**COLORADO POLICIES TO SUPPORT HIGH STANDARDS FOR TEACHERS' ACADEMIC CONTENT PREPARATION.** In Colorado, state policy has responded to the nature and quality of teachers' academic subject matter preparation. For example, in the 1991 Educator Licensing Act, education majors were eliminated in Colorado. Since then, all teacher candidates in IHE teacher education programs must complete an approved content major (e.g., English, chemistry, mathematics). Post-baccalaureate candidates must demonstrate equivalent knowledge of a content major. For example, a potential secondary language arts teacher must demonstrate s/he has competency in the following domains of content knowledge: the history/structure of the English language, literature for adolescents and adults from a range of different cultures and perspectives, and

literature that includes both classical and contemporary texts and a broad variety of genres. Typically, to meet this requirement requires a minimum of 30 semester hours of college-level coursework in the content area. The Colorado Department of Higher Education and the Colorado Department of Education evaluate and approve all programs to ensure content courses align with Colorado Model Content Standards. Finally, state policy requires that teacher candidates pass the PRAXIS II® or PLACE® licensure exam in their content area prior to student teaching.

## Knowing How to Teach: Pedagogical Knowledge

It seems intuitive that knowledge of how to teach (pedagogical knowledge) is a sound indicator of teacher quality. Pedagogical knowledge involves the integration of several bodies of knowledge including learners and learning theory, instruction and assessment, and classroom management. Shulman has argued that good teachers know their content, but more importantly they know how to represent it meaningfully to learners and how to interpret and respond to learner's misconceptions and naïve understandings. He called this special knowledge teachers have *pedagogical content knowledge, or PCK* (Shulman, 1987; Wilson, Shulman, & Richert, 1987).

Teachers develop pedagogical knowledge through initial preparation experiences at the university and in K-12 classrooms, then on-the-job during their first years, and later through continuing professional development. Researchers conducting large scale studies have been unable to create good measures of pedagogical knowledge and have had to use substitute measures such as: certification, number of credits earned in specific courses (e.g., subject matter teaching methods), or scores on licensure tests.

Each of these measures represents a high level of aggregation and therefore does not adequately account for an individual's actual knowledge. For example, as discussed earlier, *certification* is a broad classification that captures those who have met requirements of university-based programs as well as those of alternative programs with minimal preparation in pedagogy (see side bar on Teacher Licensure in Colorado, page ). Given changes in licensure standards, the meaning of “certification” varies from state to state, institution to institution within a state, and across time. The measure is ambiguous. Because certification indicates that an individual has met minimum entry requirements into the profession, it is a weak measure of quality.

Second, while the *number of credits in education courses* is a slightly more precise measure than certification, it is not sensitive to variation in an individual instructor's course content or assessment standards.

Third, *licensure* tests are required in most certification pathways and serve largely to screen out those who have unacceptable content knowledge. They provide a minimum entry standard into the profession. Starting in the 1990s Educational Testing Service (ETS) developed a series of tests which are now required in most states. The Praxis® I and II series includes tests of basic knowledge, content knowledge, and professional knowledge. Colorado only requires one licensure test which focuses on a teacher's content knowledge; this requirement may be met by passing either the National Evaluation Systems (NES)-developed PLACE® exam or the ETS-developed Praxis® II exam of content knowledge.

Whether *scores on licensure* tests measure the way knowledge is used in teaching is an open question (Mitchell, Robinson, Plake & Knowles, 2001). States, rather than test vendors, set cut scores thereby making cross-state comparisons more difficult. As the National Research Council's 2001 study of teacher assessments points out, the tests assess minimum standards for beginning teachers and given the complexity of teaching, they do not necessarily evaluate competencies of teacher candidates. Also, they

have not been evaluated for their predictive validity. Thus, we do not know if licensure tests distinguish the minimally competent from high quality candidates (Mitchell, et al., 2001).

Despite limitations of these three proxy measures (certification, education coursework, licensure tests), a number of large scale studies have been conducted that relate them with measures of teacher effectiveness. These three measures consider pedagogical knowledge developed during teacher preparation. Studies of professional development have considered what teachers learn once they are working as classroom teachers. We summarize studies of the relationship between teachers' pedagogical knowledge, whether learned during teacher preparation or professional development, and teacher quality.



**CERTIFICATION.** Wilson and Youngs (2005) identified eight large scale studies comparing certified teachers' with uncertified teachers' impact on student achievement. The studies were published between 1985 and 2002, and focused mostly on mathematics teachers in middle and high school (one also included science, and one included language and reading). Overall, seven of the studies found positive correlations between certification and student achievement.

More recently, a study of 4th to 8th grade teachers in New York City, found no difference between teaching fellows (individuals enrolled in a program whose structure resembles Colorado's Teacher-in-Residence programs described in Teacher Licensure in Colorado, page 27) and certified teachers in their impact on math achievement (Kane, Rockoff & Staiger, 2006). With regard to reading achievement, those students assigned to teaching fellows did not perform as well as those who had certified teachers.

It appears that subject-matter specific certification, particularly in mathematics, positively affects student achievement in secondary education. The evidence is less compelling in other subject areas and other grade levels, which is probably due to the imprecision of certification as a measure.

**EDUCATION COURSEWORK.** The number of credits in education courses is a different proxy measure of teachers' pedagogical knowledge. One large-scale study of 266 secondary teachers in Arkansas found that teacher education coursework best predicted teaching performance as measured on an observation instrument that included 13 categories of teaching expertise (Ferguson & Womack, 1993). The coursework was a far better predictor than GPA (Grade Point Average) in content courses or score on a test of pedagogical knowledge. Monk (1994) used the Longitudinal Study of American Youth (LSAY) data to examine relationships between secondary math and science teachers' coursework in content and pedagogy and students' achievement in those subjects. He found that courses in mathematics or science methods had a positive effect on student learning in both subjects and sometimes had more powerful effects than additional courses in content. Thus, specific courses in education, particularly subject matter methods courses, do appear to contribute to teacher quality. This appears to be a more precise indicator than certification status.

Qualitative studies of initial preparation experiences at universities have shown that individuals learn key concepts and frameworks that help them analyze and learn from experience (see Wilson, Floden, and Ferrini-Mundy, 2001 for a rigorous review of teacher preparation research). Studies document that candidates acquire knowledge of a range of instructional, assessment, and management strategies. Studies also show that in programs that emphasize developing pedagogical content knowledge, candidates learn to reorganize their subject matter knowledge so they can teach it to students.

Initial teacher preparation may be of most value when preparing teachers to develop pedagogical content knowledge to teach more complex cognitive tasks. For example, in mathematics teachers may understand the computational rules and procedures for division, but lack a conceptual understanding that will allow them to respond effectively to students' misconceptions (Ball, 1990). Kennedy (1998) found similar results with regard to teachers' lack of knowledge of grammatical principles that would allow them to explain problems in students' writing. However, in a more recent review, Kennedy (in progress) found teacher education courses may not be as influential as teacher educators hope, particularly if courses do not emphasize practical tools and if the vision of teaching promoted is inconsistent with the local context where teachers are hired.

**TEACHER TESTS.** Two different tests have been used as measures of teacher's pedagogical knowledge, licensure exams and National Board Certification. Several studies have examined whether teacher's scores on either test are related to student achievement.

Gitomer et al. (1999) showed that the Praxis exams appear to align well with what is taught in teacher education programs. However, they are not designed to predict whether a teacher will be highly effective (Wilson & Youngs, 2005). Goldhaber (in press) analyzed a unique dataset from North Carolina linking teachers to individual students in grades three through six over a 10-year period (1994-95 through 2003-04). Using value-added modeling, he exploited a natural experiment in the data. In 2000, North Carolina changed its policy with regard to cut scores on its licensure test for elementary teachers, the Praxis II tests (0011 and 0012, the Praxis II Curriculum, Assessment, and Instruction test and the Content Area Exercises test). This allowed Goldhaber to identify “teachers ... who were hired under the 1997 cut scores who would not have gained entry under the 2000 cut scores” (p. 12). He concluded there was “general support for the hypothesis that licensure tests are predictive of teacher effectiveness, particularly in teaching mathematics” (p. 27). He also noted, however, that they may be best suited to ensure a basic level of quality, rather than providing a strong signal of quality.



National Board Certification is another form of teacher testing that assesses veteran teachers' mastery of subject matter content and teaching skill. Approximately, twelve (12) studies have been conducted that examine the effect of National Board Certification on student achievement. Given the existing methods and available data, several consistent patterns emerge that relate student achievement to National Board for Professional Teaching Standards (NBPTS)<sup>6</sup> certification status. First, the apparent large achievement differences

found in some studies are largely attributable to the nonrandom assignment of teachers and students. National Board Certified Teachers (NBCTs) tend to have students who have stronger historical records of achievement. When assignment factors are controlled, students of NBCTs still tend to learn somewhat more (Gitomer, 2007a).<sup>7</sup>

<sup>6</sup>[www.nbpts.org](http://www.nbpts.org)

There are 332 National Board Certified Teachers in Colorado (2008) with 98 additional candidates for certification in 2008.

**PROFESSIONAL DEVELOPMENT.** Continuing professional development provides opportunities for both novice and veteran teachers to develop their pedagogical knowledge. In most states, including Colorado, continuing professional development is a requirement for recertification. Teacher surveys about the content and effectiveness of professional development options (Hudson, McMahon, & Overstreet, 2002; National Center for Education Statistics [NCES], 2005) show that it is both ubiquitous and of uneven quality. While generic, one-day workshops are less prevalent, there is wide variation in what has replaced them (Hill, 2007).

Research has linked professional development with enhanced student learning (Good, Grouws & Ebmeier, 1983; Carpenter, 1989, Saxe, Gearhardt, & Nasir, 2001; McCutchen, 2001). These four well-designed studies involved randomly assigning teachers to focused, subject-matter specific professional development, most of which was sustained over time. Three programs focused on mathematics, one on reading instruction. In all four studies, students whose teachers experienced quality professional development showed statistically significant learning gains on content achievement tests.

Features of quality professional development include significant time (e.g., not one-day workshops), a focus on subject-matter specific instruction and student learning, alignment with school improvement goals or curriculum materials, and the collective involvement of a number of teachers in the same program (Hill, 2007). Despite evidence of programs that do contribute to student learning, the system of professional development lacks coherence, and overall does not appear to contribute significantly to student achievement gains (Hill, 2007).

*... as in many states, Colorado's system for developing and extending pedagogical knowledge is highly variable.*

Overall, pedagogical knowledge is a broad concept that is difficult to measure. Studies where education coursework, teacher tests, or professional development are used as proxies

for pedagogical knowledge show that this is an important indicator of teacher quality, particularly in mathematics. Certification is not a good measure of teachers' pedagogical knowledge because it varies tremendously from state to state and because it sets a minimum standard for quality and does not measure different levels of quality.

**COLORADO POLICIES TO SUPPORT HIGH STANDARDS FOR TEACHERS' PEDAGOGICAL KNOWLEDGE.** In Colorado, licensure policies, both for initial and professional licenses (see Teacher Licensure in Colorado, page 27), exert some influence on teachers' development of pedagogical knowledge. Policies regarding initial licensure lead to different expectations for when candidates must demonstrate competency in basic pedagogical knowledge. Those who complete preparation programs at institutes of higher education must demonstrate this competency prior to assuming responsibility for learners. Those who go through alternative-preparation programs (about one-third of all teachers prepared in Colorado) must complete a "boot camp" and then are mentored as they assume responsibility for learners as they are developing this knowledge on-the-job.

Colorado law requires that all teachers with an initial license complete an approved induction program as part of the process to earn a professional teaching license; however, the quality of induction programs varies from district to district. All Colorado teachers who hold a professional license must complete ongoing professional development to maintain their professional license. In many cases, district-sponsored seminars and workshops fulfill this requirement for recertification. Thus, as in many states, Colorado's system for developing and extending pedagogical knowledge is highly variable. The variability means that some teachers develop extensive pedagogical knowledge, while others do not.

## TEACHING EXPERIENCE

Actual teaching experience does contribute to teacher quality (Greenwald et al., 1996). This fits with common sense understandings that what individuals learn on-the-job is likely to improve performance. Kennedy (2007) points out some limitations in the studies relating teacher experience with student achievement. She argues that “Most studies examining the effect of teachers' experience gather their data at a particular moment in time, such as 1998 or 2002, so that researchers can't know how populations of experienced teachers differ from others within their cohort who have since left the field....Every one of them is susceptible to the rival hypothesis that observed differences between teachers with more or less experience reflect differences in qualifications at the time of original hire, or differences in the group that chose to remain in teaching versus those in the entire pool of entrants. It is possible that the experience itself has nothing to do with the appearance of differences in effectiveness.” (p21).

Murnane and Philips (1981) looked at teacher experience as one variable related to students' scores on a standardized vocabulary test. The sample included over 800 low-income, African American elementary (grades 3-6) children. They found that for teachers in their first seven years, experience had a positive effect on achievement (as measured by a vocabulary test). They also found that veteran teachers, those with 14 years or more, also had a positive effect. They hypothesized that an individual's learning from experience in early years contributes to the positive effect. To explain the veteran teachers they argued that there is a “vintage” effect. They hypothesized that teachers in their sample with more experience may have entered the profession when there were fewer options for women. Also, teachers who were not effective in the first years may have “selected” out of the profession. This study reminds us that when explaining evidence that experience matters, policymakers should also consider the overall labor market for a given cohort of teachers. We should also expect some individuals will leave the profession after a few years. The impact of early-leavers on the quality of the workforce is a concern only when those who leave had great potential to be effective.

Ferguson (1991) compared teacher experience in almost 900 Texas school districts, serving over 2.4 million students, with student achievement on math and reading tests (TEAMS). He measured experience at the district-level using two variables, percentage of teachers with 5-9 years experience and percentage with more than 9 years experience. He found experience accounts for 10% of the variation in test scores across districts. For elementary teachers, he concluded that once teachers have five years experience, additional years do not add to their effectiveness. At the high school level, though, the results suggested that teachers with nine or more years produced better results than those with five to nine years. This study underscores that experience matters, and that it varies with different grade levels.

Clotfelter et al. (2004) synthesized several studies that used 2000-02 administrative data in North Carolina to examine how the distribution of teachers contributes to achievement gaps between minority and white students. They found that minority students in North Carolina are more likely to have a novice teacher. In an analysis of fifth grade students and their teachers, they found that “controlling for other teacher characteristics, the presence of a highly experienced teacher increases student achievement in math by close to a tenth of a standard deviation relative to a novice teacher and by a bit less in reading. Moreover, in both cases almost half of the achievement effect is attributable to the first years of teaching...Regardless of how effective novice teachers may eventually become, during their first year of teaching they are clearly less effective than more experienced teachers” (p. 18). They extended this work (Clotfelter et al., 2007) and again found that experience matters.

Thus, experience does contribute positively to student achievement, particularly in the initial years. Since it is impossible to hire only teachers with experience, policy makers are concerned with the disproportionate number of inexperienced teachers working in today's low-performing schools. Given that experience in the initial years does appear to matter, policy makers should attend to the quality of field experiences in teacher preparation and to strong induction programs that maximize teachers' learning and improvement of practice during this critical window.

**COLORADO POLICIES RELATED TO TEACHING EXPERIENCE.** In Colorado, several policies around licensure recognize the importance of experience. For example, teacher candidates at institutes of higher education generally must complete 800 hours of supervised field experiences prior to their first paid teaching assignment. Those

*Given that experience in the initial years does appear to matter, policy makers should attend to the quality of field experiences in teacher preparation and to strong induction programs that maximize teachers' learning and improvement of practice during this critical window.*

in alternative preparation programs develop this experience while they are in their first paid teaching assignment in a classroom. Most alternative pathway teachers are working in schools/districts that serve students in the greatest need. These are largely minimum standards that do not address the fact that schools serving high-needs learners are more likely to have inexperienced teachers. At this point,

Colorado does not have any explicit policies that attempt to address this "experience-gap." At the same time, district hiring and teacher support policies have a much greater impact on whether teachers stay in a particular building or district and thus give districts much more power to affect the "experience-gap" than the state.

## RACE AND ETHNICITY

There is a growing mismatch between teachers' racial, ethnic, and linguistic background and that of K-12 learners. The demographic profile of teachers continues to be largely white, middle class, and female (Gitomer, 2007b; NCES, 2003). While the number of minority teachers has increased, it is at a much slower rate than increases in student diversity. As shown in the next chapter, minority teachers are more likely to teach in schools with a minority population; however, minority students will still encounter more white teachers than teachers of color during their school experience (Zumwalt & Craig, 2005a).

Many have called for a more diverse teaching force (e.g., Ladson-Billings, 1992, 1994; King, 1996; National Commission on Teaching and America's Future [NCTAF], 1996). The underlying assumption is that all students benefit, as a multi-racial, multi-cultural democratic society depends on children learning to work and learn with a broad range of individuals. More specifically, students of color benefit from having teachers who are positive role models, who understand the experiences of being a person of color in the US, who can provide culturally relevant pedagogy, and who will maintain high expectations. Some contend that white teachers' low expectations and tacit racism may contribute to the achievement gap between Whites, Blacks, Hispanics, and Native Americans. Researchers have asked whether there is a significant impact on minority students' achievement when teachers' racial/ethnic background is matched to their students. The research base on this indicator is slender, and findings are mixed (Ferguson, 1998).

Ehrenberg, Goldhaber, and Brewer (1995) analyzed the 1988 National Educational Longitudinal Study (NELS) data set to analyze how a teacher's race, gender, and ethnicity, which they refer to as RGE, influence students from both the same and different RGE groups. They measured both how teachers subjectively evaluate students and student achievement data. They found, "for the most part these teacher characteristics did not affect how much students learned between 8th and 10th grade in four subject matter areas. They do, however, sometimes seem to have influenced 10th grade teachers' subjective evaluations of students, even after we control for the student's subject matter test scores in the 8th grade" (p. 559). After noting some potential limitations in the data set that might affect analyses, they suggest that the findings may either be viewed at face value as evidence that race doesn't matter, or that subjective evaluations do play an important role in the student's experience. They suggest further analysis is needed, when more longitudinal data becomes available from the NELS 88 set.

Ferguson's (1998) chapter in *The Black-White Gap* suggests that with regard to increasing student achievement, teachers' race and socioeconomic status interact in important ways. Black students seem to gain most from low socioeconomic status black teachers and high socioeconomic status white teachers. White students, on the other hand, seemed to gain most from high socioeconomic status black teachers. Matching black students to black teachers does not appear to offer any simple way of increasing the scores of black students.

Dee (2004) tackles the question of the relationship between exposure to own-race teachers and subsequent student achievement by conducting a reanalysis of the Tennessee STAR (Student Teacher Achievement Ratio) data set. The STAR project, which addressed the impact of class size on student learning, involved the random assignment of K-3 students and teachers to three conditions: small classes, average-sized classes, and average-sized classes with an aide. Dee's analysis of this unique data set indicates that "assignment to an own-race teacher was associated with substantive gains in achievement for both black and white students. More specifically, Dee's results suggest that a year with an own-race teacher increased math and reading scores by 2 to 4 percentile points" (p. 196). Dee cautions, however, that his results do not explain mechanisms for why same-race pairing may positively affect student achievement.

## TEACHERS' PEDAGOGICAL KNOWLEDGE FOR DIVERSE STUDENTS

While the previous discussion of pedagogical knowledge addressed basic pedagogical knowledge, a critical aspect of that knowledge base involves teachers "thinking pedagogically" about diversity. Researchers have shown there is a distinct body of knowledge teachers need to draw upon to support all learners, particularly those whose racial, ethnic, linguistic, or socioeconomic background differs from the teachers (Banks et al., 2005; Valdez, Bunch, Snow, Lee & Matos, 2005).

Qualitative work, such as Ladson-Billing's (1994) interpretive analysis of highly effective teachers of black and Hispanic children, makes a compelling argument for culturally responsive pedagogy. Teachers who engage in culturally responsive pedagogy see diversity as an asset. They acknowledge and appreciate students' knowledge and experiences, especially those outside school, and incorporate them into the school learning experience (Gay, 2003; Howard, 2003; Ogbu, 1997). They are "culture brokers." Teachers who engage in culturally responsive pedagogy know, respect, and care for all learners by holding high expectations for every learner, offering an intellectually rigorous curriculum, and providing appropriate support so students meet their high expectations (Banks et al., 2005). Culturally responsive teachers have examined their own biases and understand how their attitudes can shape students' behaviors; they work to develop anti-racist and non-discriminatory behaviors (Gay, 2000).

Finally, culturally responsive teachers understand the role of language in learning and how to support English language learners. This involves: understanding regional and class variations in language use in students' homes and how that differs from school-based language and literacy; seeing all students as competent speakers of the language(s) spoken in their home and community; and knowing how to bridge home language use to school so that all students expand their linguistic registers and acquire the ways of speaking and writing expected in school (Valdez et al., 2005).

Hollins and Guzman (2005) review of research on preparing teachers for diverse populations suggests that overall there are still many weaknesses in how new teachers are prepared to promote diverse students' learning. A fundamental assumption in many teacher preparation programs has been that teacher candidates' attitudes, beliefs, predispositions, and prior experiences with diversity operate as filters through which they perceive, interpret, and interact with diverse students. Research suggests that the predominantly white, middle class, female population of teacher candidates hold negative views about those who are different from themselves. Irvine (1990) shows these views may explain different patterns of interaction with students of color that affect student learning experiences (e.g., providing less specific feedback, asking lower-level questions). Approaches taken in teacher education—both initial university-based preparation and continuing professional development—include efforts to teach prejudice reduction and equity pedagogy, community-based field experiences, and using personal biographies and storytelling to develop cultural awareness. Since much of the research conducted use interpretive methods to study individual courses, interventions, or a small number of candidates, aggregating our understandings into more general findings is difficult. Much of the work done up to this point has focused on changes in teacher candidates' beliefs and attitudes. Linkages have not yet been made to classroom practices, and more importantly, to student learning outcomes.

## Colorado Watch

### Promising Practices

CRUE Center is located at the University of Colorado Denver, School of Education and Human Development. The CRUE Center is “committed to ensuring that educators and school systems in Colorado have the tools to meet the needs of culturally, linguistically, and economically diverse urban students.” The CRUE Center offers two-day trainings and also has developed a nine credit hour graduate certificate designed to assist educators in better meeting the needs of urban students who are culturally, economically and linguistically diverse. [www.cruecenter.org](http://www.cruecenter.org)

**COLORADO POLICIES RELATED TO TEACHER DIVERSITY AND TEACHERS' PREPARATION FOR DIVERSE LEARNERS.** The Colorado Department of Higher Education has included in its performance contracts with public universities targets to increase the number of minority teacher candidates who complete university-based teacher preparation programs. In Colorado the total number of teachers of color is 10%; even doubling the number of teachers of color would result in only a small increase in the overall percentage of teachers of color in the Colorado workforce. Therefore, it may be more practical to focus policy on efforts to ensure all Colorado teachers develop cultural competence and enhanced ability to support English language learners (ELL). In a 2004 survey of new teachers in ten Colorado districts, about one-third reported they did not feel confident in their ability to work with English Language Learner (ELL) students (Alliance for Quality Teaching, 2005). The Performance-Based Standards for Colorado Teachers, adopted in 2001, which replaced the standards from the 1991 Educator Licensing Act, eliminated explicit language in the 1991 initial teacher licensure standards that addressed diversity and cultural competence.

## What teachers say about teacher quality

A quality teacher is...

- Continuously learning.
- Hard working.
- Patient.
- Confident and empathetic in multi-cultural or multi-racial issues.
- Open-minded.
- Respectful of learners.

And a quality teacher...

- Builds a relationship with the students so a mutual trust and understanding can be established.
- Has high standards for the students... a belief that the child's abilities will ultimately inspire and empower the child.
- Infuses practicality.
- Has expertise, passion, courage, discipline, structure and flexibility.
- Listens.
- Makes connections to the families and communities.

Conversation with Teacher Leaders, Leadership Conference, Colorado Education Association, Copper Mountain CO, July 25, 2006.

## DEVELOPING QUALITY TEACHERS AND A QUALITY WORK FORCE

Another approach to understand teacher quality focuses on how schools and districts are organized to contribute to the growth and development of quality teachers and a quality workforce. Given that experience and developing pedagogical knowledge are strong indicators of teacher quality, it is important to pay attention to the places where individuals learn to teach, from pre-service to induction to continuing professional development.

Initial teacher preparation, whether in university-based or alternative preparation programs, is the first critical link in building a quality teacher workforce (NCTAF, 1996). The quality of teacher education programs and alternative teacher preparation have been the subject of debate and studies over many decades. Recent reports on teacher preparation programs that consistently produce quality teachers agree on several components of effective teacher education programs, including coherent and aligned coursework and consistent connections between theory and practice (Darling-Hammond, 2006; Levine, 2006).

Over the last ten years the number of pathways into teaching has increased dramatically. The research on the relationship between what pathway an individual takes into teaching and teacher effectiveness is just beginning to emerge. Louisiana, for example, instituted new accountability standards for teacher preparation in 2000-2003. Initial value-added modeling to analyze the effectiveness of these reforms is encouraging; however, it is still too early to tell whether the state-wide redesign efforts are positively impacting student learning (Noell, Porter, & Patt, 2007). Another state, further down the road in studying relationships between teacher pathways and student learning is the New York Pathways project<sup>8</sup>. A recent research brief (Boyd et al., 2007) suggests that the overall curriculum of teacher education is more similar than different. Subsequent research reports and findings from these projects bear further watch.

*The research on the relationship between what pathway an individual takes into teaching and teacher effectiveness is just beginning to emerge.*

The first three years in the teaching profession are equally crucial in building a quality teacher workforce. Recent research on teachers' working conditions outlines key features of the workplace that enhance teacher quality, retention, and effectiveness (Johnson, 2006). A fundamental assumption of Johnson's work is that teachers' characteristics and qualifications are not "fixed and static"...rather, they are malleable and dynamic within a rich, professional context that encourages learning and growth" (p.2). The workplace culture plays a key role in whether newly hired teachers stay for more than a year or two.

Research on employment patterns suggests that turnover and attrition rates have risen significantly since 2000 (Ingersoll, 2001; Johnson, 2006). High teacher turnover is most prevalent in schools serving children living in low income homes and communities, children of color, and English language learners or new arrivals. High turnover contributes to the "teacher gap" highlighted in the 2006 *Shining the Light* report.

A different approach to teacher quality, from an economic perspective, considers how salary and compensation practices affect teacher quality (Hanushek & Rivkin, 2007). In the remainder of this section, we discuss working conditions for novice teachers and compensation practices as they contribute to developing a quality teacher workforce.

<sup>8</sup><http://www.teacherpolicyresearch.org/TeacherPathwaysProject/tabid/81/Default.aspx>

## WORKING CONDITIONS FOR NOVICE TEACHERS

Teacher working conditions are also student learning conditions and they affect teacher retention (Center for Teaching Quality, 2007; Lankford et al., 2002). Johnson and colleagues studies (2004) of working conditions have identified a number of features that enable teachers, especially new teachers, to teach more effectively. These include appropriate and fair teaching assignments, induction and mentoring programs, continuing professional development, aligned curriculum, facilities and resources, and principals' leadership.

**TEACHING ASSIGNMENTS.** Appropriate teaching assignments contribute significantly to a teacher's ability to deliver quality instruction and to have a positive impact on student achievement. Included in the area of "appropriate" assignments is ensuring that teachers are assigned within their content area as well as having a manageable teaching work load. As districts have complied with NCLB's "highly qualified teacher" requirements, more teachers are teaching in their content area. Teaching load refers to the number of preparations (for secondary), non-instructional duties, and overall number of students served.

The nature of a teacher's load can affect teacher learning. For example, in secondary schools, while an average teaching load is five classes with two preparations (e.g., a math teacher might teach Algebra 1 and Geometry, each of which is a "preparation"), beginning teachers often have just as many classes with more preparations; this type of assignment presents much more work for a much less experienced teacher (Johnson, 2006). This situation takes time away from the teacher to focus on building her craft and can lead to the individual moving to another school or out of the profession entirely. Similarly, other non-instructional tasks and duties often take up time that is otherwise allotted for preparation or collaboration. As a result, teachers are left with little time outside of completing necessary tasks and teaching in the classroom to further develop their craft. In a study conducted over several school districts in five states, when asked to rate several factors according to the following statement, "In considering your future plans, please indicate the importance of the following in influencing your decision," 94% of teachers deemed "time to do my job during the day" important and 50% deemed it extremely important (surpassed only by support from administration, cost of living and salary) (Hirsch, Emerick, Church, & Fuller, 2006).

**INDUCTION.** Induction (i.e., new employee training) and mentoring programs "improve teaching quality, stem high rates of teacher attrition, and in doing so, decrease the overall costs of teacher recruitment and retention and increase student achievement" (Center for Teaching Quality, [www.teachingquality.org](http://www.teachingquality.org)). Effective induction programs are associated with reduced teacher attrition (Education Commission of the States [ECS], 2000; Molner-Kelley, 2004; Smith & Ingersoll, 2004). Studies performed by the Education Commission of the States show that induction and mentoring programs improve not only teacher retention but decrease teacher movement in and out of schools. In addition, they provide opportunities for continuing development and learning. Reducing teacher movement leads to greater stability among the staff and allows teachers to develop greater coherence in curriculum and teaching within a school.

However, these programs also require a commitment of resources, skilled and well-trained mentor teachers and allotted time for the programs in order to be most effective (ECS, 2000). In a recently published cost-benefit analysis of a comprehensive mentoring program for beginning teachers in a medium-sized district in California (Villar & Strong, 2007), the researchers found that mentoring results in greater savings to the district than costs incurred from teacher attrition (e.g., hiring and training a replacement teacher). Some features of high quality mentoring and induction practices include rigorous mentor selection based on qualities of an effective mentor, ongoing professional development and support for mentors, multi-year mentoring, intensive and specific guidance moving teaching practice

forward, professional teaching standards and data-driven conversations, ongoing beginning teacher professional development, clear roles and responsibilities for administrators, and collaboration with all stakeholders (New Teacher Center, 2007).

## Colorado Watch

### Promising Practices

The URBAN TEACHER PARTNERSHIP (UTP) program at Metropolitan State College of Denver is a partnership between Metro State and Denver Public Schools designed to expand the pipeline of high-quality middle and high school teachers in four content areas: math, science, English and social studies. One of the unique features of this partnership is that participants conduct all of their field experience in a designated “Urban Apprentice School,” one of eight identified DPS secondary schools. At that specialized site, UTP participants have access to first-rate mentors, district and school-based professional development opportunities, interview preparation support, and specialized induction support through the first three years of teaching.

[www.mscd.edu/~tqe/index.shtml](http://www.mscd.edu/~tqe/index.shtml)

The PARTNERS IN EDUCATION (PIE) program is a collaborative induction and graduate studies venture between partner school districts and the School of Education at the University of Colorado-Boulder. With broad partnership goals to share responsibilities and exchange ideas and resources, the program aims to provide targeted, classroom-based support within a context of graduate studies for novice teachers, share responsibility for retention and best practice of teachers, support the professional development of teacher leaders at local school districts and provide a mechanism to connect theory and practice.

<http://www.colorado.edu/education/prospective/pie.html>

**CONTINUING PROFESSIONAL DEVELOPMENT.** Though much of the teacher quality discussion focuses on hiring and retaining high quality new teachers, in Colorado 67% of classroom teachers have at least four years teaching experience and qualify as “veteran teachers” (Strizek, Pittsonberger, Riordan, Lyter & Orlofsky, 2006). Continued professional development complements mentoring and induction programs. As in any profession, teachers must have opportunities to continue to build upon and improve their craft. However, teachers describe many professional development opportunities as being piecemeal, isolated, and disconnected from their practice (Hill, 2007; Hirsch et al., 2006; McLaughlin & Talbert, 2006). Current best practices in professional development emphasize job-embedded learning communities, as these have been shown to offer meaningful and coherent opportunities. These opportunities help teachers to develop a network within which each individual contributes to and benefits from a collective pool of knowledge, skills and expertise (McLaughlin & Talbert, 2006). Networks contribute to stability and cohesion within a building staff. For further discussion on the impact of high quality professional development on student achievement, see the previous section, *Knowing How to Teach: Pedagogical Knowledge (Professional Development)*.

**ALIGNED CURRICULUM.** All teachers, especially new ones, need curriculum materials that are aligned with state standards and assessments. Aligned curriculum provides teachers with a continuous and consistent path in their teaching, thereby enabling them to focus on the craft of teaching (Johnson, 2006). Several studies report that while teachers support high standards, they often do not have access to or are not provided with such curricula (Johnson, 2006). Similarly, one study describes how curricular frameworks can be so general as to work against effective teaching and learning (Grossman & Thompson, 2004); general standards work against effective student learning and against adequate scaffolding of teacher knowledge.

Highly scripted curriculum is not a solution to this problem. Teachers, particularly in low-income schools, are more likely to be asked to implement prescriptive curricula. Kauffman and colleagues (2002) noted that “in calling for greater specification, these new teachers stopped well short of asking that their every move be dictated” (p. 25). Further, it is important to recognize the job embedded professional development that many aligned curricula bring with them. Along with the benefits brought about by the curriculum itself, this professional development augments its positive effect.

## Colorado Watch

### Promising Practices

University of Colorado Denver's PARTNER SCHOOLS is a School-University Collaboration where university faculty, teachers and administrators work together in partner schools to improve the education of P-12 students and to improve the preparation of new teachers for the profession. Partner schools are designed to support simultaneous renewal - improvements in teacher education that lead to improvement in school operations and student learning, which in turn leads to improvement in teacher education and so on. First established in 1992, there are currently 28 partner schools across six school districts in the Denver Metropolitan area.

<http://thunder1.cudenver.edu/ipte/ogreen/Partner%20Schools.htm>

The BOETTCHER TEACHERS PROGRAM is a field-based approach to preparing new teachers to thrive in urban schools. Through the Boettcher Teachers Program, new teachers who commit to five years teacher in urban schools are provided fellowships to acquire skills that enable them to be successful with students who have been historically underserved. This program is a collaboration among the Boettcher Foundation, Public Education and Business Coalition, University of Denver Morgridge College of Education and the Mapleton and Adams 12 Five Star school districts.

[www.boettcherteachers.org](http://www.boettcherteachers.org)

**FACILITIES AND RESOURCES.** In order to perform, teachers must have the tools to do the job. Yet, many classrooms lack even basic materials such as current textbooks and general teaching supplies (Johnson, 2006). Further, there is often a discrepancy between the availability of resources to teachers in low- and high-need classrooms. One study suggests that this discrepancy creates a type of teacher tracking, fostering teacher performance in low-need schools while hindering that performance and development in high-need areas (Achtinstein et al., 2004).

Adequate facilities are a particular challenge in rural Colorado where communities lack the ability to pay for new buildings (Donnell-Kay Foundation, 2005). It is important to enable teachers to perform at high levels by making available the resources to do so. Attending to resources is also a way of retaining teachers.

**PRINCIPAL'S LEADERSHIP.** School leadership serves a vital role in fostering and retaining quality teachers. Research shows that leadership in schools has an impact on the overall school culture as well as on teachers' job satisfaction (Hirsch et al., 2006, p. 23). As a result, it is important to hire and retain school leaders who will create a positive working environment and who distribute leadership among teachers within a building, thereby harnessing teachers' expertise to improve student learning. Teachers' knowledge can be put to use as curriculum developers, mentors, or department or grade-level team leaders.

**COLORADO POLICIES THAT SUPPORT QUALITY TEACHER WORKING CONDITIONS.** Overall, Colorado lacks coherent policy regarding the quality of teacher working conditions. State regulations for teacher licensure require teachers holding an initial teaching license to complete an approved induction program before being eligible for a professional license. The quality of these programs varies tremendously. State regulation also requires that teachers earn recertification credit, often through district-sponsored professional development. Again, the quality of professional development varies. Responsibility for curriculum typically resides at the district, and again the quality of curricular frameworks and adopted materials varies significantly. Responsibility for teaching assignments and facilities and resources typically lies at the building level, but is heavily influenced by district hiring policies and the district's bargaining agreements with its association of teachers. Finally, the district bears responsibility for the quality of principals' leadership.

## COMPENSATION PRACTICES

Currently, many districts follow the traditional model of teacher pay increase, which works as a stepwise process; a teacher is paid according to her level of education and years of service. Some authors conclude that this pay scale has served as a disincentive for some applicants, turning them to other higher-paying professions (Usdan et al, 2001). However, several alternative pay schedules have been instituted (such as Douglas County's system<sup>9</sup>, ProComp in Denver<sup>10</sup>, and Teacher Advancement Program [TAP] in Eagle County<sup>11</sup>) that are similar to other professions where employees receive compensation and bonuses for performance on the job. This system more directly rewards effective teaching through increased salary.<sup>12</sup>

In a study conducted for the Center for American Progress, Goldhaber (2006) suggests several reasons for a more performance-based pay schedule for teachers. First, teaching positions vary greatly according to workload and tasks and teachers should be compensated appropriately; second, teachers respond to monetary incentives; and, finally, research on alternative pay schedules "suggests that teacher pay reform can be an effective way to achieve policy objectives." It appears, though, that teachers who move from one school to another, particularly in the early years of their career, are motivated more by working conditions and the opportunity to work with higher-achieving students than by salary (Hanushek & Rivkin, 2007). However, research on Douglas County has suggested their compensation system has increased teacher retention (Reichardt & Van Buhler, 2003).

<sup>9</sup>For more information about the Douglas County Pay for Performance system :

[http://www.dcsdk12.org/portal/page/portal/DCSD/Human\\_Resources/Certified\\_Staff/Pay\\_for\\_Performance](http://www.dcsdk12.org/portal/page/portal/DCSD/Human_Resources/Certified_Staff/Pay_for_Performance)

<sup>10</sup><http://denverprocomp.org/>

<sup>11</sup>For more information about the TAP program in Eagle County: <http://eagleschools.net/aboutus/tap/>

<sup>12</sup>In Colorado, there are also 16 districts that provide stipends to teachers earning National Board Certification. They range from a percentage of a base salary to a flat amount usually between \$500 and \$5,000 per year. Colorado currently provides \$1000 of the \$2,500 fee to take the test for National Board Certification. An addition \$1,000 is provided through Federal funds.

## SUMMARY OF RESEARCH ON TEACHER QUALITY

The research on teacher quality, though extensive, is not highly conclusive. Because teacher quality is a broad concept, the factors that can affect teachers are wide ranging. Also, difficulty in performing experiments with children in schools makes it hard to identify which factors clearly lead to quality teaching. Despite the limitations, some commonsense notions do have moderate research support.

The quality profile that emerges suggests that “smarts” matter, but knowledge of academic content and how to teach it may be more critical for student learning. With regard to academic content knowledge, college-level subject matter courses that are closely aligned with the actual content of the k-12 curriculum may be most critical. Education courses and/or professional development experiences that help teachers develop nuanced understanding of how learners learn content and that provide teachers with practical tools to teach academic concepts and skills also matter.

Recruiting and retaining diverse teachers is important, particularly as the student population becomes increasingly more racially, ethnically, and linguistically diverse in the years ahead. There is some modest evidence that suggests that same-race pairings may positively affect student achievement, though researchers cannot explain mechanisms for why. In addition to efforts to recruit and retain diverse teachers, it is essential all teachers develop cultural competence to support *all* learners, particularly students in low-performing schools. Finally, though there are some flaws in the assumptions of research on teacher experience, teacher experience appears to positively affect student learning. Efforts to support teacher learning and development during initial years and to cultivate productive working conditions is a cost-effective strategy to retain teachers.

Colorado has made strides on a number of factors related to teacher quality, namely academic ability, academic content and pedagogical knowledge. To ensure Colorado has a quality teacher workforce so *every* child has a high quality teacher, policy attention should be focused on the following aspects of teacher quality: increasing the diversity of the teacher workforce, preparing teachers for diverse learners, enhancing teacher working conditions, and developing a systemic view of teacher learning and development, from pre-service to induction to continuing professional development.



## Teacher Licensure in Colorado

In Colorado, a classroom teacher may hold one of the following *licenses or authorizations*: initial teaching license, alternative teaching license, teacher-in-residence authorization, or professional license. An *endorsement* is the designation on a license that reflects the teacher's major area of specialization. So, a new high school math teacher may hold an initial teaching license with an endorsement in mathematics education. Some endorsements, such as reading teacher, are advanced and may only be earned after a teacher has an initial teaching license in a particular area.

**INITIAL TEACHING LICENSE:** An initial teaching license is valid for three years and is issued to an individual who holds a Bachelor's degree and who has completed an approved teacher preparation program at an accepted institution of higher education. Approved teacher preparation programs must demonstrate a comprehensive admission system, a system for ongoing screening and counseling of teacher candidates, course work and field-based training that integrates theory and practice that prepares candidates to teach the content defined in the state model content standards, a curriculum that ensures each candidate completes a minimum of 800 hours of supervised field-based experiences, a comprehensive assessment system including evaluation of each teacher candidate's subject matter and professional knowledge and ability to satisfy all Performance-based Standards for Colorado Teachers<sup>13</sup>.

**ALTERNATIVE TEACHING LICENSE:** An alternative teacher license is valid for one year and authorizes the individual to be employed only as an alternatively-licensed teacher in an approved alternative teacher preparation program. The individual must have a bachelor's degree, have passed the licensure test for his/her teaching assignment, and have met content area requirements for his/her endorsement area. Once the individual has completed an approved alternative licensure program, s/he is eligible for an initial teacher license.

**TEACHER-IN-RESIDENCE AUTHORIZATION.** A teacher-in-residence authorization is valid for two years and authorizes an individual to be employed exclusively as a teacher-in-residence in an approved teacher-in-residence program. The individual must have a bachelor's degree, have passed the licensure test for his/her teaching assignment, and have met content area requirements for his/her endorsement area. Once the individual has completed an approved alternative licensure program, s/he is eligible for a professional teacher license.

**PROFESSIONAL TEACHING LICENSE:** A professional teaching license is valid for five years. To be eligible, an individual must hold an initial teaching license and have successfully completed an approved induction program. Out of state applicants may be exempt from induction if they have three or more years of continuous, successful, evaluated experience as a teacher.

To review the Rules & Regulations adopted by the State Board of Education that govern educator licensure, please see the following website: <http://www.sos.state.co.us/CCR/NumericalSubDocList.do?deptID=4&deptName=300Education&agencyID=109&agencyName=301%20Colorado%20State%20Board%20of%20Education&ccrDocID=2044&ccrDocName=1%20CCR%2030137%20RULES%20FOR%20THE%20ADMINISTRATION%20OF%20THE%20EDUCAT>

<sup>13</sup>[http://www.cde.state.co.us/cdeprof/download/pdf/li\\_perfbasedstandards.pdf](http://www.cde.state.co.us/cdeprof/download/pdf/li_perfbasedstandards.pdf)



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